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Tackling the Millennium Development Goals: Reducing the Gender Disparity in Primary and Secondary Education in India

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Abstract- The paper makes an attempt to explain the aim of the Millennium Development Goals (MDGs): to eliminate gender disparity in primary and secondary education to be achieved by 2015, with special emphasis on girls' position. The Challenge of the Millennium Development Goals was to provide children with access to primary education either through formal or informal systems, and to reduce differences in enrolment, drop out rates and mainstream a gender perspective in the development process. Special measures needed to be adopted to eradicate discrimination at the primary and secondary stages, universalization of education and creation of a gender sensitive education system.

Index Terms- Girls' Education, Disparity, Gender Status, MDGs, India

I. INTRODUCTION

India has failed to provide universalization of education as it remains under the stranglehold of major stratifications leading to discrimination. Early marriage, social prejudices and absence of educational infrastructure have led to 60 million girl children lacking access to primary education and the gender gap remains a problem with the country. The Indian government having expressed a strong commitment towards Education for All, but still projects one of the lowest female literacy rates in Asia as there are almost 300 million illiterate women in India. Gender disparities persist, as social and legal institutions do not guarantee women equality in basic human rights. It is a major area of concern at the school level and the literacy question remains the largest juggernaut in the Indian management of education.

To set right the imbalance of relationship in a male centered and dominated society, education and economic independence is imperative. Quantitative and qualitative evidence reflects acute gender bias, confirming discrimination in educational status. Women's ability for independent thinking and her participation at par with men will confirm Gender Equality and comply with the targets of the Millennium Development Goals. The Indian Government needs to identify those geographical locations and culture patterns contributing towards gender disparity in education. The gap between male and female literacy is a sensitive indicator of social discrimination.

II. OBJECTIVES OF THE STUDY

1. To locate the gaps and possibilities in girls' education;

2. To establish the link existing between education and women's quality of life;
3. To propose and execute policy measures to enhance girls' education at all levels.

III. METHODOLOGY

The present study is based on secondary data collection. The secondary data was collected by various published sources like Census Reports, MHRD Report, Books, Journal, Magazine, etc. The findings were discussed in the light of published literature

IV. GENDER DISPARITY IN PRIMARY AND SECONDARY EDUCATION

Extensive surveys and research findings highlighted the crucial factors of gender disparity in primary and secondary education. It was found that girls from lower economic strata remained outside school, helping their parents in domestic work. They left school at 8/9 years to look after siblings while the boys continued with their schooling. Labour in the agricultural fields and non-availability of nutritious food led to malnutrition, resulting in long stretches of sickness and absenteeism from school. Marriage and frequent child birth resulted in high mortality rate amongst school age girls. With National Policies and Education Commissions coming into execution, in the age group of 6-11 boys' enrolment rose sharply from 1987 to the 1990s but the corresponding figures for girls were still dismal. Even though the general education status of children rose up to 71% in 2005-2006, the flip side shows that, years after the first deadline to make education universal for every child, this remains a distant dream, something all the more true for girls. The accepted notion is that a son's education is imperative for a job, whereas a girl will obviously get married and be bound to stereotyped domesticated roles and functions. The improvement status from 1990 was negligible for girls' education. For every 125 enrolled at the primary level, 80% dropped out before reaching class V, a further 1/3rd dropped out before reaching class VIII, and a paltry figure of 10-12% completes schooling. The National Sample Survey on Status of Education in India (2005) showed that 50% in rural India, and 20% in urban India do not have even one literate girl child in their families above the age of 15. Economists confirm a direct relationship between family income and the expenses towards girls' education. Census figures projected during 1991-2001 (Selected Educational Statistics Primary Education 1999-2001 MHRD, Govt. of India) show male literacy to be 63.86% and 75.85% against female literacy of 39.42% and 54.16%. Out of 13,459,734 dropouts from

Secondary schooling, 6.08% are males and 7.98% are females. India enters her new Millennium with two thirds of women still illiterate despite the commitment to eradicate girls' illiteracy by 2005. Educational Statistics of 2005-2006 show the overall gender gap and the low enrolment as late as 1996 to 2005.

- d) Awarding of scholarships which serve as compensation to parents should be given. This will ensure reduction of wastage and stagnation.
- e) Incentives to women teachers in the form of facilities and infrastructure support to be provided.

Table 1: % of Enrolment in Primary and Secondary Stage (1997-2005)

Year	Primary Education		Secondary Education	
	Boys	Girls	Boys	Girls
1997-98	62.3	48.0	23.6	15.9
1998-99	62.7	48.2	24.0	16.3
1999-00	64.1	49.5	25.1	17.1
2001-02	63.6	50.3	26.1	18.7
2002-03	65.4	52.1	28.2	21.2
2004-05	68.2	56.5	32.5	23.6

Source: MHRD, Dept. of Education, GOI

Though primary and secondary enrolment has increased in many regions, India witnesses an alarming statistics of out-of-school children who have not had the chance to enroll, owing primarily to factors like negligence or poverty on the part of their parents. The policy makers attribute the ignorance and apathy of the parents to absence of exposure through televised and printed media, more especially in the rural and remote parts of the country. The National Commission for Women, considering it to be their responsibility, have introduced measures of dissemination of information regarding the need to educate the girl child for national, social and global progress. First generation educated children hardly received any educational or moral support from their parents to continue. The mindset transformation of the parents has become a Herculean task for the policy makers as the rigid confirmation of girls' accepted status is firmly embedded in an understanding system where the Millennium Development Goals will find it difficult to uproot the existing and introduce the new. For this reason, apart from sudden discontinuation of education, the country is also losing girl children who would definitely be assets.

Considering the deplorable condition of girls' education, the Government of India has suggested some valid measures-amongst others:

- a) To study the problems of women's education by a system of survey and data by the institutes of Education in different States and coordinated at the National Level.
- b) A target of a primary school within walking distance of a child's home.
- c) Public opinion in favour of girls' education to be generated.

V. MDGs: PROMISES, FAILURES AND CHALLENGES

The present era is one of meeting challenges and seeking equal opportunities, the future will be women's rendering of writing her own history, the geography of her personal and public sphere, the sociology of her status, the culture of the quality of her life and her educational attainments. The Millennium agenda is both visionary and pragmatic in reducing poverty and universalizing education as connected to the well being of the children. In April 1990, The World Conference on Education for All in Jomtein identified improving access to quality education for girls and women as a 'most urgent priority'. At the Dakar World Education Forum in April 2000, participants from 164 countries reaffirmed their commitment to ensuring education of all children. The Millennium Summit of 2000 gave birth to the MDGs, upholding and stressing the importance of gender equality. The aims of the Millennium Development Goals include: To Promote Gender Equality and Empower Women; To achieve universal primary education; To eradicate extreme hunger and poverty. Freedom, equality, solidarity, tolerance and respect for humanity became the pillars of the MDGs to be achieved by 2015, with special emphasis on girls' position. The Challenge of the Millennium Development Goals was to provide children with access to primary education either through formal or informal systems, and to reduce differences in enrolment, drop out rates and mainstream a gender perspective in the development process. Special measures needed to be adopted to eradicate discrimination at the primary and secondary stages, universalization of education and creation of a gender sensitive education system.

In 2002, the MDG Roadmap presented to the General Assembly showed that out of 113 million children not going to school, 68 million were girls. Gender equality became a global agenda in the 21st century. In India, despite all the promises of the MDGs, 46% of general class and 86% of scheduled caste women are illiterate, 81.2% girls engaged in agriculture and domestic chores according to the drop out rate from 1990-2001. According to Selected Educational Statistics (2002-2003) the drop out rate has reduced from 78.3% in 1960-61 to 52.8% in 2002-03, but that still does not justify universalization of education as girl child status is still demoralizing, as the 2011 census shows the literacy rate for women being 65.5% as against 82.1% for men.

Table2: Drop-Out Rate for Girls at Primary and Lower Secondary Stage (1990-2005)

Year	Primary (I-V)			Lower Secondary (VI-VIII)		
	Boys	Girls	Total	Boys	Girls	Total
1990-91	40.1	46.0	42.6	59.1	65.0	60.9

1999-00	38.7	42.3	40.3	51.9	58.0	54.5
2000-01	NA	41.9	40.7	NA	57.0	53.7
2002-03	35.8	33.7	34.8	50.3	53.4	52.8
2004-05	31.9	25.4	29.0	50.5	51.2	50.8

Source: MHRD, Dept. of Education, GOI

Recognizing girl's education as the most sensitive index of social and national development, the MDGs felt that for sustainable development, social justice needed to be guaranteed by sanctioning gender sensitive education and the mainstreaming of girls' education within national education systems. India, agreeing in the EFA declaration, promised to undertake policies for universal retention by 2010 and elementary and secondary gender free education by 2015.

VI. POLICY IMPLICATIONS

India's administrative measures listed plans to accelerate equality and justice in imparting gender free education. The First Five Year Plan (1951-56) held that 'women have the same opportunities as men for taking all kinds of work, and this presupposes that they get equal facilities, so their entry into the professions and public services is in no way prejudiced'. The Second, Third and Fourth Five Year Plans (1956-1961; 1966-1969; 1969-1974) considered the need for increasing the proportion of women into secondary and higher education. The Fifth Year Plan (1974-1979) prioritized free and compulsory education along with free uniforms, books and scholarship as incentives. The Sixth Year Plan (1980-1985) emphasized the need of universalization of elementary education by promoting Balwadis to the girl child. In the Seventh and Eighth Five Year Plan (1986-1991 and 1992-1997), flexible school times to help girls were introduced. The National Policy on Education undertook redesigning curricula and textbooks to suit the girl child and eradication of illiteracy, strengthening vocational education and relating it to the needs of emerging urban and rural settings. Hundred percent central grants were disbursed to set up Non-Formal Education Centres for girls. The Ninth Year Plan (1997-2002) conceptualized Empowerment of Women by converging existing services available in both women-specific and women-related sectors.

The Tenth Plan (2002-2007) witnessed the Government embarking on strategies to reduce the gender divide in primary and secondary education by setting the goal of 'Education for Women's Equality' as advocated in the National Policy of Education. Yet, in spite of all this the 2005-2006 census projects the retention for girls in the primary and secondary level to be 47% and 46% against 52% for boys respectively. Quantitative and qualitative strategies through enrolment and retention and through substantive contents and teaching methods were adopted to help girls' achievement. Voluntary agencies and The Integrated Child Development Programme have made plans for furtherance of education. The NGO, Community Welfare Centres, complements girls' education with scholarships, and makes available pre - school education for girls. Girls belonging to the segment of disabled, ethnic minorities, or underprivileged are brought under the scheme of Inclusive Education in (2006-07).

The Mahila Samakhya and the Sarva Shiksha Abhiyan (SSA) plan to provide quality education for girls between 6-14 years has increased the literacy rate of girls from 15.35% in 1971 to 54.16% in 2001. In the past two decades, women's participation in primary, middle and secondary level has increased considerably. The District Primary Education Programme (DPEP) of the Central Government has reduced drop out rates to less than 10% and reduced gender gaps to less than 5%. One of the main objectives of the Sarva Shiksha Abhiyan (2001) is to bridge gender gaps in primary and secondary education by 2010. Since even after secondary education girls may not continue, 'Extension Education', a policy providing job related knowledge, was introduced for those unable to proceed with formal secondary level. The National Literacy Mission (NLM) was set up in 1988 aimed to mobilize drop outs, introduce mass and functional literacy and involve the community in educating women to the Secondary level.

The Siksha Karmi (1987) sees education as a challenge in the extremely low literary blocks. At the grass root level it works through the Panchayat Samities and the village communities to ensure enrolment and retention of the girl child in the primary level. The Saraswati Yojana (1995) focuses on local women who have passed class VIII, for them to be given training and financial assistance to run courtyard schools in their homes. The Lok Jumbish project has set up Women's Education Centres and the Women Teachers' Forum to provide gender training to teachers to handle women of the backward and poor areas.

Table3: % of Rural-Urban Literacy Rate (1991-2011)

Population	2001			2011		
	Male	Female	Total	Male	Female	Total
Rural	71.4	46.7	59.4	78.6	58.8	68.9
Urban	86.7	73.2	80.3	89.7	79.9	85.0
Total	75.8	54.2	65.4	82.1	65.5	74.0

Source: Census of India, 2001 & 2011

The government's policy measures have helped raise the female literacy rate from 54.2% in 2001 to 65.5% in 2011, reducing the gender gap from 21.7% in 2001 to 16.6% in 2011. Additional investments for promotion of girls' education in 1064 clusters of 58 educationally backward blocks in 10 districts were set up. 59 residential schools for girls at primary and secondary level with 75% seats for minorities and other backward classes were organized in the 2006-07 Scheme. In 1995, The Mid-Day Meals Scheme was launched to boost the lower secondary and universalization of primary education by impacting upon attendance, retention and nutritional needs of children. Even with all these policies, the goals of MDGs are not fully realized when records project that 70.38% girls are child labourers with no schooling, 27.33% girls suffer from malnutrition and 70% are victims of child abuse. The Censuses of 2001 and 2011 clearly project the existence of gender disparity in the Urban versus Rural scenario, which if not dealt with by measures of control will contribute to the failure of the Millennium Development Goals.

VII. PROBABLE STRATEGIES FOR EFFECTIVE DEVELOPMENT

If education indicates national development it must also address and incorporate gender free education. The core issue for achieving Education for All is the critical issue of access and equity. It is now globally recognized that 5-8 years of education is imperative to control illiteracy and poverty. The World Bank supports educational projects like Alternate and Transitional Schools for different social groups. In India, the schools supply factors and Government intervention must be strengthened without any compromise to achieve comprehensive growth, better female conditions and strive to make The Millennium Development Goals successful. There is a need:

- a) To educate women for empowerment and poverty alleviation.
- b) To nurture communication between ministries to create new mechanisms, maximize the present potentials and foster a cohesive gender responsive approach.
- c) To build gender aware expertise, concurrent programmes, budget and assist managers in planning, implementing and monitoring the process.
- d) To ensure a synergistic partnership between formal and non - formal education.
- e) To promote public dialogue on the virtues of girls' education.
- f) To increase the time slot in television media for programmes related to education and awareness.
- g) To orientate the educational system to serve the objectives of equality for women and their empowerment.
- h) To intervene to provide equal educational opportunity to women and girls belonging to lower, ethnic and poorest section of the society.
- i) To teach society to value girls' education.
- j) To plan budgetary support from the Central and the State Government towards primary and secondary education.

The gender disparity at Secondary and Tertiary stages is mainly due to the existing gender bias at the entry stage to an educational institution. There has been a noticeable high enrolment and decline in the drop out rate from 1998 onwards, though girls' privilege of being educated is still 50% less than the boys. Girls' enrolment rise in the primary level has been from 28.1% to 43.7%, middle school from 16.1% to 40.9% and secondary from 13.30 to 38.6% (Source: Statistical Year Book and Census of India: 2001). The challenge of the Millennium is to rectify the socio-economic factors leading to girls drop out and achieve their subsequent retention to the final year of the primary stage by setting up an increased outreach of both formal and non-formal variety of schooling systems. Interaction between education trusts and enlightened founders can assist to develop teaching-training and need based research institutes to invite and increase girls' educational participation.

VIII. CONCLUSION

Massive educational deprivation of the girl child is a reality. It is crucial in regions where stubborn social norms of caste and patriarchy, along with poor governance, are rampant. The exclusivist state policy of control over curriculum choices, misappropriation of funds, non-implementation of education

incentives and ideologically driven reforms and pedagogy are significant contributive factors. Education must be used as an agent of basic changes in the status of women. Education, being a public good, must include principles of non-discrimination, equity and justice. It cannot be a commodity for sale to those who can afford it. It must be an entitlement and a right that is guaranteed by the state. It should be visualized as a milestone for women's development, leading to National Development, enabling women to respond to challenges to secure better lives for them and for their children. These realities cannot be disassociated from the planning and implementation of educational policies. Therefore, in the absence of constructive, objective and progressive legislative reforms, which are mutually articulate and consistent, and can effectively address these facts and realities, the Goal of Millennium Development would remain an illusion. India is poised to become a super power; a developed country by 2020, and this aspect must be supported by ensuring universalized gender-free education. The UNDP (United Nations Development Programme) targets, through its MDGs, sustainable development of a country by eradicating hunger, poverty, child mortality, HIV/AIDS. All these aims require universalization of education.

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Space Time Equivalence-A New Concept

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Abstract- 'Heart of the God model of cosmology' says that the four dimensional 'space -time' is like a fluid of density $4.776335 \times 10^{60} \text{ Kg/m}^3$. The paper entitled 'New cosmological constants' introduced the "Siva's constant-K" with a value 2.0275×10^2 sqmt/sec. Combined analysis of both the concepts concluded that space and time are interchangeable and quantitatively 't' seconds of time can be converted in to a space with a radius of $\sqrt{(4\pi t^3)}$ meters. This physical concept is use full for physicists, cosmologists and researchers working on Grand Unification Theories and Consciousness research.

Index Terms- Cosmology, Double Relativity Effect, Film theory of universe, Heart of God space, Siva's Constant time

I. INTRODUCTION

This article elaborates a new scientific concept step by step introduction of 'Heart of God model of the universe' and Siva's Constant 'K' which are the sources to build this new concept.

Further analysis of space time with expanding universe theory and with the application of 'Double Relativity', 'Film theory of the Universe' [2] has been introduced. 'Film theory of the Universe' is a model which elaborates 'space-time' and path of each point of this expanding universe with time. It says that the universe is made-up of several films which will change for every 7.68×10^{44} seconds [2]. Thus continuity will be maintained in this universe. All the events of this universe are the consequence of this change of film just like a movie in which films will change for every 16 seconds.

With the help of this 'Film theory' and 'Double Relativity', four dimensional space time has been defined as a three dimensional fluid with certain density. The visible matter in this universe is floating on the surface of that fluid. The two dimensional surface area of the three dimensional 'space time fluid' is the three-dimensional space of this universe.

With the help of above concepts, the 'The Heart of the God model of the universe' [1] has been introduced. It elaborated concepts of space and time much more profoundly. Thus it avoided the singularity problem of 'Big Bang' theory and agreed with the Big Bang in such a way that the Big Bang is a part of the 'Steady State Theory'.

The model says-"Four dimensional 'space- time', is like a three-dimensional fluid of this universe. It is in almost spherical shape. It is existed as it is. It has no beginning or no ending. It fluctuates for every 7.68×10^{44} sec. [1] In each fluctuation, it creates matter. Means, pumps the matter in to this universe. It is similar to a human heart which fluctuates 72 times every minute

to pump the blood. So this is called as "Heart of the God" The density of the matter it pumps is constant. The calculation of density of matter distributed is almost equal to the results of 'Steady State Theory'. According to this theory, the matter distribution is in order of $4.54 \times 10^{42} \text{ kg/cum/sec}$.

With the help of equations mentioned in the concept 'Double Relativity Effect' [2] the value of Siva's constant 'K'[3] has been calculated as 1.164135058×10^2 sqmt/sec. Later it is revised as 2.0275×10^2 sqmt/sec. The conceptual conclusion shows that the theoretical value of Hubble's constant is $5.2225746 \times 10^{-20}/\text{sec}$. The mass of the universe has been calculated as $6.448233042 \times 10^{48}$ kgs.

II. SPACE TIME EQUIVALENCE CONCEPT

As per 'Heart of the God model'- the density of space time fluid is $4.776335 \times 10^{60} \text{ Kg/m}^3$

As per new cosmological constants Siva's constant 'K' is 2.0275×10^2 sqmt/sec.

As per the definition of HEART OF GOD Model the surface area of the space time fluid is equal to the three-dimensional space of the universe.

The radius will not change but the surface area changes.

In 'Heart of God model' the surface area is changing and must obey Siva's constant.

Means, if time changes, surface area will change and three-dimensional space of universe changes.

But as per 'Heart of God model' the space time fluid is constant in size.

It existed as it is. It will not change its size. So, we can say that the increment in surface area is decreasing its radius such that the total size is constant.

Increment in surface area of 'Heart of God' is expansion of space. But decrement in radius?

We know that the space time fluid is made up of space and time only. One substance is space that is increasing .so definitely the other substance is time only. This must have to decrease to compensate the other.

Thus the substance space is converting in to time and vice versa. Total space time fluid remains same.

Quantitatively-

Siva's constant 'K' is 2.0275×10^2 sqmt/sec
and 'r' is radius of 'Heart of God'.

Its surface area = $4\pi r^2$

As per theory, surface area is nothing but three dimensional space .

The formula $Vd = K$ defined for three dimensional space only.
Where -'V' is the velocity of a point from any point in space at a distance 'd'. And the direction is towards that point.

So $Vd = K \Rightarrow (d/t)d = K$ -- For particular film of the universe.
Therefore $d^2/t = K$

Let us suppose, this time is 't_s' as defined by our conventional space.

So the equation can be written as $d^2/t_s = K$

Hear both 'd' and 't' are defined by our conventional world.

As per theory -
The surface area of 'Heart of God' = $4\pi r^2 = K$
 $\Rightarrow 4\pi r^2 = K$ Where 'r' is radius of 'Heart the God'

Let us substitute 'd' as defined by our conventional space with 'r' of Heart of God

Therefore $4\pi d^2 = d^2/t$

Here the surface area is increasing means- $4\pi d^2$ is increasing.
But 'd' should not increase. It is converting in to time.

To satisfy this, suppose 'd' = t_H and t_H is increasing to compensate "increment in $4\pi d^2$ "

The equation can be written as $4\pi t_H^2 = d^2/t_s$

Therefore $t_H^2 \cdot t_s = d^2/4\pi$

Now we can not define two different times for "Heart of God(t_H)" and "our conventional space-time(t_s)"

So, let us say t_H = t_s = t

$t_H^2 \cdot t_s = d^2/4\pi$
 $\Rightarrow d^2 = 4\pi t^3$

Therefore $d = \sqrt{(4\pi t^3)}$

Thus Quantitatively 't' seconds of time can be converted in to a space (spherical shape)with a radius of 'd' meters equivalent to $\sqrt{(4\pi t^3)}$.

CONCLUSIONS

1. Space is a substance .Time is a substance. Space-time is a fluid with density 4.776335×10^{60} Kg/m³
2. Space and time can be converted in to one another forms.

3. Quantitatively 't' seconds of time can be converted in to a space (spherical shape) with a radius of 'd' meters equivalent to $\sqrt{(4\pi t^3)}$.
4. This result will be useful for researchers working in the area of Grand unification and consciousness.

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Ecofeminism in Margaret Atwood's *Surfacing*

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Abstract- The most important problem that man faces today is the degradation of land and environment and its consequences on human existence. In this context the term Ecofeminism becomes highly relevant. This paper attempts to take an in-depth study of Margaret Atwood's *Surfacing* (1972) from an ecofeminist perspective. Within this text, power and domination, directly oppress both the feminine world and the natural world. The nameless protagonist of the story is an ecofeminist who returns to the undeveloped island, Northern Quebec, where she grew up, to search for her missing father. The protagonist realizes the gap between her natural self and her artificial construct only when she encounters nature. The ecofeminist impact is seen implicit in the novel by the protagonist's return to the natural world. Her association with nature raises her consciousness of victimization of women. Like a true ecologist, she makes the earth her literal home for she knows that in the natural world all life is interrelated, teeming with diversity and complexity. Since the novel introduces issue pertaining to feminism and environmentalism, the novel constitutes a representative literary example of ecological feminism. Even the language, events and characters in this novel reflect a world that oppresses and dominates both femininity and nature.

Index Terms- Domination, Ecofeminism, Femininity, Nature, Patriarchy.

I. RESEARCH

"I am not an animal or a tree, I am the thing in which the trees and animals move and grow, I am a place."
- (*Surfacing*, 236)

Ecofeminism suggests that an end to the oppression of women is bound up with ecological values, and that women should be centrally concerned with ending the exploitation of the ecosystem (Collard, 1988). Ecofeminism has been particularly strong within radical feminism and within the Green Movement.

- Collins Dictionary of Sociology

The most important problem that man faces today is the degradation of land and environment and its consequences on human existence. In this context the term Ecofeminism becomes highly relevant. Ecofeminism is a new way of approaching nature. According to Andy Smith ecofeminists are "mostly concerned about the oppression of women and the oppression of earth." They believe that the domination of women over the years is directly connected to the environmental rape of our planet. Thus, issues of power, domination and subordination are very vital to ecofeminism. As the term suggests, it is a combination of ecology and feminism. According to Greta Gaard, "Ecofeminism's basic premise is that the ideology, which authorizes oppressions such as those based on race, class, gender, sexuality and physical abilities, is the same ideology which sanctions the oppression of nature. Ecofeminist theorists consider the interconnections between sexism, the domination of nature, racism, speciesism and other social inequalities."

This paper attempts to take an in-depth study of Margaret Atwood's *Surfacing* (1972) from an ecofeminist perspective. The Canadian writer has dealt with the issue of women and nature in many of her novels. The writing and publication of *Surfacing* coincides with the emergence of the feminist and ecological movements and obviously reflects the concerns of its time. Oppression of women in a male dominated society and exploitation of nature in a society having new developments in technology, are the major themes of her writings. Within this text, power and domination, directly oppress both the feminine world and the natural world.

The nameless protagonist of the story is an ecofeminist who returns to the undeveloped island, Northern Quebec, where she

grew up, to search for her missing father. The protagonist is a commercial artist and seems to have come back to her birthplace after many years. She is accompanied by her three friends - Anna, Joe and David. The story follows the protagonist's search for her father, which serves as a pretext for her search for her inner-self which is observed through her gradual submersion into nature and towards mystical vision. Her relationship with her lover and friend are played out alongside this search. Her relationship with her teacher, her attempt to abortion, which she now sees as murderous, shows her emotional and artistic death. She becomes a symbol for all those who are exploited and abused because of their powerlessness. At the end of the novel she realizes nature provides no identity, and she declares herself ready for motherhood and for reintegration into society. In this process, she unmasks the dualities and inconsistencies in both her personal life and her patriarchal society. Through the struggle to reclaim her identity and roots, the protagonist begins a psychological journey that leads her directly into the natural world.

The protagonist realizes the gap between her natural self and her artificial construct only when she encounters nature. While searching for her missing father in the wilderness and under the lake, she recognizes the extent to which nature has been victimized by the Americans. Her evolving awareness of herself as a 'victim' is parallel to this recognition. Men destroy nature and women just for their fun. The relationship between nature and men is relationship of exploitation. As the renowned ecofeminist Petra Kelly observes, "Women are sex toys for men, women's lives count less than those of men; women who assert their independence and power are in some way defective" (118). She realizes that as she has been violated, the sacredness of the Mother Earth is violated and the ecological unity, which means the independence of all species, is disturbed. Atwood shows man's misuse and woman's use of nature in *Surfacing*. The first sentence of the novel indicates the death of white birches:

I can't believe I'm on the same road again, twisting along past the lake where the white birches are dying, the disease is spreading up from the South, and I notice they now have sea-planes for hire. (*Surfacing*, 3)

II

The dying of birches in *Surfacing* is seen as a disease resulting from technological expansionism which Atwood equates with 'Americanism'. The narrator's sympathy for dying birches symbolizing nature is taken as a Canadian trait and this is contrasted with the two Americans who cruelly killed the heron. But they turned out to be Canadians. This prompted Atwood to say that, 'if you look like them and think like them then you are them' (*Surfacing*, 165).

The nameless protagonist finds a reflection of her own tragedy in the Quebec landscape. She expresses a deep concern for nature and helps the readers understand the women-nature connection. In the course of her homeward journey she discovers that "nothing is the same. I don't know the way anymore." (*Surfacing*, 10) She has been alienated from the landscape of her country, for the 'Old road' has been closed for years and what she needs is 'the new one' but she does not 'know the way anymore'. Throughout the novel Atwood reminds the readers that ecological destruction pervades the setting whether it is to control the dam or the destruction of older trees: "The trees will never be allowed to grow tall again, they're killed as soon as they're valuable, big trees are scarce as whale." (55)

Fishing in the lake is a metaphor which suggests entrapment. Soon, the female protagonist realizes that in her capacity for evil, she herself has not been different from them. The illusion of her childhood innocence shatters and she recalls a childhood game - the stabbing of the doll - which actually foreshadowed her abortion. The novel reminds the readers of the differences between natural predation and the hunting done by the man which is done for the excitement of killing. This contributes to the alienation of modern man from the natural world. As Vandana Shiva points out, it is not hunting which leads to a violent relationship with nature: "it is the elevation of hunting to the level of ideology which does so" (*Staying Alive*, 50). The narrator draws attention to at least two such acts of meaningless killing: the shooting of the heron and the explosions made at the lake by Americans who come for fishing. Increasingly, the narrator feels herself hurt by whatever harms she sees done to the

environment, including animals. She is disgusted by Joe and David's filming of the fish's inards. She does not want to kill the fish herself, the second time: "I couldn't anymore, I had no right to, we don't need it, our proper food was tin cans. We were committing this act, this act. Violation, for pleasure, recreation they call it." (*Surfacing*, 153). The word re-creation has been ironically used here. Then she releases the frogs into the lake and this, in turn, triggers off memories relating to the release of the frogs bottled by her brother. His subsequent anger constitutes her first lesson in patriarchal pressure. The aborted child is also recalled as a bottled frog. Her childhood drawings consist of 'rabbits with their colored egg-houses'- and all that is "normal and green" (116). This is in contrast to her brother's drawings of war and death and as a grown up his profession is one that involves violating the earth.

The relationship of Anna and David is full of tensions and imbalance. David acts as the all-powerful and dominating male character and tries to humiliate Anna. As Bouson says, through David, '*Surfacing* draws attention to the oppression of women in a male-defined order of hierarchical and oppositional roles that empower men at the expense of women.' Like nature, the female body is also seen as a resource to be colonized and commercialized. Anna, running to the lake, naked and sand-covered reminds the female protagonist of burnt leeches crawling to the lake, a part of her childhood game. During the lake scene in which David forces Anna to strip off her clothes for the movie *Random Samples*, he refers to her as, "darling. . . a good girl. . . twatface" and desires to put her picture, "in beside the dead bird" (172-73). He succeeds in taking her nude photographs. Here Anna is described in animal terms and this naturalizing of women shows that in patriarchal culture women are also seen as inferior to men as animals. Her first protest against the patriarchy which structures upon the market value of female body is symbolically expressed through the destroy of the camera films. David's camera has raped Anna's female image, it has forever entrapped her distorted self within its luminous lens. The camera is used as a phallic symbol, representing the male power over the female body. So, it acts upon Anna like a "bazooka or a strange instrument of torture." (173)

Some of the animal victims in the novel invite comparison with women as victims. David wants Anna to pose naked beside the dead heron. She is also compared to a tree in this episode. David's joke about the split beaver (128), and the fact that the beaver is the national emblem of Canada, fuses the victim status of the beaver, of women and of Canada. The beaver, as Linda Hutcheon tells, was an appealing lure to European fur traders and colonizers first, and then to American capital. The beaver image has connotations of pornographic reductions of women and also of Canada's history as a land raped and colonized by England and then by the US. The Moose family at the gas station highlights the commercial exploitation of a sentimental domestication of nature. The narrator's first lover uses photographs of his wife and children: "his stuffed and mounted family" to make her abort her child.

The narrator's self-image of animal victim is first indicated when the boys tie her to the tree in school and forget to release her. She feels she becomes an "escape artist of sorts, expert at undoing knots" (88). As an escape artist her escape route lies in thinking of herself as a victim and to take recourse to detachment and flight. She seeks her liberation through a regression to primitiveness which involves total immersion in environment to the extent of living like a wild animal. In her vision significantly, her mother turns into a jay and her father into a fish-like creature. The ecofeminist impact is seen implicit in the novel by the protagonist's return to the natural world. Before her "surfacing" takes place, she undergoes an extensive change in perception and as a result learns to embrace the natural world, healing herself in the process. She experiences the oppression and domination of male world lacking the strength to fight for her survival and passively consents to abort her child. The unnatural act of her abortion shows the empowering and dominating nature of her ex-lover:

[The unborn child] was my husband's, he imposed it on me, all the time it was growing in me I felt like an incubator. He measured everything he would let me eat, he was feeding it to me, he wanted a replica of himself. (39)

The abortion itself illustrates the ecofeminist thought that, “the implications of a culture based on the devaluation of life giving and the celebration of life taking are profound for ecology and for women.” Her ex-lover feels no emotional attachment with the child, for him it is, “simple like getting a wart removed. He said it wasn’t a person, only an animal.” (185)

Atwood emphasizes the fact that men exploit the bodies of women for their needs. They even control the process of childbirth which nature has assigned only to women. The protagonist also questions the excessive use of reproductive technologies. The modern techniques, in the guise of assisting woman, rob her of the ability to sense her bodily rhythms. Hence, she does not want the child to be taken out with a fork, “like a pickle out of a pickle jar” (101). The effect of the fertility controlling pills upon the protagonist’s eye, that is, of blurring her vision, also becomes significant in this context.

The novelist has made an attempt to create an emphatic relationship between the wounded self of the unnamed protagonist and the damaged landscape of the island near the border country in Quebec. Her journey to Quebec with her three friends made her see into the life of things and in the process she gets away from all- her friends as well as the American-Canadians who indulge in senseless cruelty to birds, trees and fish. Atwood writes:

At the midway pond the heron was still there, hanging in the hot sunlight like something in a butcher’s window, desecrated, unredeemed. It smelled worse . . . the death of the heron was causeless, undiluted. (167)

She realizes though belatedly that no human being can help her in discovering her real self and, therefore, she turns to nature. Ironically enough it is only when she identifies herself with the damaged landscape that she discovers herself. She becomes part of the landscape but prior to this, she discards her marriage ring, her name and her seeming identity. In her healing process, the narrator begins to compare herself with the dead heron. The brutal and unnecessary murder of the heron presents a direct ecological parallel to the experience of the narrator. According to Rigney, “The protagonist sees the heron as symbolic of her own psychological death” (100). She feels the deep disgust towards

the killing of the bird and compares it with oppression and harassment of women. Women’s association with fertility and men’s with environment abuse serves as a metaphor of the violation of women by men:

Why had they strung it up like a lynch victim, why didn’t they just throw it away like the trash? To prove they could do it, they had the power to kill, otherwise, it was valueless. . . . the only relation they could have to a thing like that was to destroy.” (149)

After her abortion, the protagonist comes to develop deep sympathy for the flora and fauna and realizes that regeneration through nature is the only solution for her disintegration: “Human beings are not radically separate from nature; that the fulfillment of our humanity is profoundly linked with learning to appreciate the nature within us and without.” (43)

The power for destruction can be reconciled only with the power for creation. She gradually comes to feel that she herself has been anti-nature. She had tried to subvert nature by getting the foetus aborted. So, she must compensate for this anti-nature activity. So she decides to bear a child and allow the baby to grow as a natural human being in the most natural way.

This time I will do it myself . . . the baby will slip out easily as an egg, a kitten and I’ll lick it off and bite the cord, the blood returning to the ground where it belongs; the moon will be full, pulling. In the morning I will be able to see it, it will be covered with shining fur, as god, I will never teach it any words. (209)

When she links her own life with those of the other beings of nature, she is able to perceive the rhythm of nature—its cycle of life and death. She comes to feel that in order to be one with nature; she has to shed her clothes to become like the victim animals. She survives on mushrooms, plants and berries. She merges with the forest, descending even further to the level of plants. After linking her life with the natural things, she feels that her life has been totally changed. She feels:

Through the trees the sun glances; the swamp around me smoulders, energy of decay turning to growth, green fire. I remember the heron; by now it will be insects, frogs, fish and other herons. My body also changes, the

creature in me, plant-animal, sends out filaments in me,
I ferry it secure between death and life, I multiply. (217)
She becomes a plant, animal, earth and woman at the same moment; she becomes a natural woman who should be “A new kind of centerfold” (248). She dodges like an animal, blood swells within her body like cell sap and yet she remains as a natural woman with “eyes staring blue ice from the deep sockets” (248). She feels herself to be powerful, for she is natural, human and saintly at the same time. She is no more the same person whom one saw at the beginning of the novel. She understands the essential pain in the life of her parents and realizes that this is the only truth in her own life.

Withdrawing from civilization and turning to the bush wilderness surrounding her, the narrator literally immerses herself in the natural elements and merges with the non-human ‘other’ through a metamorphosis into a virtually pre-cultural or natural state, thus gradually dissolving the boundaries between herself and non-human nature: “I lean against a tree; I am a tree-leaning.” (Surfacing, 236)

Her association with nature raises her consciousness of victimization of women. When her feminine consciousness reaches its climax, the protagonist makes ready the ground for revolt against exploitation. She uses Joe to get her pregnant but refuses to get married to him, possibly as revenge upon her ex-lover who used her. The power struggle seems to have come to an end. She feels so confident about her own power and refuses to be a victim and says,

“This above, all, to refuse to be a victim”. (249)

She decides to stay back in Quebec and give birth to the ‘gold fish’ nurturing in her womb. She does not know whether the child in her womb is a male or a female child but has made up her mind to assert herself by allowing the foetus to grow. She says:

I cannot know yet; it’s too early. But I assume it: if I die it dies, if I starve it starves with me. It might be first one, the first true human; it must be born, allowed.
(Surfacing, 250)

With the protagonist’s determination to give birth to the child, the novelist has hinted that germination will take place implying

that both women and nature will be protected provided they defend themselves against the onslaught of men over them. She is quiet aware that men’s domination of women is deep and systematic. Many men and women think that it is something natural and accepted throughout the world. The oppression of women is so deeply embedded in our societies and our psyches as Petra Kelly observes, “Women suffer both from structural oppression and from individual men” (113). But the heroine would be different. She would not allow herself to be dominated by men. She is very well aware that “the ultimate result of unchecked, terminal patriarchy will be ecological catastrophe. . .” (Kelly, 118). That is why she becomes chummy with Joe (though he belongs to male caste), who according to her estimate is a profeminist man.

Like a true ecologist, she makes the earth her literal home for she knows that in the natural world all life is interrelated, teeming with diversity and complexity. She is not afraid of any one. There is no one to boss over her and violate her physique. She becomes one with her sacred Mother Earth. She throws away all her civilization as it is destroying the biosphere. She may recreate a culture that respects to seek harmony with nature. Those whom she has known are living in the city now, in a different time. She remembers her man, the “fake husband” for whom she now feels nothing but sorrow. She totally relies on Mother Earth. Gods are questionable to her; it includes even Jesus Christ who is to her “theoretical” (247). She is not prepared to rely on anyone, it includes even Joe. She gains absolute freedom now. Firmly rooted to the Earth like the original people several years ago, she, with an enormous contentment says, “The lake is quiet, the trees surround me, asking and giving nothing” (251).

Since the novel introduces issue pertaining to feminism and environmentalism, the novel constitutes a representative literary example of ecological feminism. Even the language, events and characters in this novel reflect a world that oppresses and dominates both femininity and nature. This actual journey is the surface meaning while the deep meaning lies in the journey of self-discovery and assertion of her individual identity. These two kinds of meanings links ecology with feminism and make the

novel an eco-feminist novel. However, she does not want to overturn patriarchy and replace it with women's dominance. She wants to transform nonviolently the structures of male dominance and restore a kind of balance and harmony between women and men.

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Comparative Implementation of Automatic Car Parking System with least distance parking space in Wireless Sensor Networks

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Abstract- Recently, with the rapid development of micro electronics technology, wireless communication technology and embedded system, the technology of wireless sensor network (WSN) has been advanced a lot. At the meanwhile, more and more producers and international organizers want to make the mote more intelligent and standard. Sensor Networks being considered as an emerging area of research in recent years has evolved in itself a large potential to counteract the ongoing system. By networking large numbers of tiny sensor motes, it is possible to obtain data about physical phenomena that was difficult or even sometimes impossible to obtain in conventional ways. Automatic multi-stored car parking system is very good substitute for car parking area. Since in modern world, where space has become a very big problem and in the era of miniaturization its become a very crucial necessity to avoid the wastage of space in modern, big companies and apartments etc. For example, in a space where more than 100 cars need to be parked, it's a very difficult task to do and also to reduce the wastage of area, this system can be used. This Automatic Car Parking enables the parking of vehicles-floor after floor and thus reducing the space used. Here any number of cars can be park according to requirement. These make the system modernized and even a space-saving one. This idea is developed using AVR Microcontroller. Here program is written according to this idea using AVR ATMEGA 16 microcontroller. This Automatic Car Parking enables the parking of vehicles-floor after floor and thus reducing the space used. Here any number of cars can be park according to requirement. These make the system modernized and evens a space-saving one. This idea is developed using AVR Microcontroller. Here program is written according to this idea using AVR ATMEGA 16 microcontroller. Mathematical modeling is also done to identify the least car parking space available among the difference parking places in a city. The car parking system is already developed with the 8051 microcontroller, we have implemented multistory car parking using AVR ATMEGA 16 microcontroller with Zigbee wireless transceiver module.

Index Terms- Alfa Vizad RISC (AVR) Microcontroller, Institute of Electrical and Electronics Engineering (IEEE), ZigBee module, Wireless sensor networks (WSN), Wireless personal area Network (WPAN).

I. INTRODUCTION

With the rapid proliferation of vehicle availability and usage in recent years, finding a vacant car parking space is becoming more and more difficult, resulting in a number of practical conflicts. Parking problems are becoming ubiquitous and ever growing at an alarming rate in every major city. Wide usage of wireless technologies with the recent advances in wireless applications for parking, manifests that digital data dissemination could be the key to solve emerging parking problems. Wireless Sensor Network (WSN) technologies have attracted increased attention and are rapidly emerging due to their enormous application potential in diverse fields [4]. This field is expected to provide an efficient and cost-effective solution to the effluent car parking problems. This paper proposes a Smart Parking System based on wireless sensor network technology which provides advanced features like automated guidance. The paper describes the overall system architecture of our embedded system from hardware to software implementation in the view point of sensor networks. This paper also shows that the pre existing security surveillance (CCTVs) will be used as a sensing nodes to identify vacant parking space. The captured image will be processed through the AVR Microcontroller and the processed data will be transmitted via ZigBee to a central computer to store and update the occupancy status of available parking space vacancies in the database. The performance of this WSN based system can effectively satisfy the needs and requirements of existing parking hassles thereby minimizing the time consumed to find vacant parking lot, real time information rendering, and smart reservation mechanisms. ZigBee [1,2] defines the higher layer communication protocols built on the IEEE 802.15.4 standards for LR-PANs. ZigBee is a simple, low cost, and low power wireless communication technology used in embedded applications. ZigBee devices can form mesh networks connecting hundreds to thousands of devices together. ZigBee devices use very little power and can operate on a cell battery for many years. There are three types of ZigBee devices: Zig Bee coordinator, ZigBee router, and ZigBee end device. Zig-Bee coordinator initiates network formation, stores information, and can bridge networks together. ZigBee routers link groups of devices together and provide multi hop communication across devices. ZigBee end device consists of the sensors, actuators, and controllers that collects data and

communicates only with the router or the coordinator. The ZigBee [3] standard is publicly available from June 2005. 2.1.1 IEEE 802.15.4 Protocol.

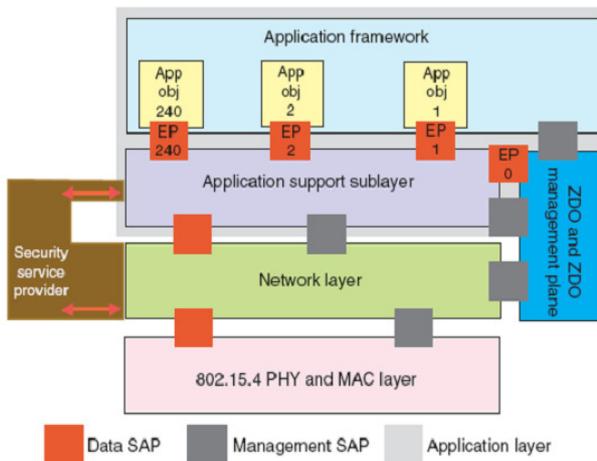


Figure 1: ZigBee Stack Layer [9]

The IEEE 802.15.4 is a part of the IEEE family of standards for the physical and link layers for Wireless Personal Area Networks (WPANs). The main focus of IEEE 802.15.4 is low data rate WPANs, with low complexity and low power consumption requirements. IEEE 802.15.4 uses device classification to reduce the complexity of the nodes. The standard classifies two types of devices to reduce complexity, a full function device (FFD) and a reduced function device (RFD). The RFD can only communicate with FFDs, but the FFD can communicate with both FFDs and RFDs. The IEEE 802.15.4 supports two Physical Layer (PHY) options. The 868/915MHz PHY known as low-band uses binary phase shift keying (BPSK) modulation whereas the 2.4 GHz PHY (high band) uses Offset Quadrature Phase Shift Keying (O-QPSK) modulation. The ZigBee network layer stack sits on top of IEEE 802.15.4 standard Medium Access Control (MAC) and PHY layers (refer to figure 1). The MAC and PHY layers contain the RF and communication components that communicate with other devices. The ZigBee stack contains the networking layer, an application support sub-layer and a security service provider (SSP) [8].

II. OLD CAR PARKING SYTEM

Old car parking system [18] was developed using 8051 microcontroller. It has the sections: Display section, Keyboard, indicator & Beeper section, Lift & motor section, Sensor section, LCD section. Program is written using 8051 microcontroller. Two 8255 IC's are connected to 8051. All circuits are interfaced with 8255. The display section displays the floor number along with the number of cars which has been already parked in that particular floor. So whenever a car is ready to either come down or go up, the program either decrements the count or increments the count automatically according to the going up or coming down of a car. Display section is done by interfacing with 8255(PPI) of 8051. Here 3 ports of 8255 are connected to three 7-segment display. Block diagram of this section is shown. 12

switches are connected in matrix form and it has three LED's, RED, GREEN & YELLOW. The person, needed to enter the password has to wait until the GREEN LED glows and when it glows, he has to press the "START" button first. This time the RED LED glows. Then the person has to enter the password. As soon as it is entered, the program checks it with the already stored passwords. If it is correct, YELLOW LED glows.

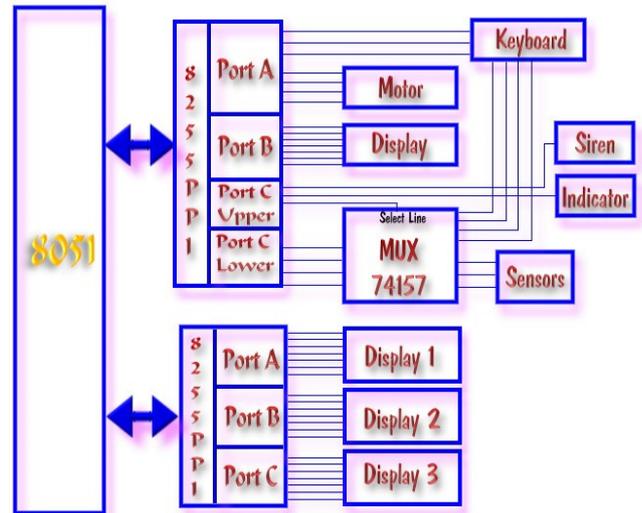


Figure 2 Car Parking System using 8051 Microcontroller

If the entered password is wrong, beeper starts beeping signifying the incorrectness of the password entered. The indicator section contains 2 LED's, RED & GREEN which are present in all the floors. RED LED signifies that the lift is presently busy and shall not entertain any car to enter but if GREEN LED glows, it suggests that the lift is ready and the car can enter the particular floor. Beeper and LED's are connected to port C upper of 8255. One more advantage of beeper is that; when a person tries to enter the lift irrespective of finding the display section to be FFF (means the floors are already filled), program sends a signal to Beeper section and it starts beeping indicating that he is not supposed to enter the lift since all the floors are already filled. In lift and motor section, there is a light beam and LDR to know whether a car has entered the lift or not. When the GREEN LED of indicator section glows, that means the lift is ready for the car to enter. When the car enters the lift, the light beam falls on LDR present in the lift gets cut and it gives a signal that a car has entered the lift. Then program decides which floor lift has to go and gives a signal to motor section. The motor section is a mechanical part of the model which is used for taking the lift up/down. When the lift has to go up, program gives the signal and the motor rotates clockwise and if it has to go down, it rotates anticlockwise. First 4 pins port A is connected to motor. Power transistors must be connected to drive the motor. Circuit diagram of this section is shown bellow. Sensor section contains LDR's. These LDR's are connected to each floor to give information if any car has to come down. When a person needs to come down from a particular floor to ground floor, he is expected to focus the headlight the car onto the LDR placed in that floor. When light

falls on LDR its resistance decreases. Hence IC 555 triggers and gives a signal. Program identifies that signal and gives a signal to motor section.

III. IMPLEMENTATION OF PARKING SYTEM USING ATMEGA 16

The implementation of automatic car parking system is shown in figure 3 which consists of the following parts.

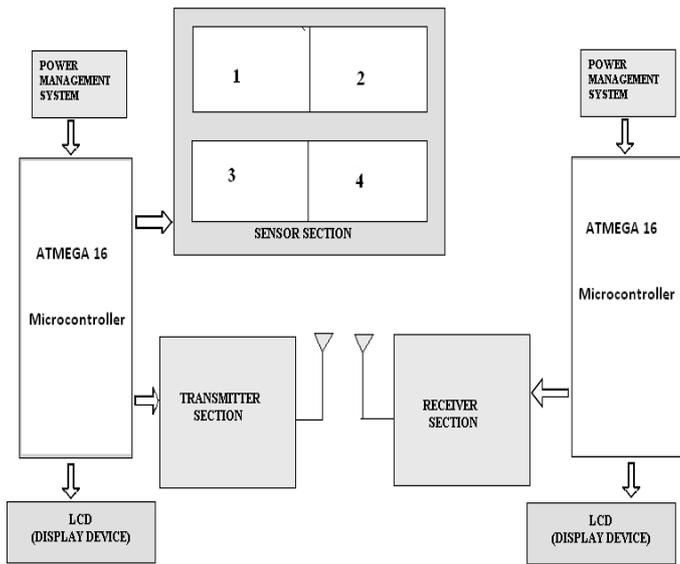


Figure 3 Automatic car parking system

ATMEGA-16 Microcontroller, LCD for Display system, Digital Sensors, Transmitter section, receiver section, Power supply management system. Power supply management system provides the 5V supply to the microcontroller. Digital sensor senses the cars and displays the corresponding floor information on the LCD display. Here are two LCD displays, one is for transmitter section and another is for receiver section. A display is provided at the ground floor which is basically a counter that displays number of cars in each floor. It informs whether the floors are fully filled with the cars or is it having place in a particular floor or not. There is facility of lift to carry the car to up and down. Movement of Lift is controlled by dc motor. In this project we have provided three floors of a building for car parking. Maximum storage capacity of each floor is given as ten. Storage capacity can be changed according to the requirement. When the lift reaches the first floor, the processor compares the filled amount to that of the already fed capacity of that floor, and if it finds that the first floor is fully filled, it goes to the second floor and thus the procedure stops here. As soon as a car is placed in a particular floor, the display counter at the ground floor increments as to indicate the floor capacity has decreased by one. After the lift places the car in a particular floor, it comes back to its normal position and that time, the motor that drives it, also stops.

IV. IMPLEMENTATION SCENERIOS

We have implemented the car parking for Ground floor to third floor. In the diagram the IR sensor is place by switch, 16 × 2 LCD display is used to display the information for Transmitter as well as Receiver. A lift mechanism is used in the implementation. If the status of Ground floor is full then lift moves towards first floor and returns to ground. Similarly if the first, second floors are full lift moves upward and returns to ground. A DC Motor is used for lift mechanism. ATMEGA 16 Microcontrollers works on the 5 V Power supply and dc motor works on 9 V. So, motor driver IC L 293 D is used to drive the motor and interfaced with ATMEGA 16 microcontroller.

Case1: Ground Floor car parking using one IR sensor, it can sense the status of Ground floor only it has the limitations to park the car on GND. If IR Sensor =1, Car parking is full and IR Sensor = 0 car parking has "VACANT SPACE".

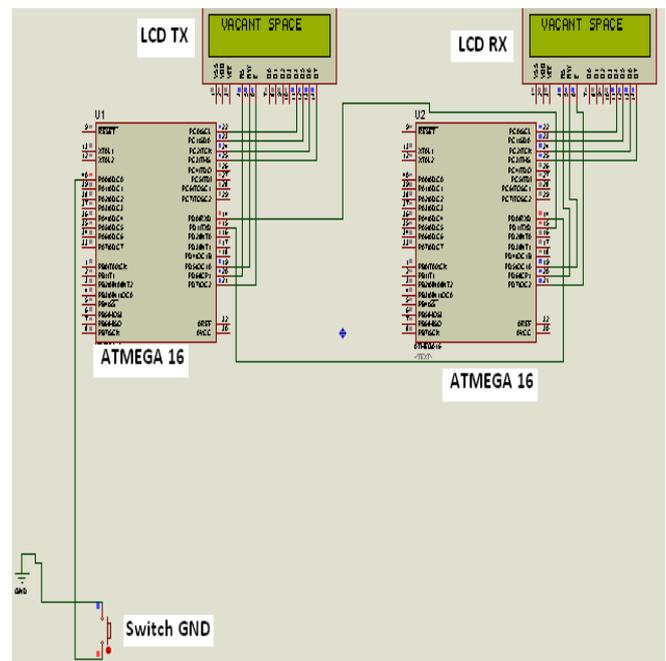


Figure 4 Car parking for ground floor

Case 2: If the Ground floor is full, A lift mechanism is used to park the car on first floor which is implemented using motor as in the simulation diagram. If it rotates in clock wise direction means the lift is moving upward, if it rotates in anticlockwise direction, it means lift rotates in downward direction. Two IR sensors are used in this IR1 for ground floor and IR2 for First Floor.

Table 1: Operation of first floor car parking

IR1	IR2	Operation
0	0	VACANT SPACE
0	1	1 VACANT, 2 FULL
1	0	1 FULL, 2 VACANT
1	1	ALL FULL

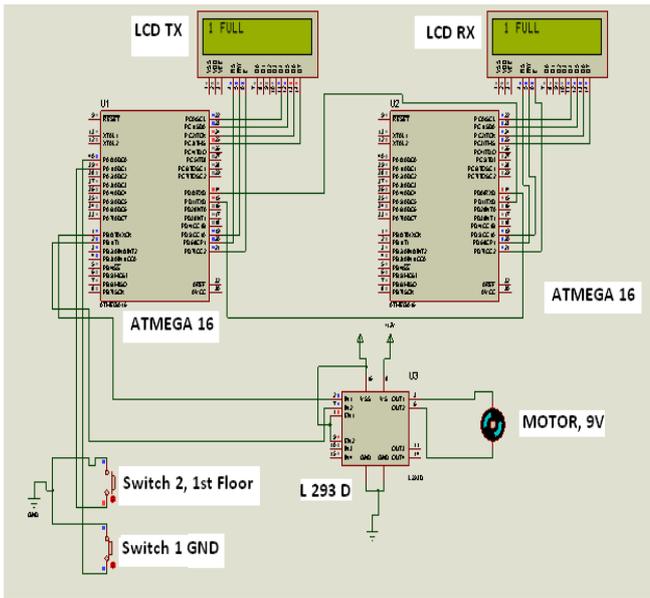


Figure 5 Car parking for first floor

Case 3: If the Ground floor is full, similar lift mechanism is used to park the car on first floor and second floor which is implemented using motor as in the simulation diagram. If it rotates in clock wise direction means the lift is moving upward, if it rotates in anticlockwise direction, it means lift rotates in downward direction. Three IR sensors are used in this IR1 for ground floor and IR2 for First Floor and IR 3.

Table 2 Operation of second floor car parking

IR1	IR2	IR3	Operation
0	0	0	VACANT SPACE
0	0	1	1 VACANT, 2 VACANT,3 FULL
0	1	0	1 VACANT, 2 FULL ,3 VACANT
0	1	1	1 VACANT, 2 FULL , 3 FULL
1	0	0	1 FULL, 2 VACANT, 3 VACANT
1	0	1	1 FULL, 2 VACANT, 3FULL
1	1	0	1 FULL, 2 FULL, 3 VACANT
1	1	1	ALL FULL

Case 4: If the Ground floor is full, similar lift mechanism is used to park the car on first floor an, second floor and third floor which is implemented using motor as in the simulation diagram. If it rotates in clock wise direction means the lift is moving upward, if it rotates in anticlockwise direction, it means lift rotates in downward direction. Three IR sensors are used in this IR1 for ground floor and IR2 for First Floor, IR 3 for second floor and IR4 for third floor.

Table 3 Operation of Third floor car parking

IR1	IR2	IR3	IR4	Operation
0	0	0	0	VACANT SPACE
0	0	0	1	1 VACANT, 2 VACANT,3 VACANT,4 FULL
0	0	1	0	1 VACANT, 2 VACANT ,3 FULL,4 VACANT
0	0	1	1	1 VACANT, 2 VACANT , 3 FULL,4 FULL
0	1	0	0	1 VACANT, 2 FULL, 3 VACANT,4 VACANT
0	1	0	1	1 VACANT, 2 FULL, 3 VACANT,4 FULL
0	1	1	0	1 VACANT , 2 FULL, 3 FULL,4 VACANT
0	1	1	1	1 VACANT , 2 FULL, 3 FULL,4 FULL
1	0	0	0	1 FULL,2 VACANT,3 VACANT,4 VACANT
1	0	0	1	1 FULL,2 VACANT,3 VACANT,4
1	0	1	0	1 FULL,2 FULL, VACANT,3,4 VACANT
1	0	1	1	1 FULL,2 VACANT,3 FULL,4 FULL
1	1	0	0	1 FULL,2 FULL,3 VACANT,4 VACANT
1	1	0	1	1 FULL,2 FULL,3 FULL, VACANT,4
1	1	1	0	1FULL, 2 FULL,3 FULL,4 VACANT
1	1	1	1	ALL FULL

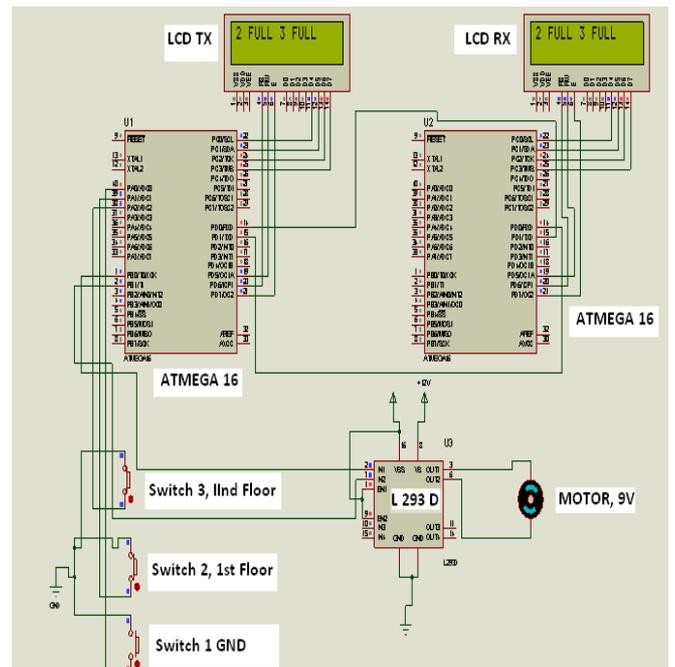


Figure 6 Car parking for second floor

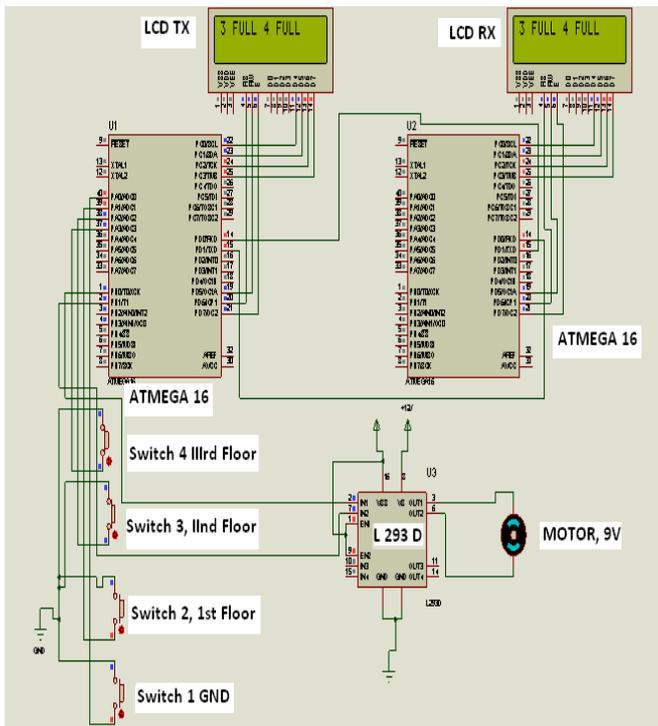


Figure 7: Car parking for Third floor

V. MATHEMATICAL MODELING & ALGORITHM OF LEAST PARKING

Let us consider a case of four parking spaces available in different buildings named as parking 1, parking 2, parking 3, and parking 4. All parking are using gyro having the coordinates (x_1, y_1, z_1) for parking 1, (x_2, y_2, z_2) for parking 2, (x_3, y_3, z_3) for parking 3, and (x_4, y_4, z_4) for parking 4. Gyro is giving the coordinates. Gyros are connected in all parking entrance and inside car also. Gyro connected inside car having the coordinate (x_5, y_5, z_5) .

A switch mechanism is inserted in the car because the car will pass by many paths and it will take many coordinates as garbage values. When this switch will on inside the car, coordinates of car will be generated using gyro 5 (x_5, y_5, z_5) . If the switch is not pressed, the car will not get any information because switch is programmed for fixed coordinates only. We will program the switch for car parking coordinates (x_1, y_1, z_1) for parking 1, (x_2, y_2, z_2) for parking 2, (x_3, y_3, z_3) for parking 3, and (x_4, y_4, z_4) for parking 4, so that it will accept the information for those parking spaces only. As the coordinates of gyro 5 will match to the coordinates of any gyro 1, gyro 2, gyro 3, gyro 4, the information will display in the car about that particular parking area. Let P1, P2, P3, P4 and P5 is the data received in gyro 1, gyro 2, gyro 3, gyro 4 and gyro 5. Data received i.e. coordinates of all parking P1 = Gyro 1, P2 = Gyro 2, P3 = Gyro 3, P4 = Gyro 4 and P5 = Gyro 5. Now calculate the distance from P1, P2, P3, and P4 from P5. Calculating the distance from all parking area using formula

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$

and display in car. Compare distances from all parking area, which is the shortest distance will display in our car

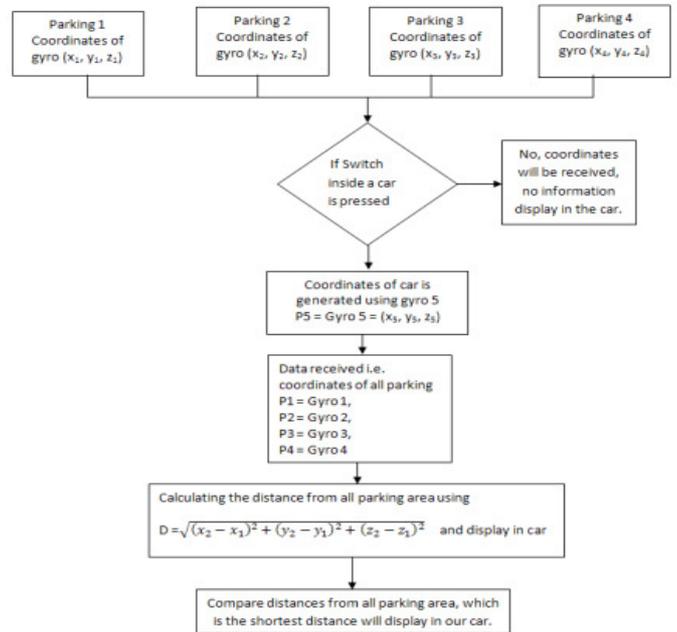


Figure 8 Algorithm of least parking space

Let us consider

- d1 = Distance of car from parking 1 or distance between gyro 1 and gyro 5
- d2 = Distance of car from parking 2 or distance between gyro 2 and gyro 5
- d3 = Distance of car from parking 3 or distance between gyro 3 and gyro 5
- d4 = Distance of car from parking 4 or distance between gyro 4 and gyro 5

We are using gyro which is giving the coordinates, gyros are connected in all parking entrance and inside car also

- P1 = Gyro 1 = (x_1, y_1, z_1) ,
// Coordinates of parking 1 from gyro in car
- P2 = Gyro 2 = (x_2, y_2, z_2) ,
// Coordinates of parking 2 from gyro in car
- P3 = Gyro 3 = (x_3, y_3, z_3) ,
// Coordinates of parking 3 from gyro in car
- P4 = Gyro 4 = (x_4, y_4, z_4) and
// Coordinates of parking 4 from gyro in car
- P5 = Gyro 5 = (x_5, y_5, z_5)
// Coordinates of gyro in car

If (switch pressed)
{
USART read () ;
// USART in microcontroller is receiving the data i.e coordinates of all parking area

$$d_1 = \sqrt{(x_5 - x_1)^2 + (y_5 - y_1)^2 + (z_5 - z_1)^2}$$

// distance of car from parking 1

$$d_2 = \sqrt{(x_5 - x_2)^2 + (y_5 - y_2)^2 + (z_5 - z_2)^2}$$

// distance of car from parking 2

```

d3 = sqrt((x3 - x2)^2 + (y3 - y2)^2 + (z3 - z2)^2)
// distance of car from parking 3
d4 = sqrt((x3 - x4)^2 + (y3 - y4)^2 + (z3 - z4)^2)
// distance of car from parking 4
{
If((d1 < d2)&&(d1 < d3)&&(d1 < d4))
printf("Distance of carparking 1 is nearest");
elseif((d2 < d1) &&(d2 < d3) &&(d2 < d4))
printf("Distance of carparking 2 is nearest");
elseif((d3 < d1) &&(d3 < d2) &&(d3 < d4))
printf("Distance of carparking 3 is nearest");
else printf("Distance of carparking 3 is nearest");
}
}

```

The proposed algorithm is for finding the information of shortest car parking available in our city.

VI. SOFTWARE DEVELOPMENT

Microcontroller, when it is used to operate as a wireless network involves following steps [10]

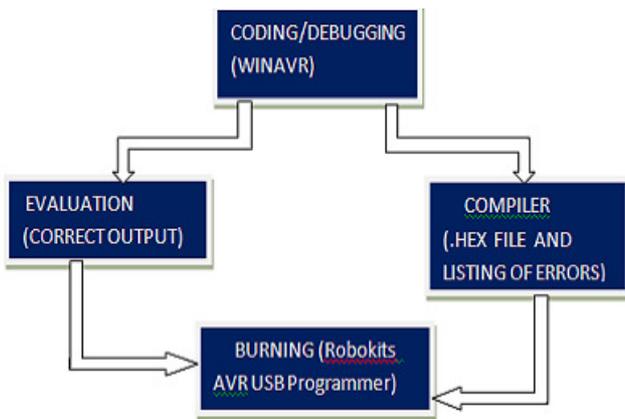


Figure 9 Steps for software development [10]

(1) *Coding / Debugging*- Coding or debugging is one in a high-level language (such as c or java). Compiler for a high-level language helps to reduce production time. To program the microcontrollers Win AVR [11] was used using C language. The source code has been commented to facilitate any occasional future improvement and maintenance. Win AVR is a suite of executable, open source software development tools for the Atmel AVR series of RISC microprocessors hosted on the Windows platform. It includes the GNU GCC compiler for C and C++. Win AVR contains all the tools for developing on the AVR. This includes AVR-gcc (compiler), AVR-gdb (debugger) etc.

(2) *Compiling*- After compiling the program, it is converted to machine level language in the form of o's and i's. This file is called as the Hex file and is saved with the extension (.Hex). The compiler also generates errors in the program which should be removed for proper execution of the program.

(3) *Burning*- Burning the machine language (hex) file into the microcontroller's program memory is achieved with a dedicated programmer, which attaches to a PC's peripheral. PC's serial port has been used for the purpose. For this purpose Ponyprog programmer was used to burn the machine language file into the microcontroller's program memory. Ponyprog is serial device programmer software with a user-friendly GUI framework available for Windows95/98/ME/NT/2000/XP and Intel Linux. Its purpose is reading and writing every serial device. It supports I²C Bus, Micro wire, SPI EEPROM, and the Atmel AVR and Microchip PIC microcontroller. The microcontrollers were programmed in approximately two seconds with a high speed-programming mode. The program memory, which is of Flash type, has, just like the EEPROM, a limited lifespan. On AVR microcontroller family it may be reprogrammed up to a thousand times without any risk of data corruption Atmega16 Programmer (ISP) which is used to burn the program into AVR microcontrollers.

(4) *Evaluation*-If the system performs as desired by the user and performs all the tasks efficiently and effectively the software development phase is over and the project is ready to be installed in any of the industrial sites as a personal area network. If not, the entire process is repeated again to rectify the errors. One of the difficulties of programming microcontrollers is the limited amount of resources the programmer has to deal with. In PCs resources such as RAM and processing speed are basically limitless when compared to microcontrollers. In contrast to a PC, the code on microcontrollers should be as low on resources as possible, but being cost effective and power efficient makes it a better option. In the programming of the proposed system is used the following .c and .h file

(1) *lcd.c* -This c file contains the code for control of functionality of the attached LCD module. The code controls the initialization of the LCD, data writing on the LCD, and also the movement, characteristics and location of the cursor. It offers the facility to write data on the LCD character-by-character or string-wise. The command set used in the software is based on the command set used in the LCD based on Hitachi HD44780 ICs. This file contain InitLCD (), LCDClear (), LCDWriteString () and LCDWriteInit ().

(2) *lcd.h*- This header file contains all the constant variable values and names of the subroutines used by various files used in the software. It clearly indicates which variable can be used as a global variable and which of the subroutines can be used across the software files.

VII. COMPARISION

In our implemenation we have used the AVR ATMEGA 16 microcontroller which has the more advantages in comparison to 8051. By the survey of ATMEGA 16 it has been proved that it is the best controller for interfacing . There is added an EEPROM to store data over a power off time. In 8051 it is not there. An internal oscillator and an internal power on reset make the AVR working without any other components , we can extend the frequency from (1 MHz to 25 MHz) by external crystals but in 8051 microcontroller crystal frequency is fixed (11.0592 MHz) A watchdog to handle hanging software states is added. This is not usable for electrical influence, since it must enable after reset

and can be disabled. For this task it must be enable by programming a fuse and not be disable. .The divider between XTAL and cycle time is reduced from 12 to one. So the instruction time is many times faster than the 8051.e.g. you can realize an I2C-interface fully in software without reduced clock speed (at fully 100 kHz). In 8051, the data transfer rate after 9600 kbps baud rate is very slow and in AVR microcontrollers it is faster than 10 times. In 8051 if the program size is larger than 1 Kb, then there will be the problem to debug in real time environment. In AVR there is no limit of program, hence it has been proved the best controller for real time interfacing in real time operating systems (RTOS).

Automatic car parking systems developed using 8051 microcontrollers are using extra peripherals such as keyboard, indicator, siren, LDR. Whenever we are designing any electronic system then Area, speed, power consumption and cost are the main parameters. In our design, based on AVR microcontroller we can optimize the hardware and power consumption. The data transmission rate is high in comparision to 8051 microcontroller based system, and then system performance will increase. AVR is the best controller to interface with various wireless technologies (GSM, Wifi, Bluetooth, Zigbee e.t.c) because we can achieve the higher baud rate with this controller. UBRR (UART bit rate recorder and % error) is shown in the figure 10. This data is taken from AVR data sheet and <http://www.wormfood.net/avrbaudcalc.php>.

Table 4: Baud rate of ATMEGA 16 with % error

20 MHz		
Baud Rate	UBRR	% of error
300	4166	0.0
600	2082	0.0
1200	1041	0.0
2400	520	0.0
4800	259	0.2
9600	129	0.2
14400	86	0.2
19200	64	0.2
28800	42	0.9
38400	32	1.4
57600	21	1.4
76800	15	1.7
115200	10	1.4

Table 5 baud rate for 8051 Microcontroller

11.0592 Mhz		
Baud Rate	UBRR	% of error
300	570	0.0
600	282	0.1

1200	205	0.1
2400	180	0.0
4800	119	0.2

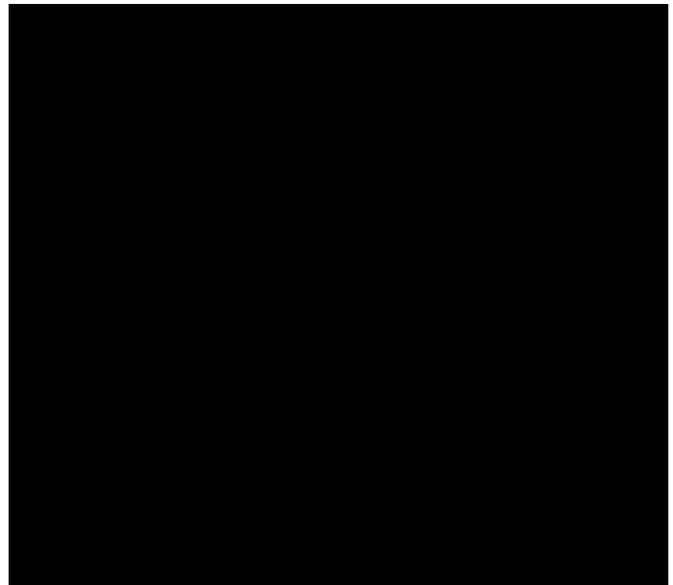


Figure 10 Comparison of performance of ATMEGA 16 and 8051 microcontroller in automatic car parking in terms UBRR (UART bit rate receiver)

Our Parking system is best suited to find out the nearest parking area among many parking places available in a city. We have used gyro mechanism in our parking system, which shows the nearest distance to park. A switch mechanism is inserted in the car because the car will pass by many paths and it will take many coordinates as garbage values. When this switch will on inside the car, coordinates of car will be generated using gyro inside the car. If the switch is not pressed, the car will not get any information because switch is programmed for fixed coordinates only. We could implement this system with 8051 microcontroller also but to achieve the good data transmission rate at least 9600 kbps baud rate is required, to achieve this baud rate the crystal frequency should be 20 MHz, which is fixed in 8051 microcontroller (XTAL = 11.0592 MHz).

VIII. CONCLUSION & FUTURE SCOPE

Automatic multi-stored car parking system is very good substitute for car parking area. Since in modern world, where space has become a very big problem and in the era of miniaturization its become a very crucial necessity to avoid the wastage of space in modern, big companies and apartments etc. In space where more than 100 cars need to be parked, it's a very difficult task to do and also to reduce the wastage of area, this system can be used. This Automatic Car Parking enables the parking of vehicles-floor after floor and thus reducing the space used. Wireless car parking system implementation is really very challenging; we have implemented our system of car parking upto three floors. Zigbee transceiver module is used as wireless

technology and the implementation of such system we have following advantages.

Parking Space Monitoring: Monitoring Parking space from a remote location and controlling of pumps can be done.

Better Utilization of space available: parking space better utilization efficiency saves time and more no of vehicles can be parked simultaneously.

Security Gates: Since through a specific access codes we could utilize the parking for a registered users. Deployment of a security barrier or tyre puncture strip if gate is breached.

For over 25 years, Remote Control Technology has been a leader in innovative applications of wireless Radio Frequency (RF) remote control and telemetry devices. These Technologies is continually expanding its product offerings and services to meet emerging customer needs, and its implementation using wireless modules is the next future which will be implemented in malls, buildings and cities.

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Effect of mutagens on quantitative characters in M₂ and M₃ generation of horsegram (*Macrotyloma uniflorum* (Lam.) Verdc)

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Abstract- The seeds of horsegram (*Macrotyloma uniflorum* (Lam.) Verdc) cv. *Dapoli Kulthi*- 1 were subjected to gamma radiation (100, 200, 300 and 400Gy), EMS (0.2, 0.3, 0.4 and 0.5 %) and combination treatments. The mutations affecting gross morphological changes in growth and yield characters such as plant habit, flowering, pod morphology, maturity and seed yield were scored as quantitative characters. The micromutations at the population level can be easily detected in the form of increased variations for quantitative traits in the segregation of mutagen treated populations. Micromutations can alter morphophysiological characters hence they are of a particular interest to the plant breeders. Both the mutagens, gamma radiations and EMS proved to be very effective to induce variability in quantitative traits like plant height, primary branches per plant, days required for first flowering and first pod maturity, number of pods per plant, pod length, number of seeds per pod, 1000 seed weight and yield per plant in M₂ and M₃ generations. In present investigation positive as well as negative impact on quantitative traits was recorded.

Index Terms- Horsegram, Micromutations, Mutagens, Variability

is an annual herb, stem erect and branched, leaves alternate, petiolate, stipulate, trifoliolate, axillary inflorescence, flowers bracteate, bisexual, corolla papilionaceous with cream, yellow or greenish yellow colour, stamens 10, 9 fused and 1 free, ovary superior, 1-celled. Fruit-pod, curved towards apex, 5–8-seeded. Seeds oblong or rounded, pale to dark reddish brown or reddish black and orange-brown.

Horsegram is cultivated in areas with annual rainfall 300-600 mm and highly drought tolerant, but does not tolerate flooding or water logging. The favourable average temperature is 18 to 27°C. Horsegram is adapted to a wide range of well-drained soils from sands and gravels to clay loams and heavy clays with neutral soils. It grows on soils having pH 5.5 to 8. (Bolbhat, 2011). Horsegram is relatively free from diseases and pests, but occasionally suffers from powdery mildew (*Sphaerotheca fuliginea*) and leaf spot (*Cercospora dolichi*) in high humid conditions. Yellow mosaic virus is one of the major constraints for its cultivation in peninsular India. In high rainfall conditions, leaf spot caused by *Ascochyta* sp. and web blight (*Thanatephorus cucumeris*) cause severe damage. Seed yield is also reduced by pod rot during late season rains, pod borers, and rodents (Barnabas et al., 2010 and Bolbhat, 2011).

I. INTRODUCTION

Horsegram (*Macrotyloma uniflorum* (Lam.) Verdc), Syn: *Dolichos biflorus* (L.) locally known as *hulga* or *kulthi* is one of the important minor, rainfed pulse crops of Maharashtra. It is drought tolerant and having good nitrogen fixing ability, but receives a low priority in cropping system, soil types etc. In addition to the protein supplement in human diet, it has medicinal value. It also furnishes concentrated feed for cattle and domestic animals. It is grown both in *kharif* and *rabbi* seasons as main crop, or as a mixed crop with tur, bajra or finger millet.

Horsegram originated and domesticated in the Indian subcontinent (Nene, 2006) which is native of the Old World Tropics. It is cultivated as a low-grade pulse crop in southern Asia, mainly from India to Myanmar. It is also grown as a forage and green manure in many tropical countries, especially in Australia and South-East Asia.

Verdcourt (1970) put horsegram under *Macrotyloma uniflorum* (Shambulingappa and Vishwanatha, 1990). Horsegram, the self pollinated crop, belongs to Fabaceae which

II. MATERIALS AND METHODS

The authentic seeds of horsegram (*Macrotyloma uniflorum* (Lam.) Verdc) cultivar Dapoli Kulthi-1 were obtained from Head, Department of Botany, College of Agriculture, Dr. Balasaheb Savant Konkan Krishi Vidyapeeth, Dapoli, Dist-Ratnagiri (M.S.) India. Gamma rays, ethyl methane sulphonate (EMS) and their combinations were employed in present study for the treatments of seeds of horsegram. Gamma radiation from ⁶⁰Co source fixed in the gamma cell 200 installed at Bhabha Atomic Research Center (BARC), Trombay, Mumbai (MS) was used in the present work. Healthy, dry and uniform seeds of horsegram with moisture content of 10-12 % were treated with 100, 200, 300 and 400Gy. Ethyl methane sulphonate (Sigma chemical Co. Ltd. USA) was used for the seed treatment of horsegram. Various concentrations of EMS (0.2% to 0.5%) were prepared in 0.1M phosphate buffer pH-7.0 (Gichner et al., 1994). Selected seeds were soaked in distilled water for 10 hours and the wet seeds were treated with different concentrations of EMS (such as 0.2, 0.3, 0.4 and 0.5% v/v) for four hours. For

combination treatments the gamma irradiated seeds were treated with different concentrations of EMS. The untreated seeds served as control. The seeds treated with various concentrations of EMS were washed thoroughly with tap water for two hours to terminate the reaction of chemical mutagen and to leach out the residual chemicals. The treated seeds (675) from each treatment were used for raising M_1 generation in field. Present investigation was carried out at Department of Botany, University of Pune, Pune- 411 007 (M.S.). All the experiments were carried out in triplicate following RBD design. The distance between two rows and two plants was 30 X 15 cm and the distance between two adjacent plots was one meter. The seeds of individually harvested M_1 plants were sown in the experimental field to raise M_2 generation in separate rows during kharif season of the year 2008.

The treated as well as control plants were screened for quantitative traits to study the induced variability. From each replication and treatment including control 20 plants were randomly selected for recording data on different quantitative characters in M_2 generations. Data on nine quantitative traits such as plant height (cm), primary branches/plant, DAS for first flowering, DAS for first pod maturity, No. of pods/plant, pod length (cm), no. of seeds/pod, 1000 seed weight (g) and seed yield/plant (g) were recorded.

All the surviving M_2 plants were harvested individually and seeds of single plant from each treatment were kept separately for raising M_3 generation. Observations on quantitative characters in M_3 generation were similar to that of M_2 generation. Data on following nine quantitative traits were recorded.

Plant height: The height of each randomly selected plant was measured before harvesting from soil level of the plant to apex by using thread and scale. The average of 20 plants was recorded in tables.

Number of primary branches per plant: It was counted actually at maturity from randomly selected 20 plants and the average values were recorded in table.

Number of days required for first flowering: The number of days required for opening of first floral bud on the plant from sowing was recorded.

Number of days required for first pod maturity: The number of days required for maturity of first pod were noted.

Total number pods per plant: Total number of pods on each selected plant was counted and average was noted.

Pod length: The length of each pod was measured in by keeping the pod on scale and average values were recorded.

Number of seeds per pod: Total number of seeds per pod was calculated after harvesting and the average number of seeds per pod was recorded in table.

1000 seed weight: The weight of 1000 seeds was determined on fine chemical balance and average value was noted.

Total seed yield per plant: The total pods on each plant at maturity were harvested separately and the seeds were taken out. The weight of total seeds per plant was recorded and average values were considered to record in the tables.

Statistical Analysis : The data were summarized as the means of three replicates with standard deviation as the measures of variability. One-way ANOVA test was performed to

determine significant differences due to various treatments. Fisher's LSD (Least significant difference) was used as post hoc test to ascertain significant differences among treatments at $p=0.05$. Statistical analysis and graphical data presentations were carried out by using Sigma stat (ver.3.5).

III. RESULTS AND DISCUSSION

Quantitative characters (Micromutations) in M_2 and M_3 generations

Gamma radiations and EMS proved to be very effective to induce variability in quantitative traits in M_2 and M_3 generations (Table-1 and 2).

Positive as well as negative impact on quantitative traits was well documented by Waghmare and Mehra (2000) in grass pea, Apparao et al., (2005) and Barshile et al., (2008) in chickpea, Bolbhat and Dhumal (2010), Dhumal and Bolbhat (2012) and Kanaka (2012) in horsegram.

Plant height

All the mutagens were effective for inducing variability in plant height (Table-1 and 2). Gamma radiation treatments have caused significant reduction in plant height. The minimum plant height 35.40cm was noted in 100Gy as compared to control (46.70 cm). EMS (0.2%) showed significant increase in plant height while other treatments showed -ve influence. Maximum and minimum plant height (53.60 cm and 38.20 cm) in M_2 generation had been recorded in 0.2% and 0.4%EMS. The average height of control plants was 46.70 cm.

The results obtained on effect of combination treatments on plant height in M_2 generation revealed that, there was no definite pattern. The highest (47.50cm) and lowest (25.70 cm) plant height as compared to control (46.70 cm) was noted in 400Gy + 0.5%EMS and 200Gy + 0.3%EMS.

Similar trend for plant height was observed in M_3 generation (Table-2). Maximum plant height (49.85cm, 49.32cm and 50.94cm in M_3 generation was recorded in 300Gy, 0.3%EMS and 300Gy +0.2%EMS respectively. The minimum plant height 44.57cm, 46.82cm and 41.84cm was noted in 200Gy, 0.5%EMS and 400Gy +0.3%EMS respectively. The average height of control plants was 50.99 cm.

All the doses/ conc. of gamma radiation, EMS, and their combinations caused reduction in plant height with few exceptions. Results reported by Dalvi (1990) and Nawale (2004) in horsegram and cowpea were in confirmatory with the present investigation. Reduction in plant height was noted by Gunsekaran et al., (1998), Khanna (1988), Khan et al., (2004) and Gaikawad et al., (2005) in cowpea, chickpea, mungbean and lentil respectively. Lower concentrations of EMS exerted a stimulatory effect on plant height. Findings of Yaqoob and Abdur (2001) in mungbean, and Barshile et al., (2008) in chickpea were in agreement with above results.

Number of primary branches per plant

Data obtained in M_2 generation on number of primary branches per plant (Table-1) indicated that the mean values of this parameter showed positive and negative influence. 300Gy and 0.3%EMS showed increased number of primary branches per plant. Maximum number of primary branches per plant was

recorded in 300Gy (7.66) and 0.3%EMS (7.33) over control (6.30). In combination treatments there was no definite pattern. The maximum decrease (5.10) was noted in 100Gy + 0.5%EMS as compared to control (6.30). The highest increase (9.10) was noted in 300Gy + 0.5%EMS. In majority of treatments the primary branches per plant were increased over control.

Similar trend was obtained in M₃ generation (Table-2). All the treatments showed increase in number of primary branches per plant as compared to control and M₂. Maximum number of primary branches was recorded in 100Gy (12.58), 0.2%EMS (10.73) and 200Gy + 0.2 %EMS (11.25) over control (10.99).

Almost all the treatments of gamma radiation and EMS showed positive as well as negative impact on primary branches per plant in horsegram. Dalvi (1990), Apparao et al., (2005), Sing et al., (2000), Nawale (2004) and Lawhale (1982) also noted similar trend with physical as well as chemical mutagens.

Number of days required for first flowering

The data recorded in Table-1 revealed that some treatments were stimulatory, while others were inhibitory to induce flowering in M₂ generation. The results on the gamma radiation treatments and EMS indicated that there was no significant change in number of days required for first flowering, while in combination treatments there was no definite pattern. The minimum number of days required for first flowering were (33.80 DAS), in 400Gy + 0.4%EMS as compared to control (53.30 DAS). In all the combination treatments, days to first flowering were less than control except 300Gy with different concentrations of EMS and 400Gy + 0.3%EMS.

Similar was the pattern noted for M₃ generation (Table-2). The minimum days required for first flowering were 50.98 DAS in 300Gy, 51.73 DAS in 0.2%EMS and 42.34 DAS in 400Gy + 0.4%EMS.

The number of days required for first flowering was not very much changed as compared to control except few treatments. However gamma radiation and EMS treatments caused slight delay with increasing dose/conc. of mutagens. Dalvi (1990) also noted similar results in horsegram with different mutagens. The results recorded by Gaikawad et al., (2005), Rudraswami et al., (2006), Manjaya and Nandanvar (2007), Ahire (2008) and Tambe (2009) in different legumes were supportive to the present findings.

Number of days required for first pod maturity

The data recorded in (Table-1) indicated that all the treatments of GR, EMS and their combinations had succeeded in reducing the duration for 1st pod maturity as compared to control. The results of combination treatments were highly significant for reducing the number of days required for 1st pod maturity. The minimum number of days (57.70 DAS) required for first pod maturity was noted in 400Gy + 0.4%EMS.

The data obtained for M₃ generation was on par with of M₂ generation (Table-2). Minimum days required for the first pod maturity were 79.17 DAS in 300Gy, 80.53 in 0.2% EMS and 71.14 DAS in 400Gy + 0.4 EMS as compared to control (83.00 DAS).

Gamma radiation (200Gy) was successful to induce earlier first pod maturity by about 5-6 days as compared to control. Nawale (2004) and Sing et al., (2000) reported contradictory

findings with reference to this parameter. All the treatments of EMS and GR + EMS, caused reduction in number of days required for first pod maturity than control (except 0.4% EMS).

Number of pods per plant

Gamma radiation and EMS single and in combination had induced variability in number of pods per plant in M₂ generation. The data recorded in Table-1 revealed that the treatments had stimulatory as well as inhibitory effect. In M₂ generation maximum number of pods per plant (83.80) were noted in 300Gy and 0.2%EMS (93.80) than control (71.20). The minimum number of pods per plant (59.50) were recorded at 200Gy and (33.40) at 0.4%EMS as compared to control. However all the combination treatments have caused reduction in number of pods per plant except 300Gy + 0.5%EMS and 400Gy + 0.5%EMS.

The trend in variation of pod number observed in M₃ generation was similar to that of M₂ generation. M₃ generation had shown slight increase in pod number as compared to M₂ generation (Table-2). Maximum pods were recorded in 300Gy (110.32), 0.2 %EMS (107.82) and 400Gy + 0.2 %EMS (102.18).

There was increase as well as decrease in number of pods per plant with different doses/ concs. used. The results of Dalvi (1990) for horsegram were in agreement with the present study. Nawale (2004) in cowpea, Gaikawad et al., (2005) in lentil and Apparao et al., (2005) in chickpea noted similar results. However decrease in pod number was also recorded by Barshile et al., (2008) in chickpea.

Pod length

The treatments of GR, EMS and their combinations in M₂ as well as in M₃ did not show any change in pod length (Table-1 and 2).

All the mutagenic treatments showed inhibitory effect on pod length (except few). The results reported by Singh and Raghuvanshi (1985) and Singh et al., (2000) in *Vigna*, Tambe (2009) in soybean and Dalvi (1990) in horsegram were inconformity with present findings.

Total number of seeds per pod

Data on total number of seeds per pod (Table-1) in M₂ progeny showed non significant change as compared to control. M₃ generation showed similar trend (Table- 2). The results recorded in table, indicated that all the treatments of mutagens of GR, EMS and GR + EMS exerted inhibitory effects on number of seeds per pod except 400Gy, 0.3%EMS, 200Gy + 0.2%EMS and 200Gy + 0.4%EMS. Decrease in number of seeds per pod was recorded in chickpea, lentil, cowpea, green gram and horsegram by Barshile, (2006), Apparao et al., (2005), Gaikawad et al., (2005), Vandana and Dubey (1990), Nawale, (2004) and Dalvi (1990) respectively.

1000- Seed weight

Results recorded on 1000-seed weight (Table-1) indicated that all the treatments of GR and EMS had exercised negligible -ve effect on this parameter. But the combination treatments such as 300Gy + 0.4%EMS and 300Gy + 0.5%EMS (30.50g and 29.80g) had shown considerable increase in 1000 seed weight. The results of M₃ generation were on par with M₂ generation.

The results with GR, EMS and GR + EMS showed negative as well as positive impact in horsegram. Similar

observations were also made by Apparao et al., (2005) in chickpea, Gaikawad et al., (2005) in lentil, Sagade (2008) and Sing et al., (2000) in urdbean and Tambe (2009) in soybean

Seed yield per plant

Mean values for seed yield per plant decreased in all treatments as compared to controls (Table-1). All the mutagenic treatments of gamma radiation except 300Gy showed -ve effect. The maximum seed yield (16.76g) was noted in 300Gy and minimum (11.22g) in 200Gy as compared to control (14.54g). EMS (0.2%) caused maximum increase (16.45g), while all other treatments showed reduction in seed yield per plant over control. The combination treatment 300Gy + 0.5%EMS had induced maximum increase (16.01g) over control (14.54g). But all other treatments had caused reduction as compared to control. In M₃ generation seed yield per plant was increased in all gamma radiation treatments, but it decreased in EMS and their combinations as compared to control (Table-2). But all M₃ population showed positive influence on total seed yield per plant as compared to M₂ population. Maximum total seed yield was recorded in 300Gy (19.60g), 0.2%EMS (16.34g) and in 200Gy + 0.4%EMS (16.96g) as compared to control (16.58g).

All the mutagenic treatments except few treatments showed inhibitory effect on seed yield per plant. Patil et al., (2004) in soybean, Auti (2005) in mungbean, Banu et al., (2005) in cowpea and Barshile et al., (2008) in chickpea also recorded adverse effect on seed yield per plant due to various types of mutagenic treatments. Hakande (1992) reported wider variability in yield due to mutagenic treatments in winged bean which was attributed to pollen sterility and genetical as well as physiological alterations caused by mutagens.

Yield is an important trait, as it governs the economic benefit. Its expression is inherited by many genes, which control the production, transport and storage of assimilates. Previous studies indicated that both additive and non-additive genes contribute to yield. Luthra et al., (1979), Reddy and Sree Ramulu (1982) also supported the above view. The variability in yield was induced by mutagenic treatments. In the present study increased seed yield was attributed to increase in number of pods per plant, length of pod, and 1000 seed weight per plant.

IV. CONCLUSION

Both the mutagens proved to be very effective to induce variability in quantitative traits like plant height, primary branches per plant, number of days required for first flowering and first pod maturity, number of pods per plant, pod length, number of seeds per pod, 1000 seed weight and yield per plant in M₂ and M₃ generations.

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Table 1: Micromutations in M₂ generation of horsegram cv. Dapoli Kulthi-1.

Treat	Plant height (cm)	Pri. br./ plant	DAS for first flowering	DAS for first pod maturity	No. of pods/ plant	Pod length (cm)	No. of seeds/ pod	1000 seed Wt. (g)	Seed yield/ plant (g)
Control	46.70±2.27	6.30±0.25	53.30±2.13	85.20±3.41	71.20±2.85	6.33±0.25	7.20±0.29	26.80±1.07	14.54±0.58
100Gy	35.40±1.77	6.66±0.33	53.07±2.65	81.70±4.09	67.70±3.39	6.20±0.31	6.66±0.33	28.30±1.42	13.36±0.67
200	39.40±2.76	6.20±0.43	53.70±3.76	78.90±5.52	59.50±4.17	6.10±0.43	6.33±0.44	28.20±1.97	11.22±0.79
300	41.30±1.24	7.66±0.23	54.80±1.64	84.60±2.54	83.80±2.51	6.30±0.19	7.10±0.21	27.50±0.83	16.76±0.50
400	40.10±2.41	6.10±0.37	54.70±3.28	84.40±5.06	71.30±4.28	6.10±0.37	6.33±0.38	26.30±1.58	12.87±0.77
0.2 %EMS	53.60±3.22	6.33±0.38	53.40±3.20	79.40±4.76	93.80±5.63	5.60±0.34	6.33±0.38	26.70±1.60	16.45±0.99
0.3	42.70±1.71	7.33±0.29	53.60±2.14	81.30±3.25	50.40±2.02	5.70±0.23	6.33±0.25	25.70±1.03	9.40±0.38
0.4	38.20±2.67	5.33±0.37	53.20±3.72	85.90±6.01	33.40±2.34	5.64±0.40	6.33±0.44	26.60±1.86	7.42±0.52
0.5	43.20±1.30	6.33±0.19	52.80±1.58	83.60±2.51	75.30±2.26	5.58±0.17	6.20±0.19	27.20±0.82	13.30±0.40
100Gy + 0.2%EMS	28.70±1.44	6.10±0.31	49.40±2.47	79.20±3.96	38.40±1.92	5.75±0.29	6.20±0.31	25.60±1.28	8.83±0.44
100 + 0.3	29.40±0.88	8.40±0.25	47.60±1.43	77.30±2.32	49.70±1.49	5.25±0.16	6.10±0.18	26.50±0.80	7.64±0.23
100 + 0.4	26.50±1.59	5.60±0.34	47.30±2.84	79.70±4.78	37.80±2.27	5.50±0.33	6.30±0.38	26.20±1.57	8.46±0.51
100 + 0.5	31.20±2.18	5.10±0.36	47.50±3.33	78.60±5.50	41.40±2.90	5.75±0.40	6.00±0.42	27.50±1.93	8.29±0.58
200 + 0.2	33.20±1.33	5.90±0.24	49.30±1.97	77.80±3.11	38.70±1.55	5.50±0.22	6.50±0.26	27.60±1.10	8.87±0.35
200 + 0.3	25.70±1.29	6.10±0.31	49.40±2.47	79.30±3.97	41.30±2.07	5.10±0.26	6.20±0.31	26.60±1.33	9.12±0.46
200 + 0.4	27.50±1.93	6.20±0.43	47.60±3.33	79.80±5.59	40.70±2.85	5.50±0.39	6.00±0.42	27.80±1.95	9.76±0.68
200 + 0.5	30.20±0.91	7.10±0.21	49.20±1.48	78.50±2.36	39.80±1.19	5.50±0.17	6.50±0.20	26.30±0.79	8.90±0.27
300 + 0.2	34.30±1.71	6.50±0.33	54.90±2.75	79.40±3.97	54.80±2.74	5.50±0.28	7.10±0.36	26.40±1.32	13.10±0.65
300 + 0.3	31.20±1.87	7.10±0.43	54.40±3.26	79.60±4.78	50.70±3.04	5.25±0.32	7.00±0.42	26.60±1.60	11.53±0.69
300 + 0.4	29.10±1.16	5.20±0.21	54.30±2.17	78.70±3.15	33.50±1.34	5.50±0.22	7.10±0.28	30.50±1.22	9.98±0.40
300 + 0.5	35.30±1.06	9.10±0.27	50.80±1.52	80.60±2.42	71.70±2.15	5.30±0.16	7.10±0.21	29.80±0.89	16.01±0.48
400 + 0.2	42.50±2.98	7.80±0.55	50.40±3.53	76.80±5.38	71.40±5.00	5.50±0.39	6.50±0.46	28.70±2.01	14.44±1.01
400 + 0.3	33.20±1.99	6.60±0.40	56.30±3.38	77.60±4.66	70.40±4.22	5.50±0.33	7.10±0.43	25.80±1.55	12.69±0.76
400 + 0.4	40.90±2.05	6.70±0.34	33.80±2.04	57.70±3.39	52.80±2.64	5.10±0.26	6.20±0.31	27.70±1.39	10.38±0.52
400 + 0.5	47.50±1.90	8.30±0.33	40.60±1.62	66.80±2.67	74.40±2.98	5.10±0.20	6.20±0.25	27.70±1.11	14.10±0.56
SEM±	1.83	0.27	2.17	3.37	2.45	0.24	0.27	1.15	0.49
F-value	36.45	27.27	7.14	3.45	99.91	4.54	4.27	2.21	68.91
P-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
LSD _{0.05}	3.58	0.39	2.08	6.61	4.80	0.47	0.53	2.25	0.96

Data are means of three replicates \pm standard deviation. Significant difference due to treatments was assessed by Fisher's LSD as post-hoc test.

Table 2: Micromutations in M₃ generation of horsegram cv. Dapoli Kulthi-1.

Treat	Plant height (cm)	Pri. br./ plant	DAS for first flowering	DAS for 1 st pod maturity	No. of pods/ plant	Pod length (cm)	No. of seeds/ pod	1000 seed Wt. (g)	Seed yield/ plant (g)
Control	50.99 \pm 4.89	10.99 \pm 0.88	54.00 \pm 1.00	83.00 \pm 1.00	100.55 \pm 7.56	6.65 \pm 0.25	6.84 \pm 0.50	25.07 \pm 0.81	16.58 \pm 2.94
100Gy	49.73 \pm 2.00	12.58 \pm 0.96	53.67 \pm 3.54	82.44 \pm 4.11	106.18 \pm 8.90	6.44 \pm 0.51	6.83 \pm 0.51	25.31 \pm 1.60	18.62 \pm 2.34
200	44.57 \pm 4.56	11.49 \pm 2.44	54.72 \pm 1.60	84.45 \pm 2.52	110.04 \pm 2.33	6.40 \pm 0.35	6.84 \pm 0.17	26.05 \pm 0.58	19.14 \pm 1.37
300	49.85 \pm 1.74	11.98 \pm 2.37	50.98 \pm 1.10	79.17 \pm 0.55	110.32 \pm 18.11	6.52 \pm 0.33	6.85 \pm 0.32	25.93 \pm 0.50	19.60 \pm 2.25
400	48.75 \pm 1.06	10.03 \pm 3.26	54.77 \pm 1.53	85.78 \pm 3.32	109.62 \pm 24.38	6.51 \pm 0.24	6.88 \pm 0.21	26.70 \pm 2.01	18.90 \pm 2.54
0.2 %EMS	47.39 \pm 1.38	10.73 \pm 3.34	51.73 \pm 1.69	80.53 \pm 3.46	107.82 \pm 22.08	6.25 \pm 0.10	6.46 \pm 0.13	24.56 \pm 1.71	16.34 \pm 3.94
0.3	49.32 \pm 4.45	9.32 \pm 3.25	56.17 \pm 0.55	87.07 \pm 1.67	96.04 \pm 40.93	6.62 \pm 0.56	7.02 \pm 0.35	26.36 \pm 0.82	16.13 \pm 7.24
0.4	48.46 \pm 6.44	8.26 \pm 3.87	53.59 \pm 0.52	82.21 \pm 1.36	69.23 \pm 21.92	6.04 \pm 0.39	6.36 \pm 0.30	24.76 \pm 1.02	11.26 \pm 3.93
0.5	46.82 \pm 9.95	6.51 \pm 0.81	54.57 \pm 4.69	84.53 \pm 6.41	66.82 \pm 18.57	6.36 \pm 1.02	6.63 \pm 0.77	25.08 \pm 1.18	10.93 \pm 3.42
100Gy + 0.2%EMS	45.10 \pm 4.55	6.78 \pm 1.02	54.00 \pm 1.73	83.67 \pm 0.58	86.88 \pm 25.68	6.38 \pm 0.45	6.55 \pm 0.39	24.80 \pm 0.48	14.12 \pm 4.18
100 + 0.3	48.50 \pm 4.18	6.39 \pm 1.16	52.63 \pm 3.57	81.31 \pm 2.84	100.11 \pm 21.59	6.36 \pm 0.50	6.53 \pm 0.37	24.14 \pm 1.00	16.35 \pm 3.01
100 + 0.4	49.27 \pm 3.72	7.30 \pm 2.07	54.86 \pm 0.24	84.16 \pm 1.89	90.25 \pm 14.74	6.40 \pm 0.21	6.62 \pm 0.09	24.56 \pm 1.38	14.95 \pm 2.57
100 + 0.5	46.11 \pm 3.89	8.48 \pm 3.69	51.44 \pm 1.78	79.18 \pm 0.31	93.33 \pm 11.95	6.06 \pm 0.31	6.42 \pm 0.19	22.84 \pm 0.87	15.27 \pm 2.04
200 + 0.2	50.61 \pm 2.43	11.25 \pm 2.22	57.34 \pm 1.37	88.66 \pm 2.50	85.22 \pm 5.02	6.58 \pm 0.28	7.08 \pm 0.38	25.53 \pm 0.64	13.83 \pm 1.53
200 + 0.3	45.81 \pm 4.97	11.06 \pm 1.75	52.94 \pm 0.12	81.86 \pm 2.02	93.42 \pm 6.60	6.05 \pm 0.15	6.54 \pm 0.41	23.85 \pm 0.80	15.71 \pm 1.51
200 + 0.4	50.42 \pm 5.85	10.44 \pm 1.41	58.12 \pm 2.53	89.82 \pm 1.93	97.28 \pm 14.90	6.63 \pm 0.14	7.16 \pm 0.24	27.31 \pm 2.22	16.96 \pm 2.03
200 + 0.5	47.07 \pm 4.45	9.68 \pm 1.34	53.23 \pm 1.66	82.65 \pm 3.24	86.53 \pm 5.66	6.10 \pm 0.29	6.54 \pm 0.54	25.09 \pm 2.61	14.71 \pm 0.90
300 + 0.2	50.94 \pm 3.93	9.64 \pm 1.62	55.64 \pm 5.05	85.75 \pm 5.88	83.49 \pm 15.54	6.20 \pm 0.40	6.52 \pm 0.50	25.81 \pm 0.55	13.68 \pm 2.67
300 + 0.3	50.78 \pm 2.41	9.11 \pm 1.58	54.67 \pm 1.53	84.00 \pm 1.00	87.33 \pm 14.73	6.11 \pm 0.10	6.18 \pm 0.32	24.28 \pm 0.23	13.52 \pm 2.96
300 + 0.4	47.00 \pm 2.82	8.67 \pm 1.45	45.19 \pm 11.92	76.23 \pm 6.93	87.18 \pm 18.38	6.03 \pm 0.40	6.84 \pm 0.31	24.27 \pm 2.00	13.40 \pm 3.28
300 + 0.5	46.03 \pm 7.36	9.87 \pm 2.57	46.71 \pm 14.47	78.44 \pm 11.7	92.39 \pm 11.07	6.25 \pm 0.14	6.42 \pm 0.48	24.57 \pm 1.33	14.23 \pm 2.38
400 + 0.2	44.10 \pm 8.39	9.67 \pm 1.84	43.29 \pm 12.82	72.35 \pm 9.19	102.18 \pm 9.82	5.93 \pm 0.24	5.82 \pm 0.11	23.45 \pm 1.81	13.30 \pm 2.21
400 + 0.3	41.84 \pm 9.19	10.51 \pm 2.72	49.88 \pm 14.63	76.90 \pm 21.6	98.42 \pm 11.79	6.64 \pm 0.48	6.74 \pm 0.06	25.65 \pm 2.65	15.59 \pm 2.73
400 + 0.4	49.12 \pm 8.17	9.22 \pm 1.35	42.34 \pm 12.70	71.14 \pm 18.4	96.08 \pm 7.25	6.14 \pm 0.46	6.18 \pm 0.32	24.40 \pm 2.12	15.20 \pm 1.83
400 + 0.5	48.91 \pm 4.39	11.01 \pm 2.21	48.52 \pm 12.34	74.68 \pm 17.84	85.53 \pm 9.43	6.43 \pm 0.26	6.78 \pm 0.53	25.52 \pm 1.12	15.18 \pm 3.05
SEM \pm	2.06	0.41	2.23	3.47	4.04	0.27	0.28	1.06	0.67
F-value	2.13	30.82	5.79	3.71	15.86	1.38	2.39	1.85	22.75
P-value	1.24	3.28	8.76	4.57	6.81	1.69	4.77	3.40	2.95
LSD _{0.05}	-	-	-	-	-	-	-	-	-

Data are means of three replicates \pm standard deviation. Significant difference due to treatments was assessed by Fisher's LSD as a post-hoc test.

Certain Case of Reducible Hypergeometric Functions of Hyperbolic Function as Argument

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Abstract- In this paper, we specialized parameters and argument, Hypergeometric function $F_E(\alpha_1, \alpha_1, \alpha_1, \beta_1, \beta_2, \beta_2; \gamma_1, \gamma_2, \gamma_3; \cosh x, \cosh y, \cosh z)$, F_G , F_k and F_N can be reduced to the hypergeometric function of Bailey's $F_4(\alpha_1, \beta_2, \gamma_2, \gamma_3; -\cosh y, -\cosh z)$ and also discussed their reducible cases into Horn's function. In the journal we consider hypergeometric function of three variables and obtain its interesting reducible case into Bailey's F_4 & Horn's function.

In the section 2, hypergeometric function of four variables can be reduced to the hypergeometric function of one, two & three variables with some new and interesting particular cases.

Index Terms- Matrix argument, Confluent, Hypergeometric function, Beta and Gamma integrals, M-transform

I. ON HYPERGEMOTERIC INTEGRALS

1.1 INTRODUCTION

We will study Laplace's double integral for Saran's function $F_E(\alpha_1, \alpha_1, \alpha_1, \beta_1, \beta_2, \beta_2; \gamma_1, \gamma_2, \gamma_3; \cosh x, \cosh y, \cosh z)$ which has been reduced to Bailey's $F_4(\alpha_1, \beta_2, \gamma_2, \gamma_3; -\cosh y, -\cosh z)$ and pochhammer type of Integrals for F_E, F_G, F_K and F_N and also discussed their reducible cases into Horn's functions. The purpose of studying only the function F_E, F_G, F_K and F_N is mainly due to the function in their integral representation contain Appell's function F_1 or F_2 or the product of Gauss's hypergeometric series which can be reduced by the following relations.

$${}_2F_1(\alpha, \beta; \gamma; \cosh y) = \sum_{k,m=0}^{\infty} \frac{(\alpha)_n (\beta)_n}{(\gamma)_n m!} \cosh^m y \tag{1.1.1}$$

$${}_2F_1(\alpha, \beta; \gamma; \cosh y) = \sum_{k,m=0}^{\infty} \frac{(\alpha)_n (\beta)_n (e^y - e^{-y})^m}{(\gamma)_n m! 2^m} \tag{1.1.2}$$

$${}_2F_1(\alpha, \beta; \gamma; \cosh y) = \frac{\Gamma(\gamma)}{\Gamma(\gamma-\beta)\Gamma(\beta)} \int_0^1 t^{\beta-1} (1-t)^{\gamma-\beta-1} (1-t \cosh y)^{-\alpha} dt \tag{1.1.3}$$

$${}_2F_1(\alpha, \beta; \gamma; \cosh y) = (1 - \cosh y)^{-\alpha} {}_2F_1(\alpha, \gamma-\beta; \gamma; \frac{\cosh y}{\cosh y - 1}) \tag{1.1.4}$$

Similarly

$${}_2F_1(\alpha, \beta; \gamma; \cosh y) = (1 - \cosh y)^{-\beta} {}_2F_1(\gamma - \alpha, \beta; \gamma; \frac{\cosh y}{\cosh y - 1}) \tag{1.1.5}$$

$${}_2F_1(\alpha, \beta; \gamma; \cosh y) = (1 - \cosh y)^{\gamma-\alpha-\beta} {}_2F_1(\gamma-\alpha, \gamma-\beta; \gamma; \cosh y) \tag{1.1.6}$$

$${}_2F_1(\alpha, \beta; \gamma; \cosh y) = (1 - \cosh y)^{-\alpha} \tag{1.1.7}$$

$$F_1(\alpha, \beta, \beta; \alpha; \cosh x, \cosh y) = (1 - \cosh y)^{-\alpha} (1 - \cosh y)^{-\beta} \tag{1.1.8}$$

$$F_1(\alpha, \beta, \beta', \beta, \beta'; \cosh x, \cosh y) = (1 - \cosh x - \cosh y)^{-\alpha} \tag{1.1.9}$$

$$F_2(\alpha, \beta, \beta', \alpha, \beta'; \cosh x, \cosh y) = (1 - \cosh y)^{-\beta - \alpha} (1 - \cosh x - \cosh y)^{-\beta} \tag{1.10}$$

where $|\cosh x| < 1$ $|\cosh y| < 1$ $|\cosh z| < 1$ for (1.1.1) to (1.1.10)

1.2 Reduction of integrals of $F_E(\cdot)$ INTO BAIEY'S $F_4(\cdot)$

The hypergeometric function F_E is defined by

$$F_1(\alpha_1, \alpha_1, \alpha_1, \beta_1, \beta_2, \beta_2; \gamma_1, \gamma_2, \gamma_3; \cosh x, \cosh y, \cosh z) = \sum_{m,n,p=0}^{\infty} \frac{(\alpha_1)_{m+n+p} (\beta_1)_m (\beta_2)_{n+p} \cosh^m x \cosh^n y \cosh^p z}{(\gamma_1)_m (\gamma_2)_n (\gamma_3)_p m! n! p!} \tag{1.2.1}$$

absolutely convergent if $m + (\sqrt{n} + \sqrt{p})^2 = 1$, $|\cosh x| < 1$, $|\cosh y| < 1$, $|\cosh z| < 1$ and $|\cosh z| < 1$ and It's integral representation S. Saran (1957) is given by

$$F_E = \frac{1}{\Gamma(\alpha_1)\Gamma(\beta_2)} \int_0^{\infty} \int_0^{\infty} e^{-p-t} p^{\alpha_1-1} t^{\beta_2-1} {}_0F_1(\beta_1; \gamma_1; p \cosh x) X_0 F_1(\gamma_2; -pt \cosh y) {}_0F_1(\gamma_3; -pt \cosh z) dp dt \tag{1.2.2}$$

Where $R(\alpha_1) > 0$ and $R(\alpha_2) > 0$

$$F_4(\alpha_1, \beta_2, \gamma_2, \gamma_3; -\cosh y, -\cosh z) = \frac{1}{\Gamma(\alpha_1)\Gamma(\beta_2)} \int_0^{\infty} \int_0^{\infty} e^{-p-t} p^{\alpha_1-1} t^{\beta_2-1} {}_0F_1(\gamma_2; -p \cosh x) X_0 F_1(\gamma_3; -pt \cosh y) dp dt \tag{1.2.3}$$

Changing the variable t to T by the substitution $t = C^2 T^2 / 4p$ and writing

$$\alpha_1 = \frac{1}{2}(\lambda + \mu + \nu - \rho) \quad \beta_2 = \frac{1}{2}(\lambda + \mu + \nu + \rho) \\ \gamma_2 = \mu + 1 \quad \gamma_3 = \nu + 1, \quad \cosh y = \frac{a^2}{c^2}, \quad \cosh z = \frac{b^2}{c^2} \tag{1.2.4}$$

$$F_4 \left[\frac{1}{2}(\lambda + \mu + \nu - \rho), \frac{1}{2}(\lambda + \mu + \nu + \rho), \mu + 1, \nu + 1; -\frac{a^2}{c^2}, -\frac{b^2}{c^2} \right] \\ = \frac{e^{(\lambda + \mu + \nu)}}{2^{(\gamma + \mu + \nu + \rho - 1)} \Gamma\left\{\frac{1}{2}(\gamma + \mu + \nu - \rho)\right\} \Gamma\left\{\frac{1}{2}(\gamma + \mu + \nu + \rho)\right\}} \\ \int_0^{\infty} \int_0^{\infty} e^{-p - \frac{C^2 T^2}{4p}} p^{\rho-1} T^{(\lambda + \mu + \nu + \rho - 1)} {}_0F_1(\mu + 1; -\frac{1}{4}a^2 T^2) {}_0F_1(\nu + 1; -\frac{1}{4}b^2 T^2) dp dt$$

We know that [E.T. Whittaker and G.N. Watson (1902)]

$$\int_0^{\infty} \exp\{-c(x + a/x)\} dx = 2(c/a)^{\frac{1}{2}} K_1(2\sqrt{ac}), \tag{1.2.5}$$

so the p- integral

$$\int_0^{\infty} e^{-p\frac{c^2T^2}{4P}} p^{\rho-1} dp = 2\left(\frac{2}{CT}\right)^{\rho} k_{\rho}(2\sqrt{ac}) \tag{1.2.6}$$

and changing ${}_0F_1$ in to Bessel function of the kind the relation

$$J_k(z) = \frac{\left(\frac{1}{2}z\right)^k}{\Gamma(k+1)} {}_0F_1\left(k+1; -\frac{1}{4}z^2\right) \tag{1.2.7}$$

$$\int_0^{\infty} t^{\lambda-1} J_{\mu}(at) J_{\nu}(bt) J_{\rho}(ct) dt = \frac{2^{\lambda-1} a^{\mu} b^{\nu} \Gamma\left\{\frac{1}{2}(\lambda + \mu + \nu + \rho)\right\} \Gamma\left\{\frac{1}{2}(\lambda + \mu + \nu - \rho)\right\}}{c^{\lambda+\mu+\nu} \Gamma(\mu+1) \Gamma(\nu+1)} \\
 F_4\left[\frac{1}{2}(\lambda + \mu + \nu + \rho), \frac{1}{2}(\lambda + \mu + \nu - \rho), \mu+1, \nu+1; \frac{a^2}{c^2}, \frac{b^2}{c^2}\right] \tag{1.2.8}$$

Where F_4 is fourth type of Appell's function

1.3 REDUCTION OF F_E, F_G, F_K AND F_N INTO HORN'S FUNCTION

Let us consider the integral S. Saran (1955) for F_E viz.

$$F_E = \frac{\Gamma(\gamma_2)\Gamma(\gamma_3)\Gamma(2-\gamma_2-\gamma_3)}{(2\pi i)^2} \int_c (-t)^{-\gamma_2} (t-1)^{-\gamma_3} \\
 F_2(\alpha_1, \beta_1, \beta_2, \gamma_1, \gamma_2 + \gamma_3 - 1; \cosh x, \frac{\cosh y}{t} + \frac{\cosh z}{1-t}) dt \tag{1.3.1}$$

where

$$|\cosh x| + \left| \frac{\cosh y}{t} + \frac{\cosh z}{1-t} \right| < 1 \text{ along the contour.}$$

Putting $\beta_1 = \gamma_1$ and $\beta_2 = \gamma_2 + \gamma_3 - 1$ in equation (1.3.1) we get

$$F_E = \frac{\Gamma(\gamma_2)\Gamma(\gamma_3)\Gamma(2-\gamma_2-\gamma_3)}{(2\pi i)^2} \int (-t)^{-\gamma_2} (-t)^{-\gamma_3} (1 - \cosh x - \frac{\cosh y}{t} - \frac{\cosh z}{1-t})^{-\alpha_1} dt$$

We can expand

$$(1 - \cosh x - \frac{\cosh y}{t} - \frac{\cosh z}{1-t})^{-\alpha} = (1 - \cosh x - \cosh y)^{-\alpha}$$

$$\sum_{m,n=0}^{\infty} \frac{(\alpha)_m}{m!n!} \left(\frac{\cosh y}{1 - \cosh x - \cosh y} \cdot \frac{1-t}{t} \right)^m \left(\frac{\cosh z}{1 - \cosh x - \cosh y} \cdot \frac{1}{1-t} \right)^n \dots \quad (1.3.2)$$

Where

$$\left| \frac{\cosh y}{1 - \cosh x - \cosh y} \cdot \frac{1-t}{t} \right| < 1, \quad \left| \frac{\cosh z}{1 - \cosh x - \cosh y} \cdot \frac{1}{1-t} \right| < 1$$

along the contour

$$= (1 - \cosh x - \cosh y - \cosh z)^{-\alpha}$$

$$\sum_{m,n=0}^{\infty} \frac{(\alpha)_m}{m!n!} \left(\frac{\cosh y}{1 - \cosh x - \cosh y - \cosh z} \cdot \frac{1-t}{t} \right)^m \left(\frac{\cosh z}{1 - \cosh x - \cosh y - \cosh z} \cdot \frac{1}{1-t} \right)^n \dots \quad (1.3.3)$$

where

$$\left| \frac{\cosh y}{1 - \cosh x - \cosh y - \cosh z} \cdot \frac{1-t}{t} \right| < 1 \text{ and } \left| \frac{\cosh z}{1 - \cosh x - \cosh y - \cosh z} \cdot \frac{1}{1-t} \right| < 1$$

along the contour using (1.3.2) and (1.3.3) and then evaluating the integral, after changing the order of the integration and summation, keeping

$$\int_c (-t)^{\alpha-1} (t-1)^{\beta-1} dt = \frac{(2\pi)^2}{\Gamma(1-\alpha)\Gamma(1-\beta)\Gamma(\alpha+\beta)}$$

We will get,

$$F_E(\alpha, \alpha, \alpha, \gamma_1, \gamma_2 + \gamma_3 - 1, \gamma_2 + \gamma_3 - 1, \gamma_1, \gamma_2, \gamma_3, : \cosh x, \cosh y, \cosh z) = (1 - \cosh x - \cosh y)^{-\alpha}$$

$$H_1(1 - \gamma_3, \alpha, \gamma_2 + \gamma_3 - 1, \gamma_2; \frac{\cosh y}{\cosh x + \cosh y - 1}, \frac{\cosh z}{\cosh x + \cosh y - 1}) \quad (1.3.4)$$

$$= (1 - \cosh x - \cosh y - \cosh z)^{-\alpha}$$

$$G_1(\alpha, 1 - \gamma_2, 1 - \gamma_3, \frac{\cosh y}{1 - \cosh x - \cosh y - \cosh z}, \frac{\cosh z}{1 - \cosh x - \cosh y - \cosh z}) \quad (1.3.5)$$

When H_1 and G_1 are defined by Horn (1931)

$$G_1(\alpha, \beta, \beta'; \cosh x, \cosh y) = \sum_{m,n=0}^{\infty} \frac{(\alpha)_{m+n} (\beta)_{n-m} (\beta')_{m-n}}{m!n!} \cosh^m x \cosh^n y \quad (1.3.6)$$

$$H_1(\alpha, \beta, \gamma, \delta; \cosh x, \cosh y) = \sum_{m,n=0}^{\infty} \frac{(\alpha)_{m-n} (\beta)_{n+m} (\gamma)_n}{m!n! (\delta)_m} \cosh^m x \cosh^n y \quad (1.3.7)$$

We also expand $(1 - \cosh x - \frac{\cosh y}{t} - \frac{\cosh z}{1-t})^{-\alpha}$ by taking $(1 - \cosh x)^{-\alpha}$ as factor but that will only reduce F_E to F_4 .

Similarly, we have $F_G(\alpha_1, \alpha_1, \alpha_1, \beta_1, \beta_2, \beta_3; \gamma_1, \gamma_2, \gamma_3; \cosh x, \cosh y, \cosh z)$

$$= \sum_{m,n,p=0}^{\infty} \frac{(\alpha_1)_{m+n+p} (\beta_1)_m (\beta_2)_n (\beta_3)_p}{m!n!(\gamma_1)_m (\gamma_2)_{n=p}} \cosh^m x \cosh^n y \cosh^p z \quad (1.3.8)$$

absolutely convergent if $m + n = 1$ and $m + p = 1$ while

$|\cosh x| < 1$, $|\cosh y| < 1$, and $|\cosh z| < 1$

Its Integral representation is given by S. Saran (1955)

$$F_G = \frac{\Gamma(\rho)\Gamma(\rho_1)\Gamma(2-\rho-\rho_1)}{(2\pi i)^2} \int_c (-t)^{-\rho} (t-1)^{-\rho_1} \left(\frac{\cosh x}{t} {}_2F_1(\rho, \beta_1; \gamma_1; t) {}_2F_1(\rho_1; \beta_2; \beta_2; \gamma_2; 1-t) + \frac{\cosh y}{1-t} + \frac{\cosh z}{1-t} \right) dt \quad (1.3.9)$$

$${}_2F_1(\alpha, \beta, 2\beta; \cosh x) = (1 - \frac{1}{2} \cosh x)^{-\alpha} {}_2F_1(\frac{1}{2}\alpha, \frac{1}{2}\alpha + \frac{1}{2}, \beta + \frac{1}{2}; \frac{(\cosh x)^2}{(2 - \cosh x)^2}) \quad (1.3.10)$$

absolutely convergent if $m + n = 1$ and $m + p = 1$ while $|\cosh x| < 1$, $|\cosh y| < 1$, and $|\cosh z| < 1$

It's integral representation is given by

$${}_2F_1(\alpha, \beta, \beta'; \beta + \beta'; \cosh x, \cosh y) = (1 - \cosh y)^{-\alpha} {}_2F_1(\alpha, \beta, \beta + \beta'; \frac{\cosh x - \cosh y}{1 - \cosh y}) \quad (1.3.11)$$

using (1.3.10) and then taking the new variable of integration u given by $t = 1/2 \cosh x + (1-1/2 \cosh x)u$ in F_G 's integral we will get

$$F_G(\gamma_1 = 2\beta_1) = (1 - \frac{1}{2} \cosh x)^{-\alpha} \frac{\Gamma(\rho)\Gamma(\rho_1)\Gamma(2-\rho-\rho_1)}{(2\pi i)^2} \int_c (-u)^{-\rho} (u-1)^{-\rho_1} {}_2F_1(\frac{1}{2}\rho, \frac{1}{2}\rho + \frac{1}{2}; \beta + \frac{1}{2}; \frac{(\cosh x)^2}{(2 - \cosh x)^2} u^2) \left(\frac{\cosh x}{(1 - \frac{\cosh x}{2})(1-u)} + \frac{\cosh z}{(1 - \frac{\cosh x}{2})(1-u)} \right) du \quad (1.3.12)$$

Now using (1.3.11) after putting $\gamma_2 = \beta_2 + \beta_3$ and introducing a new variable of integration v given by:

$$v = (1 - \cosh z - \frac{1}{2} \cosh x) / (1 - \frac{1}{2} \cosh x) \quad (1.3.13)$$

We will get, on Integration

$$F_G(\alpha_1, \alpha_1, \alpha_1, \beta_1, \beta_2, \beta_3, 2\beta_1, \beta_2 + \beta_3, \beta_2 + \beta_3; \cosh x, \cosh y, \cosh z) \\
 = (1 - \cosh z - \frac{1}{2} \cosh x)^{-\alpha_1} \\
 H_4(\alpha_1, \beta_2, \beta_1 + \frac{1}{2}, \beta_2, \beta_3; \frac{\cosh^2 x}{4(2 - \cosh x - 2 \cosh z)^2}, \frac{\cosh y - \cosh z}{(1 - \cosh z - \frac{1}{2} \cosh x)}) \quad (1.3.14)$$

where

$$H_4(\alpha, \beta, \gamma, \delta; \cosh x, \cosh y) = \sum_{m,n=0}^{\infty} \frac{(\alpha)_{2m+n} (\beta)_n}{m!n! (\gamma)_m (\delta)_n} \cosh^m x \cosh^n y \quad (1.3.15)$$

We will now consider the integral S. Saran (1955) for F_k to show that

$$F_K(\alpha_1, \alpha_2, \alpha_3, \gamma_1 + \gamma_3 - 1, \gamma_2, \gamma_1 + \gamma_3 - 1; \gamma_1, \gamma_2, \gamma_3; \cosh x, \cosh y, \cosh z) \\
 = (1 - \cosh y - \cosh z)^{-\alpha_2} \quad (1.3.16)$$

$$H_2(1 - \gamma_1, \alpha_2, \alpha_1, \gamma_1 + \gamma_3 - 1, \gamma_3; \frac{\cosh x}{\cosh y + \cosh z - 1}, -\cosh x) \\
 = (1 - \cosh x)^{-\alpha_1} (1 - \cosh y)^{-\alpha_2}$$

$$H_2(1 - \gamma_3, \alpha_1, \alpha_2, \gamma_1 + \gamma_3 - 1, \gamma_1; \frac{\cosh z}{\cosh y - 1}, \frac{\cosh z}{\cosh y - 1}) \\
 = (1 - \cosh x)^{-\alpha_1} (1 - \cosh y - \cosh z)^{-\alpha_2} \quad (1.3.17)$$

$$G_2(\alpha_1, \alpha_2, 1 - \gamma_1, 1 - \gamma_3; \frac{\cosh z}{1 - \cosh y}, \frac{\cosh z}{1 - \cosh y - \cosh z}) \quad (1.3.18)$$

where H_2 and G_2 are defined by

$$H_2(\alpha, \beta, \gamma, \delta; \theta; \cosh x, \cosh y) = \sum_{m,n=0}^{\infty} \frac{(\alpha)_{m+n} (\beta)_m (\gamma)_n (\delta)_n}{m!n! (\theta)_m} \cosh^m x \cosh^n y \quad (1.3.19)$$

and

$$G_2(\alpha, \alpha', \beta, \beta'; \cosh x, \cosh y) = \sum_{m,n=0}^{\infty} \frac{(\alpha)_m (\alpha')_n (\beta)_{n-m} (\beta')_{m-n}}{m!n!} \cosh^m x \cosh^n y \quad (1.3.20)$$

$$F_K(\alpha_1, \alpha_2, \alpha_2, \beta_1, \beta_2, \beta_1, 2\alpha_1, \beta_2, \beta_3; \cosh x, \cosh y, \cosh z)$$

$$= (1 - \frac{1}{2} \cosh x)^{-\beta_1} (1 - \cosh y)^{-\alpha_2}$$

$$H_4(\beta_1, \alpha_2, \alpha_1 + \frac{1}{2}, \gamma_3; \frac{\cosh^2 x}{4(2 - \cosh x)^2}, \frac{\cosh z}{(1 - \frac{1}{2} \cosh x)(1 - \cosh y)}) \tag{1.3.21}$$

This leads to Erdelyi's (1948) when $y = 0$

To prove these we know that

$$F_K(\alpha_1, \alpha_2, \alpha_2, \beta_1, \beta_2, \beta_1; \gamma_1, \gamma_2, \gamma_3; \cosh x, \cosh y, \cosh z)$$

$$\sum_{m,n=0}^{\infty} \frac{(\alpha_1)_m (\alpha_2)(\beta_1)_{m+p} (\beta_2)_n}{m!n!p! (\gamma_1)_m (\gamma_2)_n (\gamma_3)_p}, \cosh^m x \cosh^n y \cosh^p z \tag{1.3.22}$$

absolutely convergent if $p = (1-m) (1-n)$ where

$$|\cosh x| < 1, |\cosh y| < 1, \text{ and } |\cosh z| < 1$$

$$F_K(\alpha_1, \alpha_2, \alpha_2, \beta_1, \beta_2, \beta_1; \gamma_1, \gamma_2, \gamma_3; \cosh x, \cosh y, \cosh z)$$

$$= \frac{\Gamma(\rho)\Gamma(\rho_1)\Gamma(2-\rho-\rho_1)}{(2\pi i)^2} \int_c (-t)^{-\rho} (t-1)^{-\rho_1} dt$$

$$= {}_2F_1(\rho, \alpha_1; \gamma_1 + \frac{1}{2}; \frac{\cosh x}{t}) \cdot {}_2F_2(\alpha_2, \beta_2, \rho_1, \gamma_2, \gamma_3; \cosh y, \frac{\cosh z}{(1-t)}) \tag{1.3.23}$$

Let $|t| > |\cosh x|$ and $|\cosh z|/|1-t| < 1 - |\cosh y|$ along the contour and $\beta_1 = \rho + \rho_1 - 1$ putting $\gamma_2 = \beta_2$ and $\gamma_3 = \rho_1$ we have

$$F_2(\alpha_2, \beta_2, \rho_1, \rho_2, \rho_1; \cosh y, \frac{\cosh z}{(1-t)}) = (1 - \cosh y - \frac{\cosh z}{(1-t)})^{-\alpha_2}$$

$$= (1 - \cosh y - \cosh z)^{-\alpha_2} \sum_{m=0}^{\infty} \frac{(\alpha_2)_m}{m!} (\frac{\cosh z}{1 - \cosh y - \cosh z} \cdot \frac{t}{1-t})^m \tag{1.3.24}$$

$$= (1 - \cosh y)^{-\alpha_2} \sum_{m=0}^{\infty} \frac{(\alpha_2)_m}{m!} (\frac{\cosh z}{1 - \cosh y - \cosh z} \cdot \frac{t}{1-t})^m \tag{1.3.25}$$

and

$${}_2F_1(\rho, \alpha_1, \rho; \cosh y, \frac{\cosh x}{t}) = (1 - \frac{\cosh x}{t})^{-\alpha_2}$$

$$= (1 - \cosh x)^{-\alpha_1} \sum_{m=0}^{\infty} \frac{(\alpha_2)_m}{m!} (\frac{\cosh x}{1 - \cosh x} \cdot \frac{1}{1-t})^m \tag{1.3.26}$$

Thus if $\beta_1 = \gamma_1 + \gamma_3 - 1$ and $\beta_2 = \gamma_2$ we will have

$$F_K = \frac{\Gamma(\gamma_1)\Gamma(\gamma_3)\Gamma(2-\gamma_1-\gamma_3)}{(2\pi i)^2} \int_c (-t)^{-\gamma_1} (t-1)^{-\gamma_3} dt$$

$$(1 - \frac{\cosh y}{t})^{-\alpha_1} (1 - \cosh y - \frac{\cosh z}{1-t})^{-\alpha_2} dt \tag{1.3.27}$$

Now writing down the expansion (1.3.24) and

$$\frac{\cosh y}{(1-t)^{-\alpha_1}} = \sum_{m=0}^{\infty} \frac{(\alpha_1)_m}{m!} \left(\frac{\cosh x}{t}\right)^m \tag{1.3.28}$$

and the integrating term by term by term we will be able to prove (1.3.16) – (1.3.24) can also be proved by applying (1.3.24) and (1.3.26) and then integrating term by term.

Application of (1.3.25) and (1.3.26) will prove (1.3.17) the proof of (1.3.21) is however, similar to (1.3.14).

We can also prove the following results for F_N

$$\begin{aligned} &F_N(\alpha_1, \gamma_2, \gamma_2, \gamma_1+k-1-\beta_2, \gamma_1+k-1; \gamma_1, \gamma_2, \gamma_3; \cosh x, \cosh y, \cosh z) \\ &= (1-\cosh x)^{-\alpha_1} (1-\cosh y)^{-\beta_2} \\ &\quad H_2(1-k, \alpha_1, k, \gamma_1+k-1, \gamma_2; \frac{\cosh x}{\cosh x-1}, -\cosh z) \end{aligned} \tag{1.3.29}$$

$$\begin{aligned} &= (1-\cosh x)^{-\alpha_1} (1-\cosh y)^{-\beta_2} \\ &\quad G_2(\alpha_1, k, 1-\gamma_1, 1-k; \frac{\cosh x}{1-\cosh x}, \frac{\cosh z}{1-\cosh z}) \end{aligned} \tag{1.3.30}$$

$$\begin{aligned} &F_N(\alpha_1, \alpha_2, \alpha_2, \beta_1, \beta_2, \beta_1, \gamma_1, \gamma_2, \gamma_3; \cosh x, \cosh y, \cosh z) \\ &= \sum_{m,n=0}^{\infty} \frac{(\alpha_1)_m (\alpha_2)_2 (\beta_1)_{m+p} (\beta_2)_n}{m! n! p! (\gamma_1)_m (\gamma_2)_{n+p}} \cosh^m x \cosh^n y \cosh^p z \end{aligned} \tag{1.3.31}$$

absolutely convergent if $m+p = 1$ and $n = 1$

where $|\cosh x| < 1$, $|\cosh y| < 1$, and $|\cosh z| < 1$ and

it's integral representations

$$\begin{aligned} &F_N(\alpha_1, \alpha_2, \alpha_2, \beta_1, \beta_2, \beta_1, \gamma_1, \gamma_2, \gamma_3; \cosh x, \cosh y, \cosh z) \\ &= \frac{\Gamma(\rho)\Gamma(\rho_1)\Gamma(2-\rho-\rho_1)}{(2\pi)^2} \int_c (-t)^{-\rho} (t-1)^{-\rho_1} \\ &\quad {}_2F_1(\rho, \alpha_1, \gamma_1; \frac{\cosh x}{t}) {}_2F_2(\alpha_2, \beta_2, \rho_1, \gamma_2; \cosh y, \frac{\cosh z}{(1-t)}) dt \end{aligned} \tag{1.3.32}$$

Where $\beta_1 = \rho + \rho_1 - 1$ and $|t| > |\cosh x|$ and $|1-t| > |\cosh z|$ along the contour.

II. REDUCIBLE CASES FOR THE QADRUPLE HYPERGEOMETRIC FUNCTION

2.1 INTRODUCTION

The various Hypergeometric function of four variables are studied earlier by H. Exton, H. Srivastava and many others. Here all 21 functions are given below in the terms of a table.

1	$K_1(a,a,a,a;b,b,b,c;d,e_1,e_2,d; x,y,z,t)$	$= \sum \frac{(a,k+m+n+p)(b,k+m+n)(c,p)x^k y^m z^n t^p}{(d,k+p)(e_1,m)(e_1,n)k!m!n!p!}$
2.	$K_2(a,a,a,a;b,b,b,c;d_1,d_2,d_3,d_4; x,y,z,t)$	$= \sum \frac{(a,k+m+n+p)(b,k+m+n)(c,p)x^k y^m z^n t^p}{(d_1,k)(d_2,m)(d_3,n)(d_4,p)k!m!n!p!}$
3	$K_3(a,a,a,a;b_1,b_1,b_2,b_2;c_1,c_2,c_2,c_1; x,y,z,t)$	$= \sum \frac{(a,k+m+n+p)(b_1,k+m)((b_2,n+p)x^k y^m z^n t^p}{(c_1,k+p)(c_2,m+n)k!m!n!p!}$
4	$K_4(a,a,a,a;b_1,b_1,b_2, b_2;c,d_1,d_2,c; x,y,z,t)$	$= \sum \frac{(a,k+m+n+p)(b_1,k+m)((b_2,n+p)x^k y^m z^n t^p}{(c,k+p)(d_1,m)(d_2,n)k!m!n!p!}$
5	$K_5(a,a,a,a;b_1,b_1,b_2, b_2;c_1,c_2,c_3,c_4; x,y,z,t)$	$= \sum \frac{(a,k+m+n+p)(b_1,k+m)((b_2,n+p)x^k y^m z^n t^p}{(c_1,k)(c_2,m)(c_3,n)(c_4,p)k!m!n!p!}$
6	$K_6(a,a,a,a;b,b,c_1,c_2;e,d,d,d; x,y,z,t)$	$= \sum \frac{(a,k+m+n+p)(b,k+m)(c_1,n)(c_2,p)x^k y^m z^n t^p}{(e,k)(d,m+n+p)k!m!n!p!}$
7.	$K_7(a,a,a,a;b,b,c_1,c_2,d_1,d_2,d_1,d_2; x,y,z,t)$	$= \sum \frac{(a,k+m+n+p)(b,k+m)(c_1,n)(c_2,p)x^k y^m z^n t^p}{(d_1,k+n)(d_2,m+p)k!m!n!p!}$
8.	$K_8(a,a,a,a;b,b,c_1,c_2;d,e_1,d,e_2; x,y,z,t)$	$= \sum \frac{(a,k+m+n+p)(b,k+m)(c_1,n)(c_2,p)x^k y^m z^n t^p}{(d,k+n)(e_1,m)(e_2,n)k!m!n!p!}$
9.	$K_9(a,a,a,a;b,b,c_1,c_2,e_1,e_2,d,d; x,y,z,t)$	$= \sum \frac{(a,k+m+n+p)(b,k+m)(c_1,n)(c_2,p)x^k y^m z^n t^p}{(e_1,k)(e_2,m)(d,n+p)k!m!n!p!}$
10	$K_{10}(a,a,a,a;b,b,c_1,c_2;d_1,d_2,d_3,d_4; x,y,z,t)$	$= \sum \frac{(a,k+m+n+p)(b,k+m)(c_1,n)(c_2,p)x^k y^m z^n t^p}{(d_1,k)(d_2,m)(d_3,n)(d_4,p)k!m!n!p!}$
11	$K_{11}(a,a,a,a;b_1,b_2,b_3,b_4,c,c,c,d; x,y,z,t)$	$= \sum \frac{(a,k+m+n+p)(b_1,k)(b_2,m)(b_3,n)(b_4,p)x^k y^m z^n t^p}{(c,k+m+n)(d,p)k!m!n!p!}$
12	$K_{12}(a,a,a,a;b_1,b_2,b_3,b_4,c_1,c_1,c_2,c_2; x,y,z,t)$	$= \sum \frac{(a,k+m+n+p)(b_1,k)(b_2,m)(b_3,n)(b_4,p)x^k y^m z^n t^p}{(c_1,k+m)(c_2,n+p)k!m!n!p!}$
13	$K_{13}(a,a,a,a;b_1,b_2,b_3,b_4,c,c,d_1,d_2; x,y,z,t)$	$= \sum \frac{(a,k+m+n+p)(b_1,k)(b_2,m)(b_3,n)(b_4,p)x^k y^m z^n t^p}{(c,k+m)(d_1,n)(d_2,p)k!m!n!p!}$

14	$K_{14}(a, a, a, c_3; b, c_1, c_1, b; d, d, d, d; x, y, z, t)$	$= \sum \frac{(a, k+m+n)(c_3, p)(b, k+p)(c_1, m+n)x^k y^m z^n t^p}{(d, k+m+n+p)k!m!n!p!}$
15	$K_{15}(a, a, a, b_5; b_1, b_2, b_3, b_4; c, c, c, c; x, y, z, t)$	$= \sum \frac{(a, k+m+n)(b_5, p)(b_1, k)(b_2, m)(b_3, n)(b_4, p)x^k y^m z^n t^p}{(c, k+m+n+p)k!m!n!p!}$
16	$K_{16}(a_1, a_2, a_3, a_4; b; x, y, z, t)$	$= \sum \frac{(a_1, k+m)(a_2, k+n)(a_3, n+p)(a_4, n+p)x^k y^m z^n t^p}{(c, k+m+n+p)k!m!n!p!}$
17	$K_{17}(a_1, a_2, a_3, b_1, b_2; c; x, y, z, t)$	$= \sum \frac{(a_1, k+m)(a_2, k+n)(a_3, n+p)(b_1, p)(b_2, p)x^k y^m z^n t^p}{(c, k+m+n+p)k!m!n!p!}$
18	$K_{18}(a_1, a_2, a_3, b_1, b_2; c; x, y, z, t)$	$= \sum \frac{(a_1, k+m)(a_2, k+p)(a_3, m+n)(b_1, n)(b_2, p)x^k y^m z^n t^p}{(c, k+m+n+p)k!m!n!p!}$
19	$K_{19}(a_1, a_2, b_1, b_2, b_3, b_4; c; x, y, z, t)$	$= \sum \frac{(a_1, k+m)(a_2, k+n)(b_1, m)(b_2, n)(b_3, p)x^k y^m z^n t^p}{(c, k+m+n+p)k!m!n!p!}$
20	$K_{20}(a_1, a_2, b_3, b_4; b_1, b_2, a_2, a_2; c, c, c, c; x, y, z, t)$	$= \sum \frac{(a_1, k)(a_2, m)(b_3, n)(b_4, p)(b_1, k)(b_2, m)(a_2, n+p)x^k y^m z^n t^p}{(c, k+m+n+p)k!m!n!p!}$
21	$K_{21}(a, a, b_6, b_5; b_1, b_2, b_3, b_4; c, c, c, c; x, y, z, t)$	$= \sum \frac{(a, k+m)(b_6, n)(b_5, p)(b_1, k)(b_2, m)(b_3, n)(b_4, p)x^k y^m z^n t^p}{(c, k+m+n+p)k!m!n!p!}$

All results are having convergent conditions and restrictions on parameters including variables due to Exton (1972)

As far as known to me all the results investigation in this journal are new and interesting which have a wide range of application in the field mathematical series

2.2 In this Section Quadruple hypergeometric function reduced to the hypergeometric function of one variable.

(1) **Theorem** : By specializing the parameters of K_{14} , we obtain the following

$$\begin{aligned}
 &F(1, a, a, 1; b_1, b_2, b_1, b_2; b_1, b_2 + b_1 + b_2, b_1 + b_2, b_1 + b_2; x, y, z, t) \\
 &= (x + y - xy)^{-1} (z + t - zt)^{-1} \\
 &[x {}_2F_1(b_1+p, a_2+p; b_1+b_2+p+q; x) + y {}_2F_1(b_2+q, a_2+p; b_1+b_2+p+q; y)] \\
 &\quad \cdot [z {}_2F_1(b_1, a_2; b_1+b_2; z) + y {}_2F_1(b_2, a_2, b_1+b_2; t)] \tag{2.2.1}
 \end{aligned}$$

condition and restrictions are given in Exton (1972)

proof:

$$F(1, a_2, a_2, 1; b_1, b_2, b_1, b_2; b_1+b_2, b_1 + b_2, b_1 + b_2, b_1 + b_2; x, y, z, t)$$

$$\sum_{m, n, p, q=0}^{\infty} \frac{(1)_m (a_2)_{n+p} (1)_q (b_1)_{m+p} (b_2)_{n+q}}{(b_1 + b_2)_{m+n+p+q}} \frac{x^m y^n z^p t^q}{m!n!p!q!} \tag{2.2.2}$$

$$\begin{aligned}
 &= \sum_{m,n,p,q=0}^{\infty} \frac{m!(a_2)_{n+p} (1)_q (b_1+p)_m (b_1)_p (b_2+q)_n (b_2)_q x^m y^n z^p t^q}{(b_1+b_2+p+q)_{m+n} (b_1+b_2)_{m+n} m!n!p!q!} \\
 &= \sum_{m,n=0}^{\infty} \left[\frac{(b_1+p)_m (b_2+q)_n x^m y^n}{(b_1+b_2+p+q)_{m+n}} \right] \frac{(a_2+p)_n}{n!} \sum_{p,q=0}^{\infty} \left[\frac{(b_1)_p (b_2)_q z^p t^q}{(b_1+b_2+p+q)_{m+n}} \right] \frac{(a_2)_p (1)_q}{n!q!} \quad (2.2.3)
 \end{aligned}$$

by virtue of the result the to carlitz formula in the term

$$\sum_{m,n=0}^{\infty} \left[\frac{(\alpha)_m (\beta)_n x^m y^n}{(\alpha+\beta)_{m+n}} \right] = (x+y-xy)^{-1} \sum_{m=0}^{\infty} \left[\frac{(\alpha)_m x^{m+1}}{(\alpha+\beta)_m} \right] + \sum_{n=0}^{\infty} \left[\frac{(\beta)_n y^{n+1}}{(\alpha+\beta)_n} \right]$$

We have equation (2.2.3) in the term

$$\begin{aligned}
 &= (x+y-xy)^{-1} \left[\sum_{n=0}^{\infty} \frac{(b_1+p)_n x^{n+1}}{(b_1+b_2+p+q)_n} + \sum_{n=0}^{\infty} \frac{(b_2+q)_n y^{n+1}}{(b_1+b_2+p+q)_n} \right] \frac{(a_2+p)_n}{n!} \\
 &\cdot (z+t-zt)^{-1} \left[\sum_{p=0}^{\infty} \frac{(b_1)_p z^{p+1}}{(b_1+b_2)_p} + \sum_{p=0}^{\infty} \frac{(b_2)_p t^{p+1}}{(b_1+b_2)_p} \right] \frac{(a_2)_p}{p!} \quad (2.2.4)
 \end{aligned}$$

$$\begin{aligned}
 &= (x+y-xy)^{-1} (z+t-zt)^{-1} \left[x \sum_{n=0}^{\infty} \frac{(b_1+p)_n (a_2+p)_n x^n}{(b_1+b_2+p+q)_n n!} + y \sum_{n=0}^{\infty} \frac{(b_2+q)_n (a_2+p)_n y^n}{(b_1+b_2+p+q)_n n!} \right] \\
 &\left[z \sum_{p=0}^{\infty} \frac{(b_1)_p (a_2)_p z^p}{(b_1+b_2)_p p!} + t \sum_{p=0}^{\infty} \frac{(b_2)_p (a_2)_p t^p}{(b_1+b_2)_p p!} \right]
 \end{aligned}$$

then theorem follows

$$F(1, a_2, a_2, 1; b_1, b_2, b_1, b_2, b_1+b_2, b_1+b_2, b_1+b_2, b_1+b_2; x, y, z, t) = (x+y-xy)^{-1} (z+t-zt)^{-1}$$

$$\begin{aligned}
 &[x {}_2F_1(b_1+p, a_2+p; b_1+b_2+p+q; x) + y {}_2F_1(b_2+q, a_2+p; b_1+b_2+p+q; y)]. \\
 &[z {}_2F_1(b_1, a_2; b_1+b_2; z) + t {}_2F_1(b_2, a_2; b_1+b_2; t)]
 \end{aligned}$$

The completes the derivation of (2.2.1).

(2) **Theorem** by specializing the parameters of K_{14} , we obtain the following.

(i) $F(1, a_2, a_2, 1; b_1, b_2, b_1, b_2, b_1+b_2, b_1+b_2, b_1+b_2, b_1+b_2; 1, 1, 1, 1)$

$$\begin{aligned}
 &= \left[\frac{\Gamma(b_1+b_2+p+q)\Gamma(b_2+q-a_2-p)}{\Gamma(b_2+q)\Gamma(b_1+b_2+q-a_2)} + \frac{\Gamma(b_1+b_2+p+q)\Gamma(b_2+p-q-a_2)}{\Gamma(b_1+q)\Gamma(b_1+b_2+p-a_2)} \right] \\
 &\left[\frac{\Gamma(b_1+b_2)\Gamma(b_2-a_2)}{\Gamma(b_2)\Gamma(b_1+b_2-a_2)} + \frac{\Gamma(b_1+b_2)\Gamma(b_2-a_2)}{\Gamma(b_1)\Gamma(b_1+b_2-a_2)} \right] \quad (2.2.6)
 \end{aligned}$$

(ii) $F(1, a_2, a_2, 1; a_2, a_2, a_2, a_2; 2a_2, 2a_2, 2a_2, 2a_2; 1, 1, 1, 1)$

$$= \left[\frac{\Gamma(2a_2 + p + q)\Gamma(q - p)}{\Gamma(a_2 + q)\Gamma(a_2 + q)} + \frac{\Gamma(a_2 + p + q)\Gamma(q - p)}{\Gamma(a_2 + q)\Gamma(a_2 + q)} \right] 2 \left[\frac{\Gamma(2a_2)}{\Gamma(a_2)\Gamma(a_2)} \right] \quad (2.2.7)$$

(iii) $F(1,1,1,1;1,1,1,1;2,2,2,2;1,1,1,1)$

$$= \frac{\Gamma(p + q + 2)}{\Gamma(q + 1)\Gamma(p + 1)} [\Gamma(q + 1) + \Gamma(p + 1)] \quad (2.2.8)$$

(1) Proof :-

now putting $x = y = z = 1$ in equation (2.2.1) than we get

$F(1, a_2, a_2, 1; b_1, b_2, b_1, b_2; b_1 + b_2, b_1 + b_2, b_1 + b_2, b_1 + b_2; 1, 1, 1, 1)$

$= [{}_2F_1(b_1 + p, a_2 + p; b_1 + b_2 + p + q; 1) + {}_2F_1(b_2 + q, a_2 + p; b_1 + b_2 + p + q; 1)]$.

$$[{}_2F_1(b_1, a_2; b_1 + b_2; 1) + {}_2F_1(b_2, a_2; b_1 + b_2; 1)] \quad (2.2.9)$$

now Apply Gauss's summation theorem (1812)

$${}_2F_1(\alpha, \beta, \gamma; 1) = \frac{\Gamma(\gamma)\Gamma(\gamma - \alpha - \beta)}{\Gamma(\gamma - \alpha)\Gamma(\gamma - \beta)} \quad (2.2.10)$$

using equation (2.2.10) in (2.2.9) we get

$$= \left[\frac{\Gamma(b_1 + b_2 + p + q)\Gamma(b_2 + q - a_2 - p)}{\Gamma(b_2 + q)\Gamma(b_1 + b_2 + q - a_2)} + \frac{\Gamma(b_1 + b_2 + p + q)\Gamma(b_1 + p - q - a_2)}{\Gamma(b_1 + q)\Gamma(b_1 + b_2 + p - a_2)} \right]$$

$$\left[\frac{\Gamma(b_1 + b_2)\Gamma(b_2 - a_2)}{\Gamma(b_2)\Gamma(b_1 + b_2 - a_2)} + \frac{\Gamma(b_1 + b_2)\Gamma(b_2 - a_2)}{\Gamma(b_1)\Gamma(b_1 + b_2 - a_2)} \right] \quad (2.2.11)$$

This completes the derivation of (2.2.6)

(2) Proof:- now putting $b_1 = b_2 = a_2$ in equation (2.2.11)

$F(1, a_2, a_2, a_2; 1; a_2, a_2, a_2, a_2; 2a_2, 2a_2, 2a_2, 2a_2; 1, 1, 1, 1)$

$$= \left[\frac{\Gamma(2a_2 + p + q)\Gamma(q - p)}{\Gamma(a_2 + q)\Gamma(a_2 + q)} + \frac{\Gamma(a_2 + p + q)\Gamma(p - q)}{\Gamma(a_2 + p)\Gamma(a_2 + p)} \right] \left[\frac{\Gamma(2a_2)}{\Gamma(a_2)\Gamma(a_2)} + \frac{\Gamma(2a_2)}{\Gamma(a_2)\Gamma(a_2)} \right]$$

$$= \left[\frac{\Gamma(2a_2 + p + q)\Gamma(q - p)}{\Gamma(a_2 + q)\Gamma(a_2 + q)} + \frac{\Gamma(a_2 + p + q)\Gamma(p - q)}{\Gamma(a_2 + p)\Gamma(a_2 + p)} \right] \left[\frac{\Gamma(2a_2)}{\Gamma(a_2)\Gamma(a_2)} \right] \quad (2.2.12)$$

This completes the derivation of (2.2.7)

(3) Proof: now putting $b_1 = b_2 = a_2 = 1$ in equation (2.2.12)

$F(1, 1, 1, 1; 1, 1, 1, 1; 2, 2, 2, 2; 1, 1, 1, 1)$

$$\begin{aligned}
 &= \left[\frac{\Gamma(p+q+2)}{2\Gamma(q+1)} + \frac{\Gamma(p+q+2)}{2\Gamma(q+1)} \right] \Gamma(2) \\
 &= \frac{\Gamma(p+q+2)}{\Gamma(q+1)\Gamma(p+1)} [\Gamma(q+1)+\Gamma(p+1)] \tag{2.2.13}
 \end{aligned}$$

This completes the derivation of (2.2.8)

2.3 In this Section Quadruple hypergeometric function reduced to the Appell hypergeometric function

(1) **Theorem** By specializing the parameters of K_{12}, K_{10}, K_{15} we obtain the following

$$\begin{aligned}
 &K_{12}(a, a, a, a; b_1, b_2, b_3, b_4, c_1, c_1, c_2, c_2; x, y, z, t) \\
 &= F_1(a, b_1, b_2; c_1; x, y) F_1(a+m+n, b_3, b_4; c_2; z, t) \tag{2.3.1}
 \end{aligned}$$

$$\begin{aligned}
 &K_{12}(a, a, a, a; b_1, b_2, b_3, b_4, c_1, c_1, c_2, c_2; 1, 1, 1, 1) \\
 &= \frac{\Gamma(c_1)\Gamma(c_1 - a - b_1 - b_2)}{\Gamma(c_1 - a)\Gamma(c_1 - b_1 - b_2)} \cdot \frac{\Gamma(c_2)\Gamma(c_2 - a - m - n - b_3 - b_4)}{\Gamma(c_2 - a)\Gamma(c_2 - b_3 - b_4)} \tag{2.3.2}
 \end{aligned}$$

$$\begin{aligned}
 &K_{10}(a, a, a, a; b, b, c_1, c_2; d_1, d_2, d_3, d_4; x, y, z, t) \\
 &= F_4(a, b; d_1, d_2; x, y) F_2(a+m+n, c_1, c_2; d_3, d_4; z, t) \tag{2.3.3}
 \end{aligned}$$

$$\begin{aligned}
 &K_{15}(a, a, a, a; b_5; b_1, b_2, b_3, b_4; c, c, c, c; x, y, z, t) \\
 &= F_1(a, b_1, b_2; c; x, y) F_3(a+m+n, b_5, b_3, b_4; c+m+n; z, t) \tag{2.3.4}
 \end{aligned}$$

where (F_1, F_2, F_3, F_4) are Appell hypergeometric function of two variables.

(1) **Proof:**
 Now Quadruple hypergeometric function can be reduced to Appell function of two variable.

$$\begin{aligned}
 &K_{12}(a, a, a, a; b_1, b_2, b_3, b_4, c_1, c_1, c_2, c_2; x, y, z, t) \\
 &= \sum_{m,n,p,q=0}^{\infty} \frac{(a)_{m+n+p+q} (b_1)_m (b_2)_n (b_3)_p (b_4)_q x^m y^n z^p t^q}{(c_1)_{m+n} m! n! m! n! p! q!} \tag{2.3.5}
 \end{aligned}$$

$$\begin{aligned}
 &= \sum_{m,n,p,q=0}^{\infty} \frac{(a)_{m+n+p+q} (b_1)_m (b_2)_n x^m y^n (a+m+n)_{p+q} (b_3)_p (b_4)_q z^p t^q}{(c_1)_{m+n} m! n! (c_2)_{p+q} p! q!} \\
 &= \left[\sum_{m,n=0}^{\infty} \frac{(a)_{m+n+p+q} (b_1)_m (b_2)_n x^m y^n}{(c_1)_{m+n} m! n!} \right] \left[\sum_{p,q=0}^{\infty} \frac{(a+m+n)_{p+q} (b_3)_p (b_4)_q z^p t^q}{(c_2)_{p+q} p! q!} \right] \\
 &= F_1(a, b_1, b_2; c; x, y) F_1(a+m+n, b_3, b_4; c_2; z, t) \tag{2.3.6}
 \end{aligned}$$

where F_1 is Appell function of two variable
 This completes the derivation of (2.3.1)

(2) **Proof :-**
 now putting $x = y = z = t = 1$ in equation (2.3.6)

$$\begin{aligned}
 &K_{12}(a, a, a, a; b_1, b_2, b_3, b_4, c_1, c_1, c_2, c_2; 1, 1, 1, 1) \\
 &= F_1(a, b_1, b_2; c; 1, 1) F_1(a+m+n, b_3, b_4; c_2; 1, 1) \tag{2.3.7}
 \end{aligned}$$

Now Apply Gauss's summation theorem

$$F_1(\alpha, \beta, \beta_1, \gamma; 1, 1) = \frac{\Gamma(\gamma)\Gamma(\gamma - \alpha - \beta - \beta_1)}{\Gamma(\gamma - \alpha)\Gamma(\gamma - \beta - \beta_1)} \quad (2.3.8)$$

Using equation (2.3.7) and (2.3.8)

$$= \frac{\Gamma(c_1)\Gamma(c_1 - a - b_1 - b_2)}{\Gamma(c_1 - a)\Gamma(c_1 - b_1 - b_2)} \cdot \frac{\Gamma(c_2)\Gamma(c_2 - a - m - n - b_3 - b_4)}{\Gamma(c_2 - a)\Gamma(c_2 - b_3 - b_4)} \quad (2.3.9)$$

This completes the derivation of (2.3.2)

(3) Proof:

K_{10} (a, a, a, a; b, b, c₁, c₂; d₁, d₂, d₃, d₄; x, y, z, t)

$$= \sum_{m,n,p,q=0}^{\infty} \frac{(a)_{m+n+p+q} (b)_{m+n} (c_1)_p (c_2)_q x^m y^n z^p t^q}{(d_1)_m (d_2)_n (d_3)_p (d_4)_q m!n!p!q!} \quad (2.3.10)$$

$$= \sum_{m,n,p,q=0}^{\infty} \frac{(a)_{m+n} (b)_{m+n} x^m y^n (a)_{p+q} (c_1)_p (c_2)_q z^p t^q}{(d_1)_m (d_2)_n m!n! (d_3)_p (d_4)_q p!q!}$$

$$= \left[\sum_{m,n=0}^{\infty} \frac{(a)_{m+n} (b)_{m+n} x^m y^n}{(d_1)_m (d_2)_n m!n!} \right] \left[\sum_{p,q=0}^{\infty} \frac{(a+m+n)_{p+q} (c_1)_p (c_2)_q z^p t^q}{(d_3)_p (d_4)_q p!q!} \right]$$

$$= F_4(a, b; d_1, d_2; x, y) F_2(a+m+n, c_1, c_2; d_3, d_4; z, t) \quad (2.3.11)$$

where F_4 & F_2 are Appell function of two variable

This completes the derivation of (2.3.3)

(4) Proof:

K_{15} (a, a, a, b₅; b₁, b₂, b₃, b₄; c, c, c, c; x, y, z, t)

$$= \sum_{m,n,p,q=0}^{\infty} \frac{(a)_{m+n+p} (b_5)_q (b_1)_m (b_2)_n (b_3)_p (b_4)_q x^m y^n z^p t^q}{(c)_{m+n+p+q} m!n!p!q!} \quad (2.3.12)$$

$$= \sum_{m,n,p,q=0}^{\infty} \frac{(a)_{m+n} (b_1)_m (b_2)_n x^m y^n (a+m+n)_p (b_5)_q (b_4)_q (b_3)_p z^p t^q}{(c)_{m+n} m!n! (c+m+n)_{p+q} p!q!}$$

$$= \left[\sum_{m,n=0}^{\infty} \frac{(a)_{m+n} (b_1)_m (b_2)_n x^m y^n}{(c)_{m+n} m!n!} \right] \left[\sum_{p,q=0}^{\infty} \frac{(a+m+n)_p (b_5)_q (b_4)_q (b_3)_p z^p t^q}{(c+m+n)_{p+q} p!q!} \right]$$

$$= F_1(a, b_1, b_2; c; x, y) F_3(a+m+n, b_5, b_3, b_4; c+m+n; z, t) \quad (2.3.13)$$

Where F_1 & F_3 are Appell function of two variable

This completes the derivation of (2.3.4)

2.4 In this Section Quadruple hypergeometric function reduced to the Appell hypergeometric function Lauricella's set and Saran

(1) Theorem

By specializing the parameters of K_2 , K_{12} , K_{15} , K_6 we obtain the following

K_2 (a, a, a, a; b, b, b, c; d₁, d₂, d₃, d₄; x, y, z, t)

$$= F_E(a, a, a, b, b, c; d_1, d_2, d_3; x, y, t) {}_2F_1(a+m+n+q, b+m+n, d_4; z) \quad (2.4.1)$$

$$K_2 (a, a, a, a; b, b, b, c; d_1, d_2, d_3, d_4; x, y, l, t) \\ \frac{\Gamma(d_4)\Gamma(d_4 - a - b - q - 2m - 2n)}{\Gamma(d_4 - a - m - n - q)\Gamma(d_4 - b - m - n)} F_E (a, a, a, b, b, c,; d_1, d_2, d_3; x, y, t) \quad (2.4.2)$$

$$K_{12} (a, a, a, a; b_1, b_2, b_3, b_4, c_1, c_1, c_2, c_2; x, y, z, t) \\ = F_G (a, a, a, b_1, b_3, b_4, c_1, c_2, c_2; x, z, t) {}_2F_1 (a+m+p+q, b_2; c_1+m; y) \quad (2.4.3)$$

$$K_{12} (a, a, a, a; b_1, b_2, b_3, b_4, c_1, c_1, c_2, c_2; x, l, z, t) \\ \frac{\Gamma(c_1 + m)\Gamma(c_1 - a - b_2 - p - q)}{\Gamma(c_1 + m - b_2)\Gamma(c_1 - a - p - q)} F_G (a, a, a, b_1, b_3, b_4,; c_1, c_2, c_2; x, y, z, t) \quad (2.4.4)$$

$$K_{15} (a, a, a, b_5; b_4, b_1, b_2, b_3; c, c, c, c; x, y, z, t) \\ = F_S (b_5, a, a, b_4, b_1, b_2; c, c, c; x, y, t) {}_2F_1 (a+m+n, b_3; c+q+m+n; z) \quad (2.4.5)$$

$$K_{15} (a, a, a, b_5; b_4, b_1, b_2, b_3; c, c, c, c; x, y, z, t)$$

$$\frac{\Gamma(c + q + m + n)\Gamma(c + q - a - b_3)}{\Gamma(c + q + m + n - b_3)\Gamma(c + q - a)} F_S (b_5, a, a, b_4, b_1, b_2,; c, c, c; x, y, t) \quad (2.4.6)$$

$$K_6 (a, a, a, a; b, b, c_1, c_2; e, d, d, d; x, y, z, t)$$

$$= F_F (a, a, a, b, c_1, b, ; e, d, d; x, z, y) {}_2F_1 (a+m+p+n, c_2; d+p+n; t) \quad (2.4.7)$$

$$K_6 (a, a, a, a; b, b, c_1, c_2; e, d, d, d; x, y, z, t)$$

$$\frac{\Gamma(d + p + n)\Gamma(d - m - a - c_2)}{\Gamma(d - a - m)\Gamma(d + p + n - c_2)} F_F (a, a, a, b, c_1, b, ; e, d, d; x, z, y) \quad (2.4.8)$$

Where (F₄, F₁₄, F₈, F₇) & (F_E, F_F, F_G, F_S) are Lauricella's set & Saran Triple hypergeometric Series.

(1) Proof:-

Now Quadruple hypergeometric function can be reduced to Lauricella's set and Saran Triple hypergeometric Series.

$$K_2 (a, a, a, a; b, b, b, c; d_1, d_2, d_3, d_4; x, y, z, t)$$

$$= \sum_{m, n, p, q=0}^{\infty} \frac{(a)_{m+n+p+q} (b)_{m+n+p} (c)_q x^m y^n z^p t^q}{(d_1)_m (d_2)_n (d_3)_p (d_4)_q m! n! p! q!} \quad (2.4.9)$$

$$= \sum_{m, n, p, q=0}^{\infty} \frac{(a)_{m+n+q} (b)_{m+n} (c)_q x^m y^n t^q}{(d_1)_m (d_2)_n (d_4)_q m! n!} \frac{(a + m + n + q)_p}{(d_3)_p} \frac{(b + m + n)_p z^p}{p!}$$

$$= \left[\sum_{q, m, n=0}^{\infty} \frac{(a)_{m+n+q} (b)_{m+n} (c)_q x^m y^n t^q}{(d_1)_m (d_2)_n (d_4)_q m! n! q!} \right] \left[\sum_{p=0}^{\infty} \frac{(a + m + n + q)(b + m + n) z^p}{(d_3)_p p!} \right]$$

$$= F_E (a, a, a, b, b, c,; d_1, d_2, d_3, x, y, t) {}_2F_1 (a+m+n+q, b+m+n, d_4; z) \quad (2.4.10)$$

This completes the derivation of (2.4.1)

(2) Proof:

If z = 1, in equation (2.4.10)

$$K_2 (a, a, a, a; b, b, b, c; d_1, d_2, d_3, d_4; x, y, l, t) \\ = F_E (a, a, a, b, b, c,; d_1, d_2, d_3, x, y, t) {}_2F_1 (a+m+n+q, b+m+n, d_4; 1) \quad (2.4.11)$$

Now Apply Gauss's summation theorem in equation (2.4.11)

$$\frac{\Gamma(\gamma)\Gamma(\gamma - \alpha - \beta)}{\Gamma(\gamma - \alpha)\Gamma(\gamma - \beta)}$$

$$F_1(\alpha, \beta, \gamma; 1) = \frac{\Gamma(\gamma - \alpha)\Gamma(\gamma - \beta)}{\Gamma(\gamma)\Gamma(\gamma - \alpha - \beta)}$$

$$K_2 (a, a, a, a; b, b, b, c; d_1, d_2, d_3, d_4; x, y, l, t)$$

$$\frac{\Gamma(d_4)\Gamma(d_4 - a - b - q - 2m - 2n)}{\Gamma(d_4 - a - m - n - q)\Gamma(d_4 - b - m - n)} F_E(a, a, a, b, b, c, ; d_1, d_2, d_3; x, z, t) \quad (2.4.12)$$

This completes the derivation of (2.4.2)

(3) Proof:

$$K_{12}(a, a, a, a; b_1, b_2, b_3, b_4, c_1, c_2, c_2; x, y, z, t) \\ = \sum_{m,n,p,q=0}^{\infty} \frac{(a)_{m+n+p+q} (b_1)_m (b_2)_n (b_3)_p (b_4)_q x^m y^n z^p t^q}{(c_1)_{m+n} (c_2)_{p+q} m! n! p! q!} \quad (2.4.13) \\ = \sum_{m,n,p,q=0}^{\infty} \frac{(a)_{m+n+p+q} (b_1)_m (b_3)_p (b_4)_q x^m y^n t^q}{(c_1)_m (c_2)_{p+q} m! p! q! (c_1 + m)_n n!} \frac{(a + m + p + q)_n (b_2)_n y^n}{(c_1 + m)_n n!} \\ = \left[\sum_{m,p,q=0}^{\infty} \frac{(a)_{m+n+q} (b_1)_m (b_3)_p (b_4)_q x^m y^p t^q}{(c_1)_m (c_2)_{p+q} m! p! q!} \right] \left[\sum_{p=0}^{\infty} \frac{(a + m + n + q)_n (b_2)_n y^n}{(c_1 + m)_n n!} \right]$$

$$F_G(a, a, a, b_1, b_3, b_4; c_1, c_2, c_2; x, z, t) {}_2F_1(a+m+p+q; b_2; c_1+m; y) \quad (2.4.14)$$

This completes the derivation of (2.4.3)

(4) Proof:

When $y = 1$, in equation (2.4.14) Then

$$K_{12}(a, a, a, a; b_1, b_2, b_3, b_4, c_1, c_1, c_2, c_2; x, 1, z, t) \\ = F_G(a, a, a, b_1, b_3, b_4; c_1, c_2, c_2; x, z, t) {}_2F_1(a+m+p+q; b_2; c_1+m; 1) \quad (2.4.15)$$

Now Apply Gauss's summation theorem in equation (2.4.15)

$$F_1(\alpha, \beta, \gamma; 1) = \frac{\Gamma(\gamma)\Gamma(\gamma - \alpha - \beta)}{\Gamma(\gamma - \alpha)\Gamma(\gamma - \beta)}$$

$$\frac{\Gamma(c_1 + m)\Gamma(c_1 - a - b_2 - p - q)}{\Gamma(c_1 + m - b_2)\Gamma(c_1 - a - p - q)} F_G(a, a, a, b_1, b_3, b_4, c_1, c_2, c_2; x, z, t) \quad (2.4.16)$$

This completes the derivation of (2.4.4)

(5) Proof :-

$$K_{15}(a, a, a, b_5; b_1, b_2, b_3, b_4; c, c, c, c; x, y, z, t)$$

$$= \sum_{m,n,p,q=0}^{\infty} \frac{(a)_{m+n+p} (b_5)_q (b_1)_m (b_2)_n (b_3)_p (b_4)_q x^m y^n z^p t^q}{(c)_{m+n+p+q} m! n! p! q!} \\ = \sum_{m,n,p,q=0}^{\infty} \frac{(b_5)_q (a)_{m+n} (b_4)_q (b_1)_m (b_2)_n t^q x^m y^n (a + m + n)_p (b_3)_p z^q}{(c)_{q+m+n} q! m! n! (c + q + m + n)_p p!} \\ = \left[\sum_{m,p,q=0}^{\infty} \frac{(b_5)_q (a)_{m+n} (b_4)_q (b_1)_m (b_2)_n t^q x^m y^n}{(c)_{m+n} q! m! p!} \right] \left[\sum_{p=0}^{\infty} \frac{(a + m + p + p + q)_n (b_3)_n y^n}{(c + q + m + n)_n n!} \right]$$

$$= F_5(b_5, a, a, b_4, b_1, b_2; c, c, c; x, y, t) {}_2F_1(a+m+n, b_3; c+q+m+n; z) \quad (2.4.17)$$

This completes the derivation of (2.4.5)

(6) Proof :-

When $z = 1$ in equation (2.4.17) Then

$$K_{15}(a, a, a, b_5, b_4, b_1, b_2, b_3; c, c, c, c; x, y, 1, t) \\ = F_5(b_5, a, a, b_4, b_1, b_2; c, c, c; x, y, t) {}_2F_1(a+m+n, b_3; c+q+m+n; 1) \quad (2.4.18)$$

Now Apply Gauss's summation theorem in equation

$$F_1(\alpha, \beta, \gamma; 1) = \frac{\Gamma(\gamma)\Gamma(\gamma - \alpha - \beta)}{\Gamma(\gamma - \alpha)\Gamma(\gamma - \beta)}$$

$$= \frac{\Gamma(c + q + m + n)\Gamma(c - q - a - b_3)}{\Gamma(c + q + m + n - b_3)\Gamma(c + q - a)} F_S(b_5, a, a, b_4, b_1, b_2, c, c, c, ; x, z, t) \quad (2.4.19)$$

This completes the derivation of (2.4.6)

(7) Proof:-

$K_6 (a, a, a, a; b, b, c_1, c_2 ; e, d, d, d; x, y, z, t)$

$$= \sum_{m,n,p,q=0}^{\infty} \frac{(a)_{m+n+p+q} (b)_{m+n} (c_1)_p (c_2)_q x^m y^n z^p t^q}{(e)_m (d)_{n+p+q} m! n! p! q!} \quad (2.4.20)$$

$$= \sum_{m,n,p,q=0}^{\infty} \frac{(a)_{m+p+n} (b)_{m+n} (c_1)_p x^m z^p y^n (a + m + p + n)_q (c_2)_q t^q}{(e)_m (d)_{n+p+q} m! n! p! q!}$$

$$= \left[\sum_{m,p,q=0}^{\infty} \frac{(a)_{m+p+n} (b)_{m+n} (c_1)_p x^m z^p y^n}{(e)_m (d)_{p+n} m! p! n!} \right] \left[\sum_{p=0}^{\infty} \frac{(a + m + p + n)_q (c_2)_q t^q}{(d + p + n)_q q!} \right]$$

$$= F_F(a, a, a, b, c_1, b, ; e, d, d; x, z, y) {}_2F_1(a + m + p + n, c_2 ; d + p + n; t) \quad (2.4.21)$$

This complete the derivation of (2.4.7)

(8) Proof :-

When $t = 1$ in equation (2.4.21) Then

$$K_6 (a, a, a, a; b, b, c_1, c_2; e, d, d, d; x, y, z, 1)$$

$$= F_F(a, a, a, b, c_1, b, ; e, d, d; x, z, y) {}_2F_1(a + m + p + n, c_2 ; d + p + n; 1) \quad (2.4.22)$$

Now Apply Gauss's summation theorem in equation

$$F_1(\alpha, \beta, \gamma; 1) = \frac{\Gamma(\gamma)\Gamma(\gamma - \alpha - \beta)}{\Gamma(\gamma - \alpha)\Gamma(\gamma - \beta)}$$

$$= \frac{\Gamma(d + p + n)\Gamma(d - m - a - c_2)}{\Gamma(d - a - m)\Gamma(d + p + n - c_2)} F_F(a, a, a, b, c_1, b, ; e, d, d; x, z, y) \quad (2.4.23)$$

This completes the derivation of (2.4.8)

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Sediment Quality of Sewri Mudflats, Mumbai, West Coast of India

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Abstract- The sediment is the ultimate sink of contaminants in the aquatic systems. The study was conducted to assess the sediment physico-chemical parameters of Sewri mudflats. Sediment samples were collected for a periods of 13 months from November 2008 to November 2009 at low, mid and high tides area from 9 different stations near Sewri jetty. Samples were analysed for temperature, pH, moisture content, sediment texture (sand, silt and clay), total phosphorus and organic carbon of sediment. Pearson correlation coefficient was used to analyse the data. Sediment average values of temperature, pH, moisture content, sand, silt, clay, total phosphorus and organic carbon were respectively 26.3 °C, 7.4, 76.6 %, 5.6 %, 48.5 %, 45.9 %, 3288 µg g⁻¹ and 3.1 %. The Moisture content was slightly higher attributed to silty clay to clayey silt nature of sediment. Total phosphorus and organic carbon showed marginally higher values which can be attributed to organic load. Throughout the study benthic phytoplankton and 3 groups of macrobenthose were observed.

Index Terms- physico-chemical parameters, pollution, sediment, Sewri mudflats.

I. INTRODUCTION

The mudflats area in Maharashtra is 471.44 km² (Jagtap *et al.*, 2001). The mud surface plays an important role in nutrient chemistry. They receive nutrients from the tidal flow and the nearby marsh, particularly as its decays. However, mudflats worldwide are under threat from predicted sea level rises, land claims for housing and development, digging and dredging for navigation and chemical pollution. The physico-chemical properties of muddy substratum directly influence the infaunal community that lives in the soft sediment (Wilson, 1981). Moreover, Hopkison *et al.* (1999) contented that sediments play an important role in organic matter degradation and nutrient recycling in aquatic ecosystems.

Sedimentological parameters have been studied in association with ecological aspects. The pioneering work was done by Sander (1956, 58) in U.S.A. and Jones (1951, 52, 55-56) in U.K. In India, sediment have been reported from Mandovi and Zuari estuaries (Jagtap, 1987; Ansari, 1988; Nasnolkar *et al.*, 1996), Asthamudi estuary (Nair *et al.*, 1984), Rushikuly estuary (Gouda & Panigrahy, 1996), Cochin backwaters (Murty & Veerayya, 1972; Reddy & Sankaranarayanan, 1972; Sankaranarayanan & Punampunnayil, 1979; Sunil kumar, 2001), marine environment of Bombay (Kotimere & Bhosale, 1976; Mohapatra, 1985; Sahoo & Khopkar, 1985).

II. AREA OF STUDY

The open mudflats of Sewri are located along the Arabian Sea (west coast of India), covering an area of 10 km long and 3 km wide, dominated by mangroves all along the coast. There are many migratory birds including flamingos, which visit this area. Their migration to Sewri creek is likely to get affected in future due to ongoing and proposed developmental work in the area. There are many petrochemical and refinery industries located along the coast. Considering the importance of flora and fauna and constant threat from the industrial discharge, sewage disposal and developmental activities, regular monitoring of this ecosystem is required to assess its health. There is no information on sediment quality of Sewri creek, as it is major intertidal area of Arabian Sea adjoining Mumbai harbour. The present study, in addition to rendering information on ecological characteristics of mudflats will also help in providing baseline information for future ecological comparisons.

III. MATERIALS AND METHODS

Nine stations (L1, M1, H1 - L2, M2, H2 - L3, M3, H3) for sediments sample were selected, covering low tide, mid tide and high tide areas. These stations were divided into three zones as zone 1 towards the left of jetty (L1, M1, H1), zone 2 in front of jetty (L2, M2, H2) and zone 3 towards right of jetty (L3, M3, H3). The stations located between 19° 01' 00" N and 72° 52' 60" E.

Sediment samples were collected with help of scoop once in a month for 13 months (November 2008 – November 2009) during the low tides. Sediments were collected at each sampling station and stored in a labeled polythene bags. The collected sediments were air dried and oven dried at room temperature in the laboratory for the estimation of temperature, pH, moisture content of the sediment, sediment texture, total phosphorus, organic carbon and benthic organisms for qualitative analysis. The sediment physico-chemical parameters were determined following standard methods (APHA, 1992).

IV. RESULTS

Sedimentology: The range of sediment temperature for the entire study area was from 24 to 30 °C with an average of 26.3 °C. The highest temperature was recorded in the month of February from stations M1 and M2 and the lowest in the month of April from stations L1, M1, H2 and H3. Seasonal values for the area were 26.5, 25.7 and 26.6 °C respectively for premonsoon, monsoon and postmonsoon periods. The pH is a

parameter that plays an important role in the recycling of nutrients between water and sediments of an estuary (Nasolkar *et al.*, 1996). The range of pH for the area varied from 6.23 to 8.36 (av. 7.42). The maximum pH was observed in the month of November '08 from station H3 and the minimum in the months of June and April from stations L1 and H3 respectively. Calculated values for premonsoon, monsoon and postmonsoon seasons were 7.18, 7.38 and 7.65 respectively. Presence of clay in the sediment increases the water holding capacity, where as sandy substrate holds less moisture. At Sewri mudflats it was from 58.01 to 92.37 % with an average of 76.57 %. The highest and the lowest moisture content were recorded in the month of June and November '08 respectively from station M3. Seasonal values for premonsoon, monsoon and postmonsoon periods were 75.64, 82.96 and 72.20 % respectively. The range of sand percentage for the area was from 4.10 to 7.30 % with an average of 5.57 %. The highest percentage of sand was observed in the month of January from station L1 and the lowest in December from station M2. Calculated values of sand content for premonsoon, monsoon and postmonsoon seasons were 5.45, 5.47 and 5.74 % respectively. The range of silt for Sewri mudflats varied between 35.70 and 66.20 % (av.48.57 %). The maximum silt was recorded in the month of March from station M3 and the minimum in the month of November'09 from station H1. Seasonal values of silt for premonsoon, monsoon and postmonsoon periods were 48.89, 49.38 and 47.60 % respectively. Clay content of the sediment ranged from 28.10 to 58.00 % with an average of 45.90 %. The maximum value was recorded in the month of December from station H1 and the minimum in February from station M3 and in March from stations M3 and H3. Calculated values of clay were 45.66, 45.16 and 46.68 % respectively for premonsoon, monsoon and postmonsoon periods. For the entire study area total phosphorous varied from 1050 to 4950 $\mu\text{g g}^{-1}$ with an average of 3288 $\mu\text{g g}^{-1}$. The maximum value was observed in the month of January from station H3 and the minimum in February from stations M1 and H3. Calculated values of total phosphorous were 2609, 3536 and 3633 $\mu\text{g g}^{-1}$ respectively for premonsoon, monsoon and postmonsoon periods. The range of organic carbon varied between 1.61 and 5.32 % (av. 3.14 %). The highest percentage of organic carbon was observed in the month of December from station M2 and lowest in February from station L2. The calculated seasonal values were 2.88, 2.94 and 3.51 % respectively for premonsoon, monsoon and postmonsoon periods.

Benthic phytoplankton: 27 genera of phytoplankton were recorded from the sediments of Sewri mudflats. They are *Amphora*, *Amphiprora*, *Achanthes*, *Biddulphia*, *Coscinodiscus*, *Cyclotella*, *Cymbella*, *Diatoma*, *Eucampia*, *Gyrosigma*, *Hylodiscus*, *Lauderia*, *Licmophora*, *Melosira*, *Navicula*, *Nitzschia*, *Oscillatoria*, *Planktoniella*, *Pleurosigma*, *Rhizosolenia*, *Skeletonema*, *Surirella*, *Synedra*, *Thalassionema*, *Thalassiothrix*, *Triceratium* and *Spirulina*.

Macrobenthos: Throughout the study macrobenthos recorded from the sediment of Sewri mudflats belonged to 3 groups, polychaetes, gastropods and bivalves. Polychaetes were more in number as compared to gastropods and bivalves. They belonged to families Eunicidae, Pilargidae, Spionidae, and Nereidae.

Correlation: Correlation of physicochemical parameters of sediment was significant with various parameters. Temperature of sediment showed 1 % level of significance with pH, silt and clay and 5% level of significance with sand of the sediment. Moisture contents and organic carbon of the sediments showed correlation with pH at 1 % level of significance. Correlation of moisture content with silt, clay and organic carbon of the sediment was at 1% level of significance. Sediment texture showed correlation with total phosphorous and organic carbon of the sediments at 1 % level of significance.

V. DISCUSSION

At Sewri mudflats the variation in sediment temperature was marginal, influenced by atmospheric and water temperature. The acidic pH values observed at some station of study can be attributed to the release organic acid by mangrove into sediment (Ball, 1988). Comparatively narrow range of moisture content was reported by Matilal *et al.* (1986) from Sundarban mangroves (63.5 to 75.23 %) where coarse sand was also observed. Higher moisture content of sediment from Sewri mudflats can be attributed to dominance of silt and clay components that increases its water holding capacity. Seasonal variation of moisture content of Sewri mudflats was marginal with higher value in monsoon season. The sediment texture of Sewri mudflats showed highest percentage for clay and silt followed by sand. The percentage of sand, silt and clay for zone 1 was respectively 5.74, 41.71 and 52.56 where as for zone 2 their percentage was 5.32, 45.14 and 49.56 in that order. This indicates that the sediment texture is silty clay at zone 1 and 2. The percentage of sand silt and clay for zone 3 was respectively 5.64, 58.77 and 35.58 indicative of clayey silt texture. Considering the entire area of study i.e. zone 1, 2 and 3, the percentage of sand, silt and clay was 5.57, 48.54 and 45.90 respectively, indicative of clayey silt texture. The values of total phosphorous of sediment are higher than the values (770 – 1500 $\mu\text{g g}^{-1}$) observed by Ram & Zingde (2000) in Gorai creek. The higher value of phosphorous in the present study can be attributed to land drainage and regenerative activity in the sediment. Comparable values of organic carbon were observed by Joydas & Damodaran (2009) from Arabian Sea, west coast of India (av. 2.9%), Murty & Veerayya (1972) from Vembanad Lake (2.55 %), Thangaraj (1984) from Vellar estuary (2.32 %) and Reddy & Sankaranarayanan (1972) from tropical estuary (2.06 %). Vijayakumar *et al.* (1991) recorded 4.56 % of organic carbon from Kakinada Bay. Seasonal variation in the present study was marginal. Slightly higher value of organic carbon in the present study can be attributed to organic load due to land drainage, industrial discharge and mangroves. A concentration more than 4 % of organic carbon in the sediment can cause a decrease of benthic fauna.

VI. CONCLUSION

Based on various aspect covered in the present study from Sewri mudflats following conclusions are made. Temperature and pH were in the standard range. Moisture content was slightly higher attributed to silty clay to clayey silt nature of sediment.

Organic carbon showed slightly higher values. Low population and diversity of benthic organisms was observed. Considering these findings, Sewri mudflats area can be termed as slightly to moderately polluted and under organic load. The deterioration can be attributed to huge quantity of domestic sewage and industrial effluent released in the creek. Reclamation and construction activities of ships also might be obstructing tidal flow affecting the flushing. The industries might be releasing effluents according to the pollution control board norms, but their concentration around an ecosystem accentuates the pollution effect. Continuous ecological assessment and monitoring is required to save this ecologically important ecosystem of Sewri mudflats.

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Table 1. Variations in different physico-chemical parameters of sediment (Values in parentheses are mean values).

Parameters	Zone 1	Zone 2	Zone 3
Temperature ($^{\circ}\text{C}$)	24 – 30 (26.3)	24 – 30 (26.3)	24 – 28.5 (26.3)
pH	6.23 – 8.28 (7.39)	6.31 – 8.30 (7.46)	6.23 – 8.36 (7.40)
Moisture content (%)	58.77 – 90.46 (76.90)	59.86 – 90.53 (76.98)	58.01 – 92.37 (75.84)
Sand (%)	4.60 – 7.30 (5.74)	4.10 – 6.20 (5.32)	4.70 – 6.70 (5.64)
Silt (%)	35.70 – 45.10 (41.71)	39.80 – 49.30 (45.14)	46.80 – 66.20 (58.77)
Clay (%)	46.20 – 58 (52.56)	44.80 – 55.40 (49.56)	28.10 – 47 (35.58)
Phosphorus ($\mu\text{g g}^{-1}$)	1050 – 4510 (3165)	1200 – 4620 (3272)	1200 – 4950 (3426)
Organic carbon (%)	2.17 – 4.40 (3.21)	1.61 – 5.32 (3.12)	2.13 – 4.96 (3.09)

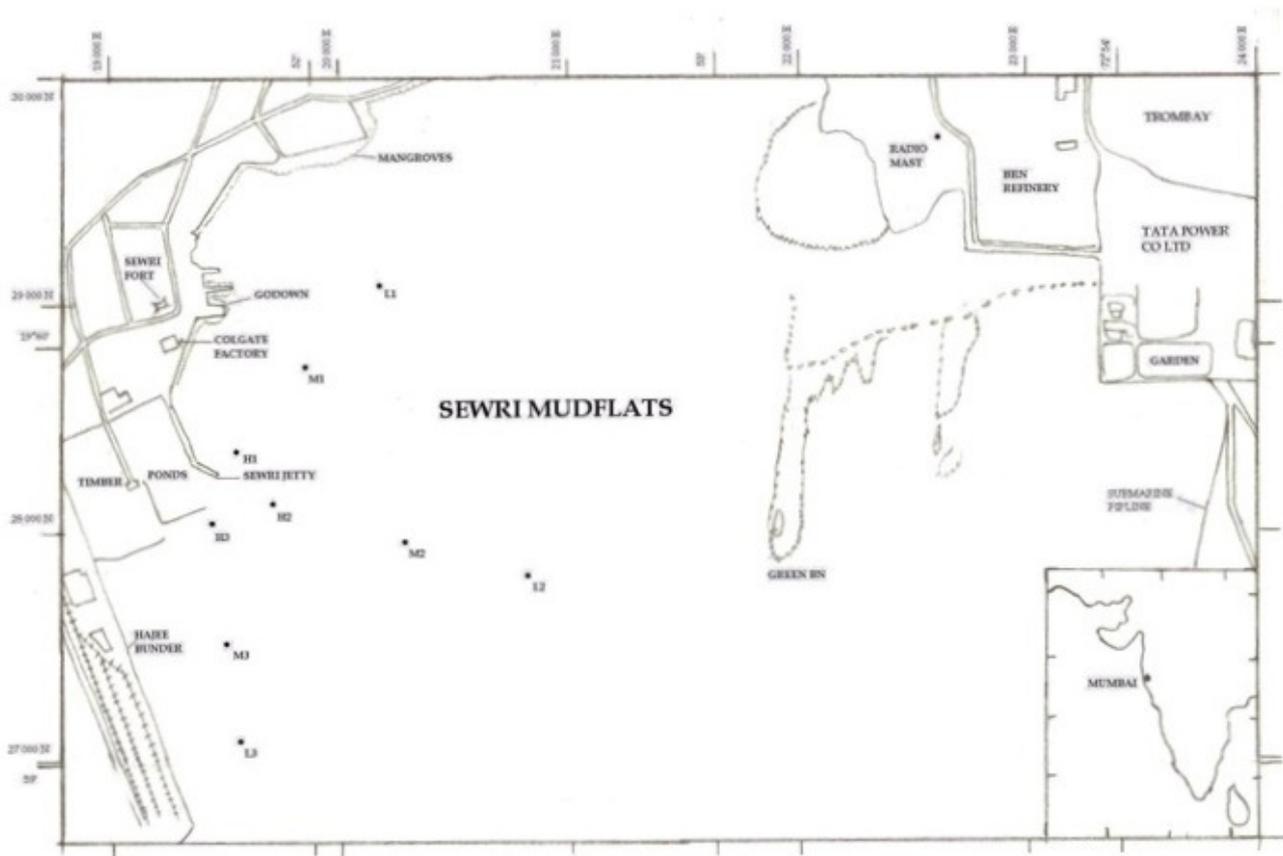


Fig. 1. Location of station

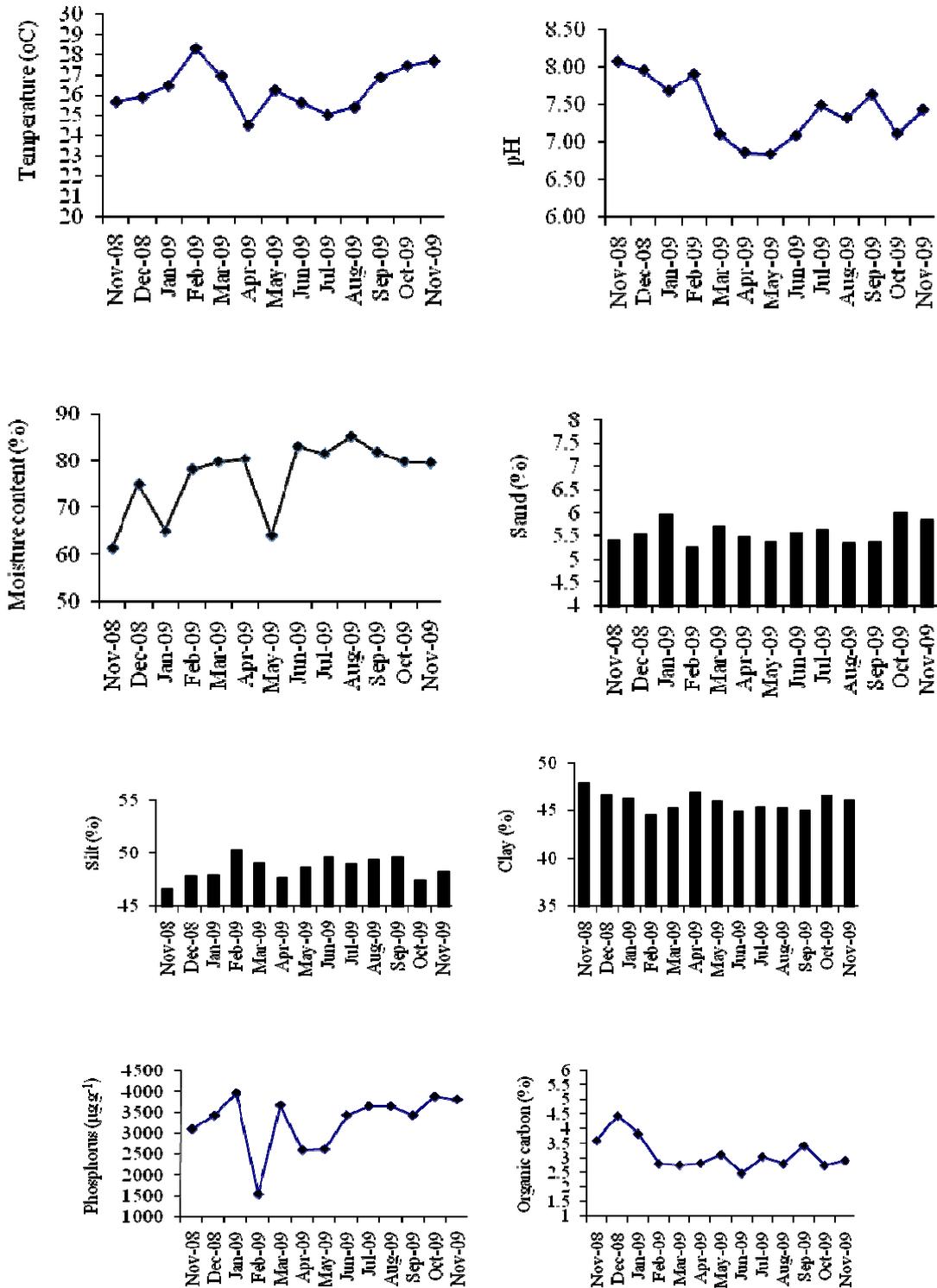


Fig.2. Mean monthly values of sediment a) temperature b) pH c) moisture content d) sand e) silt f) clay g) total phosphorus h) organic carbon

Preparation and Characterization of Chitosan Binary Blend

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Abstract- Chitosan biopolymer represents an attractive alternative to other bio materials because of its significant physico-chemical behaviours. In order to improve chitosan's performance, chemical modification has been carried out. Chemical modification that lead to the formation of chitosan derivatives, grafted chitosan and chitosan composites have gained much attention, extensively studied and widely reported in the literature. In this work, the properties of chitosan are modified by blending with silk fibroin which is another natural polymer which is produced by the silk worm larvae of *Bombyx mori*. Chitosan/silk fibroin binary blend is synthesized and characterized by FTIR, TGA and XRD. The results showed that the proper blending has been taken place between the polymers.

Index Terms- Chitosan, Silk fibroin, Binary blends.

I. INTRODUCTION

Chitosan, poly- β -(1 \rightarrow 4)-2-amino-2-deoxy-D-glucose, is an aminopolysaccharide derived from the N-deacetylation of chitin (see **Figure 1**), which is a structural element in the exoskeleton of crustaceans (crabs, shrimps, etc.) and cell wall of fungi and it is also classified as a natural polymer because of the presence of a degradable enzyme, chitosanase. The relative amount of the two monosaccharides in chitosan may vary, giving samples of different degrees of deacetylation (75-95%), viscosities, pKa values and molecular weights (50-2,000 kDa) [1-3]. Therefore, chitosan not only refers to a uniquely defined compound but also refers to a family of copolymers with various fractions of acetylated units.

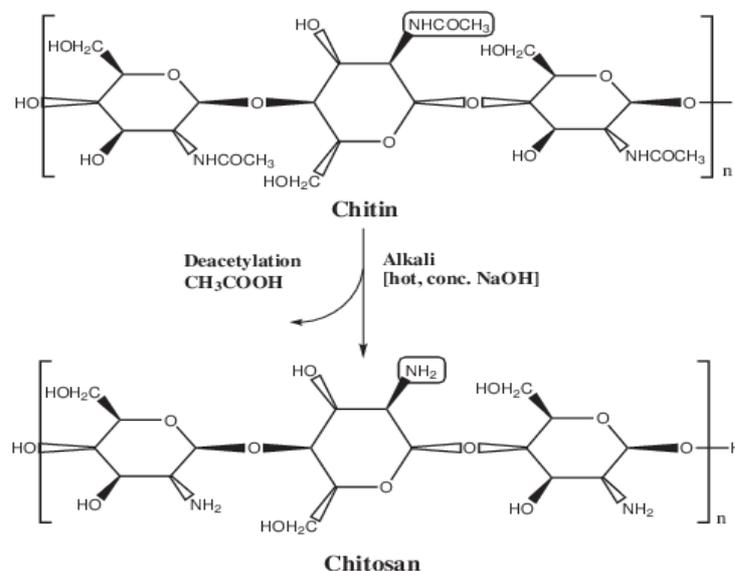


Figure 1: Chemical structure of chitosan and its production from chitin.

Chitosan is a biopolymer which has many interesting properties that have been utilized in many pharmaceutical applications [4]. Improving the fragile nature of films and membrane permeability are the key challenges that need to be addressed for improving chitosan as a biomaterial. In addition, chitosan is expected to be useful in the development of composite materials such as blends or alloys with other polymers, since chitosan has many functional properties [5]. There have been many studies on the blends of chitosan with various kinds of polymers [6-10] in order to obtain some improved properties.

In recent years, polymer blending has received much attention. This is mainly due to the fact that new materials can be observed with better physicochemical properties when the original polymers are compatible [11,12].

In order to satisfy the growing needs of new materials with specific properties such as engineering materials, new polymers have been developed [13-15] and chemical modifications in conventional polymers have also been proposed [16,17]. The characteristics of polymeric blend will mainly depend on the miscibility of the constituent polymers, the properties of its polymeric components, and its composition [18]. Miscibility has been known as one of key factors influencing the structure and properties of a polymer blend which are important in applications. Therefore, miscibility, structure and properties have been important issues in the studies regarding polymer blends [19].

In some cases, by synergistic effects, the blend provides better properties than the pure components [18,20]. Since chitosan has many functional groups, it can be modified by blending with other polymeric materials which is expected to be useful for some applications. The formation of polymeric blends constitutes a perspective way of making materials with new properties, especially from natural polymers that are of special importance.

Numerous investigations have been reported on the studies of films made from chitosan [21-25] and chitosan blends with natural polymers [7,26-29] or synthetic polymers [9,30].

II. MATERIALS AND METHODS

A. Preparation of Chitosan Solution

Chitosan (from crab shells) was obtained from India Sea Foods, Cochin, Kerala. About 50 gms of chitosan was slowly added to 1000 ml of 1:1 formic acid with constant stirring. The mixture was heated to set a whitish viscous gel of chitosan – formic acid mixture. *Bombyx mori* silk was boiled in 0.5 wt% of Na₂CO₃ solution for 40 mins to remove the sericin, then rinsed three times successively in distilled water and soaked in distilled water overnight. The degummed silk was dried for 7 hrs. Silk fibroin solution was prepared by dissolving 50 g of degummed silk in 1000 ml of 15% lithium chloride in formic acid. The chitosan/silk fibroin blends were prepared by mixing solutions of chitosan with silk fibroin solution in the weight ratio 1:1. The solutions were stirred well and were stored at 5 °C overnight and then allowed to dry to get chitosan/silk fibroin blends.

B. FTIR Studies

Fourier Transform infrared (FTIR) spectral analyses of chitosan/silk fibroin blend were performed with Thermo Nicolet AVATAR 330 spectrophotometer in 4000 – 400 cm⁻¹ wave length range, using KBr pellet method.

C. Thermo Gravimetric Analysis

Thermogravimetric analysis was conducted to measure the thermal weight loss of the chitosan/silk fibroin blend on a SDT Q600 V8.0 Build 95 instrument at a heating rate of 10 °C min⁻¹ in nitrogen atmosphere. The weight losses at different stages were analysed.

D. X – Ray Diffraction Studies

X-ray diffraction (XRD) patterns of chitosan/silk fibroin blend were studied using X-ray powder diffractometer (XRD – SHIMADZU XD – D1) using a Ni – filtered Cu K α X-ray radiation source. The relative intensities were recorded within the range of 10° – 90° (2 θ) at a scanning rate of 5° min⁻¹

III. RESULTS AND DISCUSSION

A. FTIR Spectroscopy

The IR spectra of chitosan (**Figure – 2**) showed a strong absorption band at 3454 cm⁻¹ due to OH and amine N-H symmetrical stretching vibrations. A peak at 2923 cm⁻¹ was due to symmetric -CH₂ stretching vibration attributed to pyranose ring [31]. A peak at 1156 cm⁻¹ was assigned to the structure of saccharide. The sharp peak at 1384 cm⁻¹ was assigned to CH₃ in amide group [32]. The broad peak at 1021 and 1098 cm⁻¹ indicated the C-O stretching vibration in chitosan and peaks at 1628 and 1540 cm⁻¹ were due to -C=O stretching (amide I) and NH stretching (amide II). The absorption bands at 1151 cm⁻¹ was assigned to the anti-symmetric stretching of C-O-C bridge, and 1098 and 1021 cm⁻¹ were assigned to the skeletal vibrations involving the C-O stretching [33].

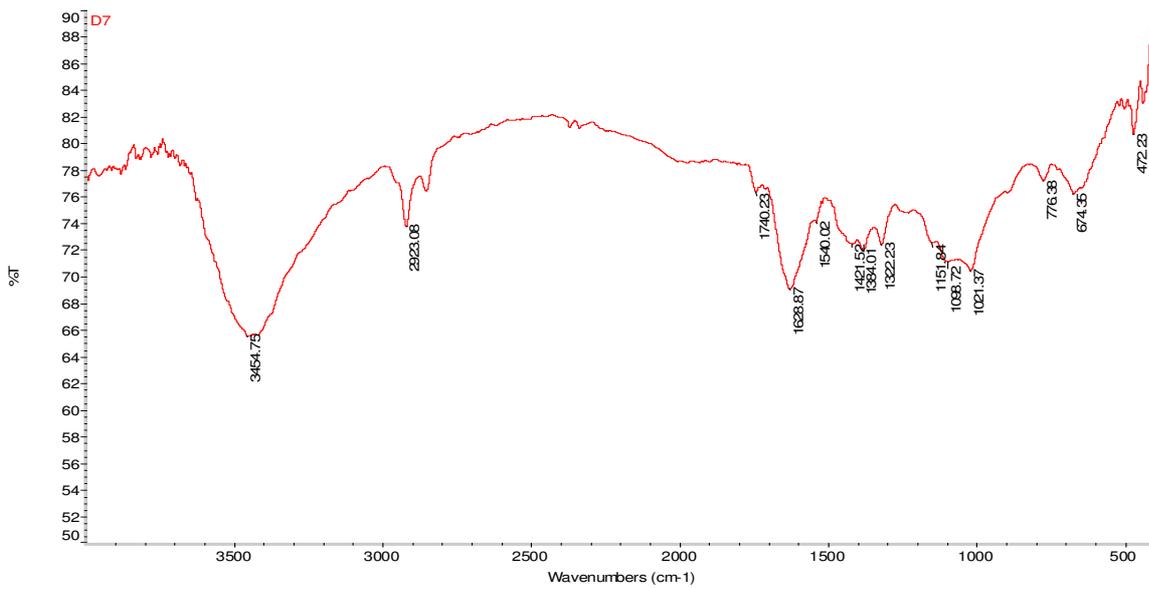


Figure 2: FTIR spectra of Pure Chitosan

In the FTIR spectra of 1:1 CS/SF blend (Figure-3), the absorption band at 3434.94 cm⁻¹ corresponds to -OH and NH stretching frequency. The band at 2927.01 cm⁻¹ corresponds to -CH₂ vibration and was assigned to the -CH stretching vibration of the pyranose ring. The band at 1598.33 cm⁻¹ corresponds to C=O stretching vibration and 1426.93 cm⁻¹ corresponds to C-H and O-H deformation vibrations. Another absorption band at 1230 cm⁻¹ could be attributed to C-OH stretching. A peak at 777.96 cm⁻¹ band showed CH₂ rocking. The peak 680.40 cm⁻¹ corresponds to N-H bending.

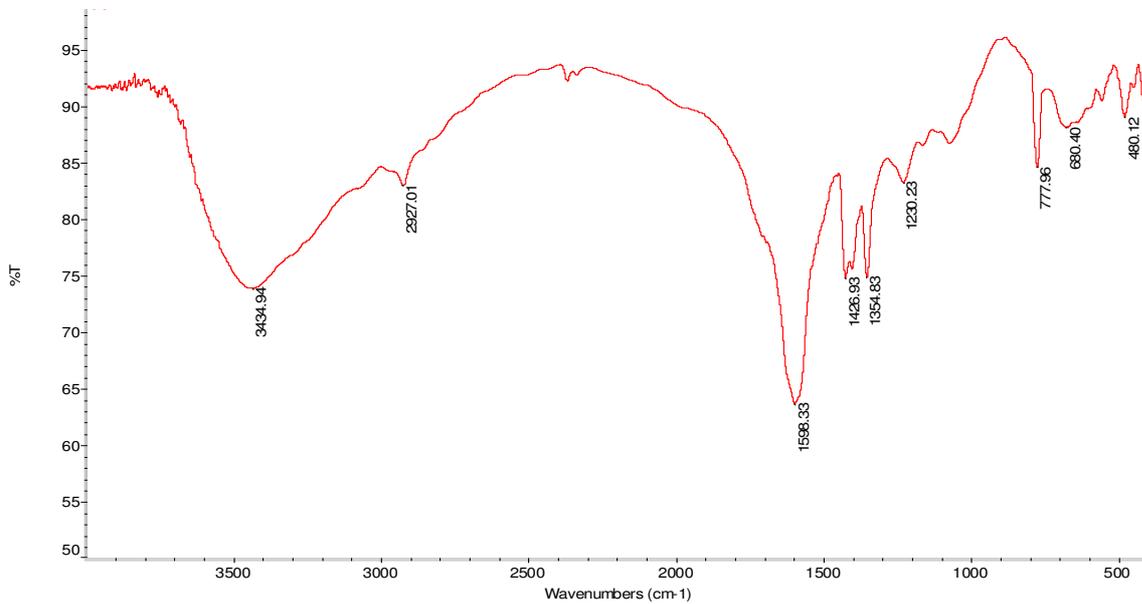


Figure 3: FTIR spectra of 1:1 CS/SF blend

The IR spectrum of chitosan showed absorption bands at 3454 cm⁻¹ and 1628 cm⁻¹ correspond to OH, NH stretching and C=O in amide group stretching vibration. For the 1:1 CS/SF blend, the absorption band at around 3454 cm⁻¹ concerned with OH stretching vibration for pure chitosan broadened and shifted to a lower wave number 3434 cm⁻¹. Compared with chitosan, the blend showed disappearance of the C=O in amide group at 1628 cm⁻¹ concluded that a certain degree of interaction between silk fibroin and chitosan molecules may be due to the formation of intermolecular hydrogen bands [34].

B. Thermogravimetric Analysis

TGA thermal details of chitosan with 92% degree of deacetylation is shown in **Table I and Figures 4 and 5**. It can be seen from **Figure 5** that three consecutive weight loss steps were observed in the pure chitosan. The first weight loss was about 6.733 wt% at 55 – 191 °C which was responsible for the loss of moisture content indicating its hygroscopic nature. The second weight loss was about 38.35 wt% in the range of 230 to 327 °C, which was due to scission of the ether linkage in the chitosan backbone. In the third stage, the weight loss was about 24.85 wt% in the range of 327–840 °C, which corresponds to the thermal decomposition of glucosamine residues [35].

Table 1: TGA Thermal studies of pure chitosan

Percentage Decomposition (%)	Decomposition Temperature (°C)
10	276
20	300
30	330
40	450
50	715
60	800
70	840

The thermal decomposition details of chitosan given in **Table - 1 and Figure – 4** represent the percentage decomposition of the sample at different temperatures. At the end of the experiment nearly 30% of the sample was remained as residue showing the higher thermal stability of chitosan. The degradation of chitosan in fact started with the amino groups and formed an unsaturated structure [36].

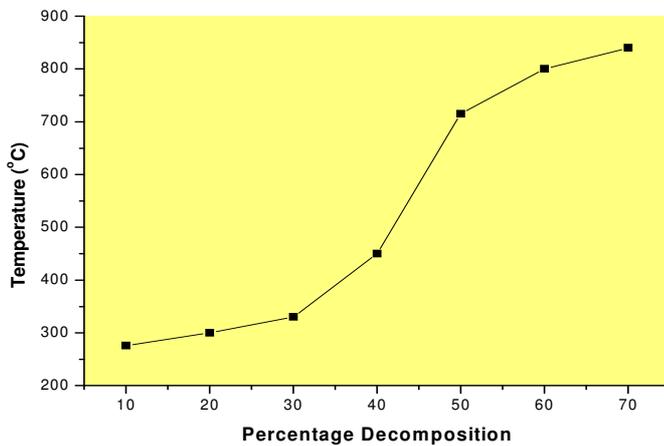


Figure 4: TGA Thermal studies of pure chitosan.

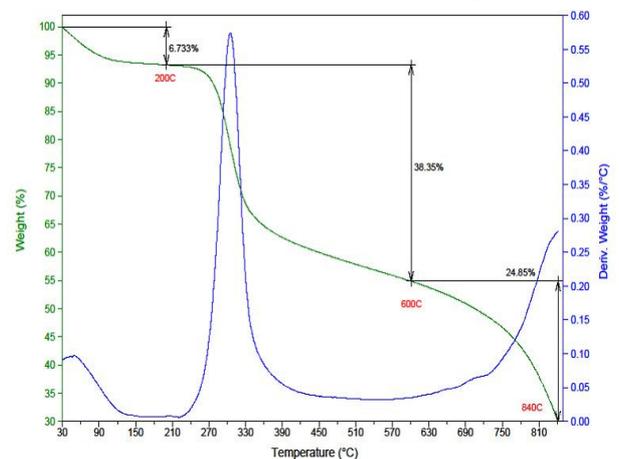


Figure 5: TGA thermogram of pure chitosan.

Table - II and Figure - 6 represent the TGA thermogram details of chitosan/silk fibroin composite (1:1). **Figure 7** shows the thermogravimetric curves of 1:1 chitosan/silk fibroin blend. The blend exhibited two weight loss steps. The initial weight loss fallen in the range of 100–230 °C and was due to the evaporation of water. The second weight loss began at about 350 °C that was due to degradation of blend. Similar weight loss has been observed in the case of chitosan/polyaniline blend by Thanpicha and his group [37].

Table II: TGA thermal studies of chitosan /silk fibroin blend (1:1).

Percentage decomposition (%)	Decomposition temperature (°C)
10	148
20	188
30	245
40	280
50	338
60	400
70	444
80	464
90	635

TGA thermogram details of CS/SF (1:1) blend showed that 90% of the blend disintegrated at 635 °C. Maximum weight loss of the blend occurred at the temperature range of 188–400 °C. During heating above 150 °C, the degradation rate sharply increased to reach its maximum at 400 °C (**Table - II and Figures – 6 & 7**). At the end of the experiment (at 788 °C) only 7.89% of the blend remained. Residual weight was found to be 0.381 mg.

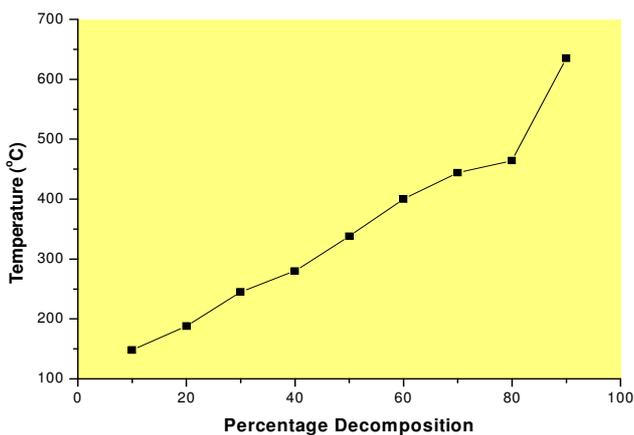


Figure 6: TGA thermal studies of 1:1 CS/SF blend.

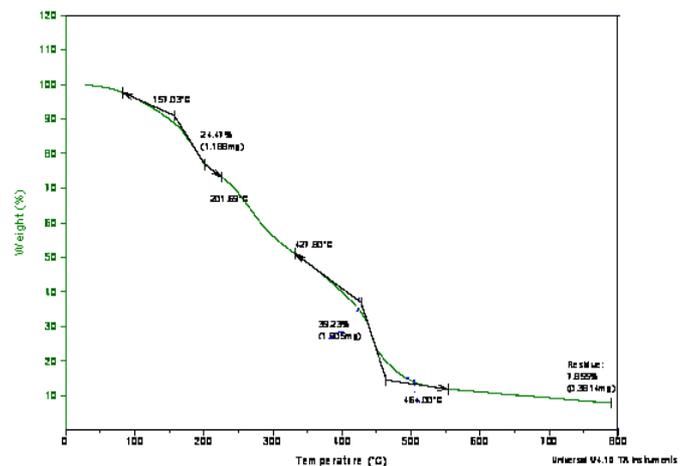


Figure 7: TGA thermogram of 1:1 CS/SF blend.

From **Table-III and Figure-8**, it is evident that the percentage decomposition of chitosan/silk fibroin blend 1:1 was greater compared to that of pure chitosan. As the temperature increased, the percentage decomposition of the blend also increased drastically. The main observation on the blended system was that the decomposition temperature of blends was higher than those of pure chitosan. In the case of CS/SF blend, the degradation was about 15–40% higher when compared to pure chitosan. This is an unusual behavior

because generally the related system may have the greater thermal stability than the pure one [38,39] and this anomaly could be related with crystalline and/or morphological variations in blend with respect to those of the pure polymers [40].

Table III: Rate of thermal decomposition (%) of CS and CS/SF blend

Temperature (°C)	CS	CS/SF (1:1)
100	6	4
200	8	23
300	20	44
400	38	61
500	43	86
600	45	89
700	50	91

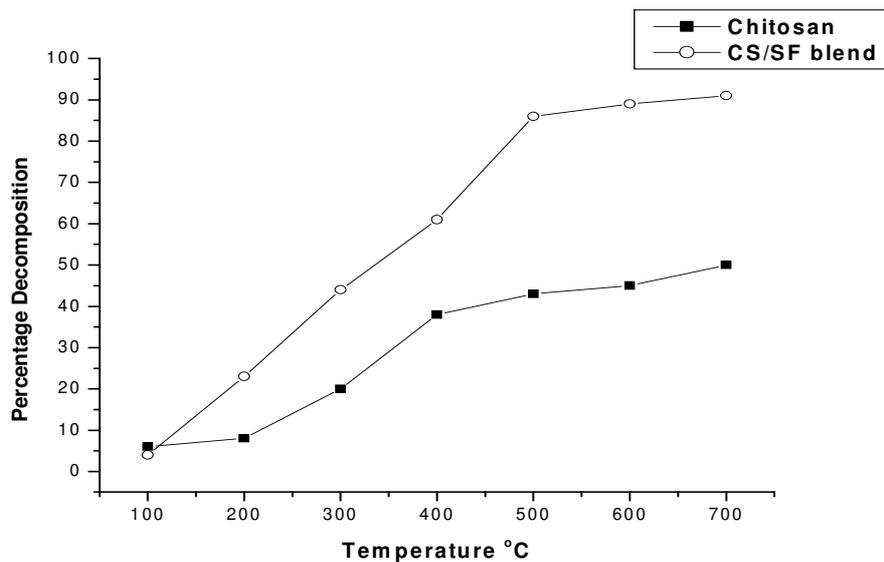


Figure 8: Rate of thermal decomposition (%) of CS and CS/SF blends

C. X-Ray Diffraction Studies

Figure 9 shows the X-ray diffraction pattern of chitosan which showed distinct crystalline peaks at around 2θ values 10° and 20° . This is because of presence of plenty of $-OH$ and $-NH_2$ groups in the chitosan structure, which could form stronger inter and intramolecular hydrogen bonds and the chitosan structure has certain regularity, so that the molecules form crystalline regions easily which was similar to the results reported by Duan and his co-workers.

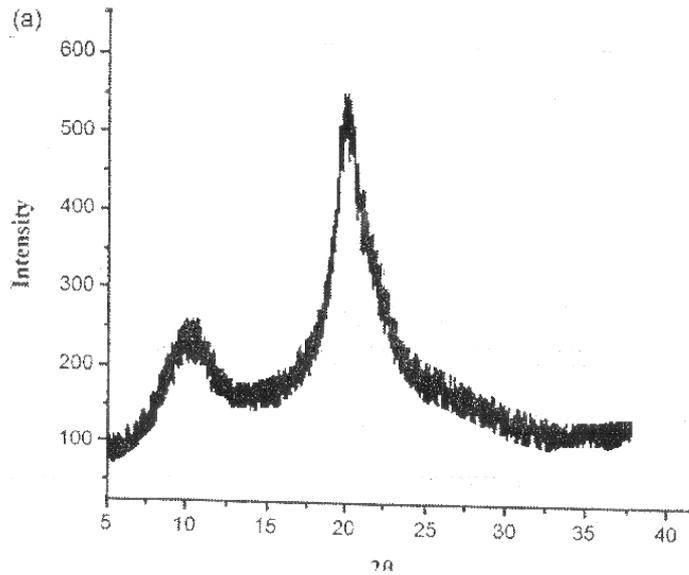


Figure 9: X-ray diffraction pattern of pure chitosan

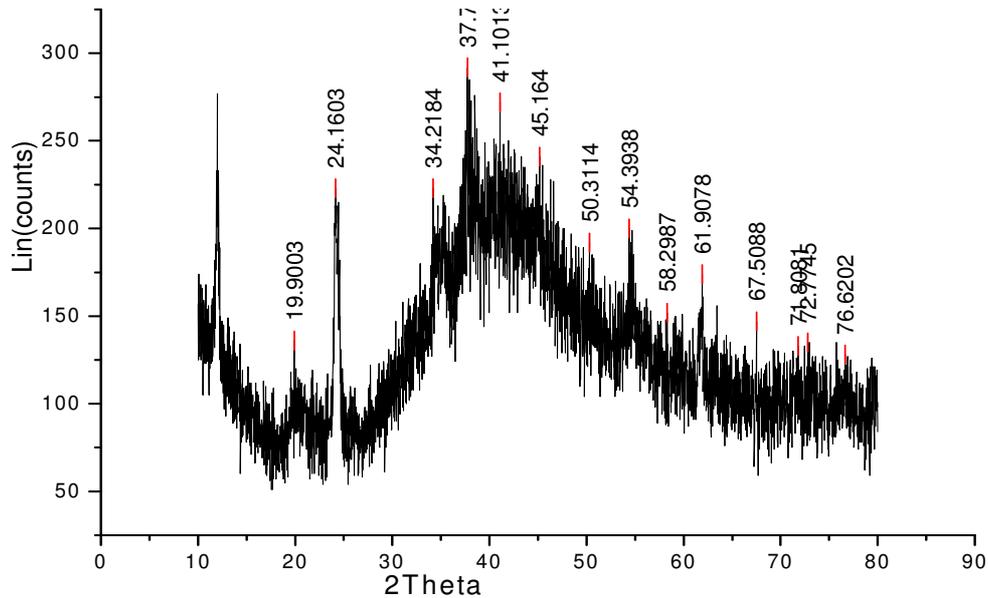


Figure 10: X-ray diffraction pattern of 1:1 CS/SF blend

Figure 10 present the XRD pattern of CS/SF blend under study. For the pure chitosan, there were two peaks around 2θ value 10° and 20° [7]. The peak of chitosan at 2θ = 10° became weak until disappearing in the blend and the peak at 20° weakened and the intensity of the peak became low. These evidences suggested that strong interaction occurred between CS and SF molecule in the blend. A new peak was observed in all the blends at 2θ around 40° which may be the characteristic peak of silk fibroin. The significant shift in the diffraction peaks and the diffraction pattern with a broad amorphous peak indicated that there was a molecular miscibility and interaction between the components [42]. The XRD results thus, provided supporting evidence to the FTIR results that some specific chemical interaction between CS and SF existed in the blend.

IV. CONCLUSION

In this present research, chitosan/silk fibroin binary blend was developed successfully and characterized using FTIR spectra, thermograms and XRD. The characterization results proved that there was an interaction between the polymers. The binary blend may have both the characteristics of chitosan and silk fibroin, which can be used for various applications like biomedical application and waste water treatment.

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Stress and Mental Health of Tribal and Non-Tribal Female School Teachers in Jharkhand, INDIA

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Abstract- The research reported in the paper examines the effects of stress, marital status and ethnicity upon mental health of female school teachers. A 2x2x2 factorial design with three factors, each having two levels was used and ANOVA was applied for the analysis of data obtained from a stratified random sample of 304 female school teachers. General Health Questionnaire (GHQ) – 12_{was} used to measure mental health and stress was developed by Hassan (1982). Results reveal that out of three factors, namely stress, marital status and ethnicity, only ethnicity was found to produce main effect on mental health. Neither second order interaction nor third order interaction was found significant.

Index Terms- Ethnicity, Marital Status, Mental Health, Stress

I. INTRODUCTION

Mental Health is described as some thing more than a mere absence of mental disorders. Mental Health refers to a state of mind which is characterized by emotional well-being, relative freedom from anxiety and disabling symptoms, and a capacity to establish constructive relationships and cope with the ordinary demands and stresses of life (Bhagi,1992).

Mental health as defined by Kornhauser (1995) means those behaviours, perceptions and feelings that determine a person's over all level of personal effectiveness, success, happiness and excellence of functioning as a present also depends on the development and retention of goals that are neither too high nor too low to permit realistic successful maintenance of belief in one's self as a worthy, effective human being. He further states that since, employees spend roughly one third of their time in their workplace, mental health is of particular importance.

WHO defined 'Health is a state of Complete Physical, Mental, Social and Spiritual well being and not merely the absence of disease or infirmity.' The concept of mental health includes subjective well being perceived self-efficacy, autonomy, competence and recognition of the ability to realize one's intellectual and emotional potential. It has been also defined as state of well being whereby individual's recognize their abilities, or able to cope with their normal stress of life, work productivity and fruitfully make a contribution to their communities (Agarwal, 2007).

The rise in magnitude of mental disorders, affecting millions of people all over the world has become a problem of grave-concern. World Health Organization in its world health report (2000-2001) has stated that 20-25% of the world population is affected by mental problems at some time during

their life. Prevalence rate of mental disorders in India is reported to be 58.2 per thousand populations (Reddy and Chandrasekhar, 1998). Incidence of mental disorders is on rise. In 1990, mental and neurological disorders accounted for 10% of the total patients of all disease and injuries which rose to 12% in 2000 and by 2020, it is projected that the burden of these disorders will increase to 15 percent. Factors associated with the prevalence, onset and course of mental and behavioral disorders include poverty, gender, age, conflicts, and disasters, major physical disease, and the family and social environment.

The present Century is not only a Century of human achievements and success but is also a world of stress. The present day human society, characterized by population explosion, onset of disease like Cancer, HIV/Aids, highly competitive market economy, family and social feuds, threat of attacks by the super-power, problems of refugees and their rehabilitation, rise of extremism and terrorism etc. has exposed individuals to stressful situation which tend to produce adverse effects on their mental health. All segments of human society have been affected by the problems of mental health as well as stress (Jamal and Baba,2000;Paul, 2008; Rai et. al., 1977; Singh and Dubey, 1977).

Stress can be defined as the condition or the situations that disturb the normal functioning of physical and mental health of an individual. In present scenario, every person is bound to be affected by certain amount of stress. In extreme stress conditions which are harmful to human health but a moderate amount of stress is acceptable. It motivates individuals to undertake self care activities that promote health, individual's success is achieved through well managed stresses (Lazarand & Folkman, 1984; Mathew, 1985; Pestonjee, 1987, 1997; Priya et. al.,2007).

The effect of perceived role of stress, resulting from role ambiguity, role conflict and role overload on mental health has been examined by several researchers (Beehr & Newman, 1987; Mittal et.al, 2000; Srivastava, 1991).

Researches on mental health of tribals are not much in numbers. Few studies made on them have produced inconsistent results (Bhaskaran et. al., 1970; Dewan, 2009d; 2010c; Mahanta, 1979; Srivastava et. at., 1981; Verma, 1973; Wig, 1981).

In view of the paucity of Indian researches and inconsistent findings, the present research was made to study the effects of ethnicity, marital status and stress on mental health of female tribal and non tribal school teachers in Jharkhand.

II. OBJECTIVE OF THE STUDY

The main objective of the present study was to examine the main and interaction effects of ethnicity, marital status and stress on mental health of tribal school teachers.

selected using stratified random sampling; the stratification was based on ethnicity (tribal/non-tribal), marital status (married/un-married), and level of stress (high/low).

There were eight sub- groups and for each sub-group 50 cases were selected on a random basis.

III. RESEARCH METHODOLOGY

Sample description:

A sample of 400 female school teachers were drawn from schools of Ranchi town, 160 tribal and 160 non- tribal were

The sample design is given below:

	Tribal		Non-Tribal	
	Married	Un-married	Married	Unmarried
High Stress	50	50	50	50
Low Stress	50	50	50	50
	100	100	100	100
	200		200	
	400			

TOOLS:

(A) General Health Questionnaire (GHQ) – 12:

This scale was made by Shamsunder et.al.1986 and Goutam et.al. 1987. It consists 12 questions related to health problems focused on anxiety/stress, malnutrition, weight, height, anemia/hemoglobin, blood pressure, sugar level etc. High scores indicate good mental health.

(B) Stress Scale:

It is a 20-item scale developed by Hassan (1982). It is reported to be a valid and reliable test of stress. High scores on this Scale indicate high stress.

Both the scales have two response alternatives (Yes/No) to each of their items. Half of the items of the two scales were positive and half were negative. A score of 1 was given for 'Yes' responses to positive items and 0 for 'No' responses and negative items.

On the basis of scores on Stress Scale, the school teachers, both tribal and non-tribal were classified into married and un-married categories, which were classified into two groups, namely high and low stress. Subjects scoring above the median were considered high scorers and those, scoring below median were categorized as low scorers.

IV. ANALYSIS AND RESULTS

To examine whether observed differences were statistically significant or not and to study the main and interaction effects of ethnicity, marital status and stress, Analysis of Variance (ANOVA) was used. The results of Analysis of Variance are present in table 1.

Table 1: Showing the Result of Analysis of Variance (ANOVA)

Sources of variation	df	MS	F-ratio
A. Ethnicity	1	25.54	13.098**
B. Marital Status	1	0.50	0.256NS
C. Stress	1	0.12	0.06 NS
A x B	1	2.45	1.256 NS
A x C	1	3.50	1.794 NS
B x C	1	2.89	1.482 NS
AXBXC	1	5.45	2.794 NS
Error	292	1.95	

***Significant at .01*

Table 1: indicates the following main points:

Marital status and stress do not produce any effect on mental health of school teachers. Only ethnicity is found to produce effect on this variable. The 'F' ratio is 13.098, which is statistically significant at .01 level. This shows that tribal school teachers, as compared to non-tribal school have better mental health.

Neither second order interaction nor third order interaction effects are statistically significant. This shows that the effect of ethnicity is the same for married and un-married school teachers and for high and low stress school teachers. It also shows that the simple effect of stress on mental health of married and un-married school teachers is the same.

The insignificant third order interaction effect indicates that two of the factors say ethnicity and stress do not differ in magnetite from level to level of third factor that is marital status.

Considering the significant 'F' value, tribal and non-tribal groups in married as well as un-married categories were compared on their mean mental health scores, using 't' ratios for testing the significance of mean differences. Data are reported in table-2.

Table 2: Comparison between Tribal and Non-Tribal groups on Mental Health

	TRIBAL		NON TRIBAL	
	MARRIED	UN-MARRIED	MARRIED	UN-MARRIED
NO	100	100	100	100
MEAN	10.12	8.67	9.96	7.95
SD	2.74	2.15	.90	2.68
t-value	4.14 **		2.36*	

**** □ Significant at .01, *Significant at .05**

Above table 2 indicate that there is significant difference between tribal and non-tribal groups in respect of marital status. The t-values of tribal group is found 4.14, significant at .01 level and that of non-tribal group is 2.36, which is significant at .05 level.

Mean and SD scores of both married and un-married tribal school teachers are significantly higher than married and un-married non-tribal school teachers on Mental Health Scale.

V. CONCLUSION & DISCUSSION

The main conclusion emerged from the analysis of data is that only ethnicity is associated with mental health of tribal school teachers. Tribal seem to have better mental health than non-tribal. The finding collaborates earlier researches showing the relationship of mental health of individuals with their ethnicity (Bhaskaran, et. al., 1970; Dewan, 2009d; 2008a; Hassan,1986; Mahanta, 1979; Murphy, 1993 Srivastava et. al.,1981; Verma, 1973; Wig,1981).

Insignificant effects of marital status on mental health of tribal and non-tribal school teachers as revealed by the present research are not surprising. Some studies have indicated that married women lag behind un-married women in mental health (Booth et. al, 1984; Fanous et. al, 2002), while others have confirmed the finding of present research (Davar, 1999; Dewan, 2010c).

Stress has also not found any significant effect on mental health of married and non-married tribal and non-tribal school teachers' sample. There are researches to indicate that mental health is affected only by very high stress. (Jamal & Baba,2000; Rai et. al., 1977 ; Singh and Dubey, 1977). At times, normal stress has positive influence also. It motivates individuals to undertake self care activities that promote health. Individual's success is achieved through well managed stresses (Lazarand & Folkman, 1984; Mathew, 1985 ; Pestonjee, 1987; 1997; Priya et. al., 2007).

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The Relation between Anxiety and Sports Perfectionism of Kabaddi Players

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Abstract- Kabaddi is an indigenous folk game of India. Now in India it is considered as “National Game”. To make it international, impetus is provided only very recently. To make a game popular and to rise it up to the international standard different rules should be framed, effective coaching should be provided, skills should be well developed and performance should be measured as well as increased. For this purpose research should be done. But till now very limited research has already been done. To bridge up the gap we are putting our best endeavour to launch a research project. The present study was carried out through descriptive survey method within ex-post-facto research design. Ninety four men Kabaddi players of the teams of different Indian Universities were considered as the sample of the present study. Data was collected from the Kabaddi players in course of Inter-University Kabaddi (Men) Tournament, held in the University of Kalyani during October 12-14, 2006. To measure perfectionism “Sport Multidimensional Perfectionism” Sport-MPS of Dunn, Causgrove Dunn & Syrotuikm (2002) was considered and for “Trait Anxiety” the scale devised by Spielberger, Gorsuch, Lushane, Vagg and Jacobs (1983) was taken. “Multiple Regression Analysis” was done. Here Trait Anxiety was taken as dependent variable and different facets of Sport-MPS [Personal Standards (P.S.), Concern Over Mistakes (COM), Perceived Parental Pressure (PPP) and Perceived Coach Pressure (PCP)] were considered as independent variables. The derived predictive equation was as follows: Trait Anxiety = 43.569 – 0.229 × Personal Standards (P.S.) + 0.325 × Concern Over Mistakes (COM) + 0.065 × Perceived Parental Pressure (PPP) – 0.203 × Perceived Coach Pressure (PCP). Personal Standards (P.S.) and Perceived Coach Pressure (PCP) decrease the Trait Anxiety. Whereas Over Mistakes (COM) and Perceived Parental Pressure (PPP) increase the Trait Anxiety of the Kabaddi players.

Index Terms- Test Anxiety, Perfectionism and Sport Multidimensional Perfectionism, Multiple Regression Analysis.

I. INTRODUCTION

Kabaddi is a folk game. Kabaddi is indigenous to India, and it is considered as our “National Game”. To make it international, impetus is provided only very recently. To make a game popular and to rise it up to the international standard different rules should be framed, effective coaching should be provided, skills should be well developed and performance

should be measured as well as increased. For this purpose research should be done. But till now very limited research has already been done. To bridge up the gap we are putting our best endeavour to launch a research project.

II. AIM OF THE RESEARCH PROBLEM

To make a game popular and to rise it up to the international standard different rules should be framed, effective coaching should be provided, skills should be well developed and performance should be measured as well as increased. For this purpose research should be done. But till now very limited research has already been done. To bridge up the gap we are putting our best endeavour to launch a research project.

III. METHODS

The present study will be carried out through descriptive survey method within ex-post-facto research design. The details regarding sample, tools, procedure of data collection and statistical technique are reported as under:

Sample: Ninety four men Kabaddi players of the teams of different Indian Universities was considered as the sample of the present study. Data was collected from the Kabaddi players in course of Inter-University Kabaddi (Men) Tournament, held in the University of Kalyani during October 12-14, 2006.

Tools: The following research tools will be used in the present study for data collection. By applying yardsticks of relevance, appropriateness, reliability, validity and suitability tools are selected. Brief descriptions of the tools are given hereunder. For measuring “Sport Multidimensional Perfectionism” Sport MPS of Dunn, Causgrove Dunn & Syrotuikm (2002) was considered and for “Trait Anxiety” the scale devised by Spielberger, Gorsuch, Lushane, Vagg and Jacobs (1983) was taken. **The Sport-MPS contains** 30 items and 4 subscales. The subscales are labelled Personal Standards (PS: 7 items), Concern Over Mistakes (COM: 8 items, Perceived Parental Pressure (PPP: 9 items), and Perceived Coach Pressure (PCP: 6 items.). The instrument is designed to measure how athletes view certain aspects of their competitive experiences in sport. Athletes rate the extent to which they agree with each of the 30 items using a 5-point Likert-type scale (1 = strongly disagree; 5 = strongly agree). Item scores are averaged within each subscale, with higher scores reflecting higher levels of perfectionism on each dimension.

The State-Trait Anxiety Inventory (STAI) was used as research tool. This inventory was designed by Spielberger, Gorsuch, Lushane, Vagg and Jacobs (1983) not only for the assessment of the anxiety loading of the individual but also for the distinction of two aspects of anxiety viz. state anxiety and trait anxiety. “State Anxiety” is conceptualised as a transitory level of anxiety, which is often situationally determined, and fluctuates with time and circumstances, whereas, “Trait Anxiety” is regarded as a latent predisposition, which is relatively stable and can be triggered by appropriate stimuli. This is considered as basic anxiety level.

STAI is a self-evaluation questionnaire. Both of the two parts of the inventory contains 20 items each. Items of this scale have been constructed in reverse- and non-reverse-keyed format,

and instructions are given asking participants to rate their agreement with a statement on 4-point “Likert type scale”.

Procedure for Data Collection: The relevant data on different constructs was collected by administering the above-mentioned tools on the subjects under the study in accordance with the directions provided in the respective manuals of the tools.

Statistical Techniques: The relationships among the variables were found out by computing Pearson’s product-moment correlation coefficient and multiple regression equation was framed.

IV. Result

Table – 1: Descriptive Statistics

Variable	Total No. of Item	Maximum Score	Mean	Std. Deviation	N
Trait Anxiety	20	20×4 = 80	43.33	5.562	490
Personal Standards (P.S.)	7	7×5= 35	23.49	4.593	490
Concern Over Mistakes (COM)	8	8×5=40	23.45	5.548	490
Perceived Parental Pressure (PPP)	9	9×5=45	28.33	4.921	490
Perceived Coach Pressure (PCP)	6	6×5=30	18.33	3.814	490

Table - 2: Variables Entered in Multiple Regression Analysis (Trait Anxiety as Dependent Variable)

Dependent Variable	Variables Entered	Method
Trait Anxiety	Personal Standards (P.S.), Concern Over Mistakes (COM), Perceived Parental Pressure (PPP) and Perceived Coach Pressure (PCP)	Enter

Table - 3: Model Summary in Multiple Regression Analysis (Trait Anxiety as Dependent Variable)

Model	R	R ²	Adjusted R ²	Std. Error of the Estimate
1	.125 ^a	.016	.014	5.524
2	.253 ^b	.064	.060	5.393
3	.286 ^c	.082	.076	5.346
4	.305 ^d	.093	.085	5.319

^a Predictors: (Constant), PCP

^b Predictors: (Constant), PCP, COM

^c Predictors: (Constant), PCP, COM, P.S.

^d Predictors: (Constant), PCP, COM, P.S., PPP

**Table - 4: ANOVA in Multiple Regression Analysis
(Trait Anxiety as Dependent Variable)**

Model		Sum of Squares	Mean Square	F	Sig.
1	Regression	235.477	235.477	7.716	.006 ^a
	Residual	14892.278	30.517		
	Total	15127.755			
2	Regression	965.752	482.876	16.605	.000 ^b
	Residual	14162.004	29.080		
	Total	15127.755			
3	Regression	1239.188	413.063	14.454	.000 ^c
	Residual	13888.567	28.577		
	Total	15127.755			
4	Regression	1405.394	351.349	12.418	.000 ^d
	Residual	13722.361	28.294		
	Total	15127.755			

^a Predictors: (Constant), PCP

^b Predictors: (Constant), PCP, COM

^c Predictors: (Constant), PCP, COM, P.S.

^d Predictors: (Constant), PCP, COM, P.S., PPP

**Table - 5: Coefficients of Multiple Regression Analysis
(Trait Anxiety as Dependent Variable)**

Model	Dependent Variables and Constant	Un-standardized Coefficients		Standardized Coefficients	t	Significant
		B	Std. Error	β		
1	(Constant)	46.662	1.226		38.051	0.000
	PCP	-0.182	0.065	-0.125	-2.778	0.006
2	(Constant)	44.170	1.296		34.075	0.000
	PCP	-0.375	0.075	-0.257	-5.024	0.000
	COM	0.257	0.051	0.257	5.011	0.000
3	(Constant)	45.798	1.389		32.980	0.000
	PCP	-0.267	0.082	-0.183	-3.265	0.001
	COM	0.324	0.055	0.323	5.863	0.000
	P.S.	-0.220	0.071	-0.182	-3.093	0.002
4	(Constant)	44.088	1.552		28.415	0.000
	PCP	-0.322	0.085	-0.221	-3.813	0.000
	COM	0.294	0.056	0.293	5.215	0.000
	P.S.	-0.256	0.072	-0.211	-3.533	0.000
	PPP	0.150	0.062	0.133	2.424	0.016

Regression Equation for Model – 4:

$$\text{Trait Anxiety} = 44.088 - 0.322 \times \text{Perceived Coach Pressure (PCP)} + 0.294 \times \text{Concern Over Mistakes (COM)} - 0.256 \times \text{Personal Standards (P.S.)} + 0.150 \times \text{Perceived Parental Pressure (PPP)}$$

IV. DISCUSSION AND CONCLUSION

[A] When Personal Standards (P.S.) increases Trait anxiety Decreases

[B] When Concern Over Mistakes (COM) increases Trait anxiety also increases

[C] When Perceived Parental Pressure (PPP) increases Trait anxiety also increases

[D] When Perceived Coach Pressure (PCP) increases Trait anxiety decreases

To control trait Anxiety Concern Over Mistakes (COM) and Perceived Parental Pressure (PPP) should be controlled; whereas Personal Standards (P.S.) and Perceived Coach Pressure (PCP) should be increased.

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Janani Surasksha Yojana: Impact on Socio-Economic Conditions among Beneficiary Families

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Abstract- Government of India introduced Janani Suraksha Yojana (JSY) in 2006 under the umbrella of National Rural Health Mission by modifying National Maternity Benefit Scheme. Primarily, created for integrating cash assistance with antenatal care during the pregnancy period, institutional care and immediate post-partum period, this program has been successful in bringing down Infant mortality rate (IMR) and Maternal mortality rate (MMR) in India. While abundant literature is available on the facilitating and increased number of institutional delivery because of JSY, little is available on the beneficence of the cash assistance. This paper is based on a quantitative research to find out the socio-economic role of the program in terms of awareness, implementation and changes in the beneficiary families. The study has been conducted in the two districts, Nawada and Araria of Bihar selected on the basis of their contrasting health outputs. With response rate of 94.67 per cent, the total sample under study was 142 women registered as beneficiaries with the local health service providers. The results of the study reflected a high level of awareness among women accessing and community at large. Involvement of ASHA worker in program is considered to be a philanthropic work (66.2%). It is also to be considered that this awareness level about the program is among the women who have availed the services of JSY. However with regards to cash incentives, only 68% of the participants have received incentive of which only 69% have collected it themselves. Only 67.7% is registered for antenatal check-up. Reflecting upon the changing social status, 61% have provided a positive response of upward movement in the community describing the facilitative nature in building the educational and livelihood standard of the family. Undoubtedly the program is a beneficial inclusive initiative of the government helping families move up the social ladder. The two regions in spite on contradictory health outcomes had similar responses about JSY. However red-tape incidents were also reported reflecting the need of amendments in the process of implementation.

Index Terms- Incentives, Institutional deliveries, JSY, Maternal health, socio-economic impact

I. INTRODUCTION

India is recorded to have 30 million pregnancies a year of which 27 millions are delivered [1], 15% of which are to develop complications with Haemorrhage (38%), Sepsis (11%), Hypertension disorders (5%), obstructed labor (5%), abortion (8%) and other conditions. Maternal Mortality and morbidity

along with infant conditions are critical aspects for sexual and reproductive health status of country but also the society living in. The National family Health survey –III states the reduction in the MMR rates from 424 to 254 in last two decades. Though National Maternity benefit scheme existed in the country, the Planning commission through an evaluative report declared it to be ineffective in reducing the MMR. [1] Suggestions were provided for divided two-time cash assistance and more for girl child delivery. Accordingly, the Ministry of Health and Family Welfare, Government of India declared the Janani Surksha Yojana modifying the National Maternity Benefit Scheme under the broader umbrella mission- National Rural Livelihood Mission. This program targets to provide cash assistance with antenatal care during pregnancy period, institutional care during delivery and immediate post-partum period, to all pregnant women above or 19years old belonging to Below Poverty Line (BPL) families. The success of this program depended on the institutional deliveries. The NFHS data in three rounds showed the increase of institutional deliveries from 26.1 per cent to 33.6 per cent and in 2006 increase to 40.8 per cent. An assessment of JSY by NIHFW and UNFPA indicated a huge increase of institutional deliveries in low-performing states which led to the popularity of the program. [2]. Anirudh K Jain reflected upon the several impact assessment survey by governmental and non-governmental research organizations establishing the fact that number of births in hospital was increasing. [3]. However little literature is available about the socio-economic development of the families/individuals after accessing the services in JSY. This research paper deals with the impact of JSY in socio-economic conditions of families especially mothers as direct beneficiaries of the program.

II. RESEARCH QUESTION

JSY had identified 10 states as Low Performing States (LPS) to implement the program; they are namely Uttar Pradesh, Uttaranchal, Madhya Pradesh, Chhattisgarh, Rajasthan, Bihar, Jharkhand and Orissa along with Assam and Jammu and Kashmir. The literature available on JSY implementation and change described how researches have been majorly conducted in the states of Rajasthan, Jharkhand and Orissa. Bihar in spite of being a fragile state in terms of health outcomes has been not looked up by research units. The state of Bihar records a MMR of 312 per 100,000 live births compared to national average of 254 [4] and 56 as IMR compared to national count of 52 [4]. JSY has been reported to have successfully reduced the IMR and MMR in the country with the increase in institutional deliveries

to 41% countrywide. [1] However the subsequent years have not shown much a change in Bihar which has only 34% institutional deliveries.[5] But it is to be noticed that JSY as a program has penetrated to the communities in Bihar and has brought in the institutional deliveries to the stated percentage. Thus in research an attempt has been made to find out the impact of socio-economic status in reference to being beneficiaries of JSY in the state of Bihar. In doing so, two districts with different and contrasting geographical-demographic composition has been identified. While Nawada has good health indicators by being geographically located nearer to Patna, Araria is 450 kms away and catastrophically prone to floods. Thus the political map location and the natural climatic conditions have marked Nawada as 4th rank in state ranking in Health indicators leaving Araria in last few districts. [5] The researcher taking in reference of the difference in the districts' health outcome performing factor is trying to tap the experiences of the women beneficiaries of the two states.

The specific objectives of the study are:

- ❖ To find the level of awareness level about JSY by identifying how and where they women came to know about JSY
- ❖ To find out the extent of the JSY program implementation through the experiences of the women beneficiaries in terms of access
- ❖ To identify the changes in the family socio-economic structure and status after accessing JSY

III. METHODOLOGY

A. Research Design

The study design is a triangulation of quantitative-qualitative methodology. The qualitative aspects include finding out level of awareness and a numerical representation have been collected from the study population to describe the extent of awareness and accessibility. The qualitative methodology was developed to explore and record the experience of the women beneficiaries. The research also has a paradigm of looking into aspects from Feminist perspective. In this research a feminist approach was adopted to understand the subjective experiences, perceptions of the women participants of the village

B. Sampling

A purposive sampling has been applied in three stages: Selection of number of: panchayats → villages → households. The selection of panchayats was random but the villages under the study were on the basis of the number of JSY beneficiaries as provided by the District Health Societies. The respondent sample size is 10% of the household beneficiaries in each village. The total sample size is 142. With a non-response rate of 5%, the total sample size is 150. The respondents of the study are individual women who have received and thus registered under the JSY scheme of the panchayat.

C. Data Collection tools

The tools used in the research have been within the scope provided by the research design and method perspective. In this research data collection, a methodological triangulation has been used. Methodological triangulation is the base of combination of

tools of data collection. Herein a complex method of data collection is been practiced; the sources of data has been both secondary and primary which has also determined the tools for data collection.

The primary tools of data collection involving direct connection with the participants are in-depth interview and focus group discussions (FGD). The secondary data sources have varied from District Health Society reports, gazetteers and public documents of Bihar State health Society, Public Health Resource Network and National Health System Resource Centre.

D. Data Analysis

The data collected were entered into the SPSS (Statistical Package for Social Sciences). Data has been analyzed by creating frequency table and cross tabulation. The qualitative data has been manually analyzed under the themes of awareness, accessibility and societal change.

IV. RESULTS AND DISCUSSION

Considering the objective to explore and count the experiences of the women beneficiaries of the program, 100% of the respondents are female. Out of 142 respondents, 53.5 per cent belong to the age group of 20 to 25 years while 37.8 per cent were from 26 to 30 years of age group. Only 8.5 per cent were from the age group of 31-35 years. It was important for the researcher to tap the social background of the respondents who had availed the services of JSY. Thus the social category was asked in the interview; 56.8 per cent of the respondent belonged to the Scheduled Caste with 34.7 per cent belonging to Other Backward Castes (OBC). Interestingly only 6.4 per cent women were from general category household, with the least per cent of respondents from Scheduled Tribe (2.1%). As social factor, religion is critical in facilitating health seeking behavior; 91.8 per cent of the respondents were followed Hinduism and remaining 8.2 per cent were Muslims. The area had no Christian or any other religious communities. Education is another crucial social factor in determining the awareness level and pro-nature towards utilization of health services. 56.8 per cent are illiterate (never gone to educational institutes), 19.6 per cent are literate and 13.7 per cent have completed primary education. 81.9 per cent of respondents were engaged in daily labor work and 14.6 per cent in farms; only 3.5 per cent were homemakers without any economic work engagement.

Considering the sample size as 10% of the beneficiaries from specific villages, the ratio of accessing health facilities is 1:1 with a minimal difference by the district from Nawada more by 0.7 percent. Thus the records of beneficiaries described in spite of geographical differences, the services of JSY reached both the districts without any socio-cultural boundary.

100 per cent of the respondents participating in the study belonged to below poverty line (BPL) household. The family size was critical in this study to understand the strength as well as dependants of the household and the impact of that on the JSY access. But the study revealed that it had no direct connect as families with 4 to 6 members maximum participation in JSY (54.3%) while 2.4 per cent respondents were from family size having 13 to 15 members. However the respondents wherein the

work force was least (1-2 members in the family) had maximum availed the JSY services (79.3%).

A. Awareness Level and Implementation Benefits from JSY

The study aims at determining the awareness level of the beneficiaries through the information on source of knowledge on JSY scheme, extent of knowledge. All (100%) knew about JSY and thus registered for benefits but not all knew the name or specifications of the scheme. For 72.7 per cent respondents, the source of information was the neighbors. This reflects the community level awareness about the scheme; if not specifications but the existence of the scheme have reached the community. 18.4 per cent had ASHA as their source, 6.2 per cent as members of family and 2.7 per cent knew from the primary health care centre (PHCs). The respondents (100%) also knew about the amount for institutional delivery which is Rs. 1400/- but least (5.3%) knew of the 24*7 government facility for delivery.

B. Extent of implementation of the scheme

Out of 142 respondents, 68% had received JSY incentive at the time of discharge and 32% after six months to one year after the delivery. Undoubtedly that is the sign of delay in dispensing funds among the beneficiaries. The incentive in 47.89 per cent of cases was paid through cash and the rest (52.11%) is via check. The respondents have however referred to have paid 'service charges' of Rs 200-300 to the health functionaries. However the success of the scheme could be defined by the fact that the mothers themselves receive the incentive. 69 per cent have answered to have received by self the amount, while 21 per cent and 10 per cent have received through husband and other family member respectively. This percentage of women receiving by self is high because of the guideline established for disbursement of checks by the health post in the name of the beneficiary. [6]

JSY is not only about incentive but also critical in facilitating antenatal care among their registered mothers. Among the respondents, 67.7 per cent were registered with the nearest sub-centre while 32.3 per cent were never registered. The frequency of ante natal care visits have also been very low with the maximum respondents (49.5%) visiting only two times. For post natal care, 58.4 per cent have been registered and thus received some level of help.

The JSY in Bihar have definitely decreased the home deliveries by virtue of increasing the institutional deliveries through its community reach. [7] The current study confirms the fact of increasing community involvement in the implementation of JSY in terms of registering for the scheme and facilitating institutional delivery. But considering the low registration of ante natal and post care among already JSY registered mothers, there is a huge population untouched by JSY.

C. Socio-economic Impact of JSY

JSY caters to the pregnant women of the BPL families in all states specifically to the low performing states. [6] The study tries to measure the social movement after accessing the JSY services by identifying the monetary changes in terms of expenditure and investment on different aspects associated with baby birth and pregnancy.

Before introducing the JSY scheme, 42.8 per cent respondents had spent up to Rs 500 on antenatal care but this had

dropped to 6.4 per cent spending Rs 500. Also the amount of expenditure had decreased to less than Rs 500. But there has been an increase in households (26.4% to 45.6%) spending upto Rs 2000 on deliveries services. However this is not self expenditure but a share of the incentive provides help to the families to spend on the delivery services. With the increase in institutional deliveries, cost for transport facilities has increased by 20 per cent from Rs 400 to Rs 600. This is included in the total expenditure on the delivery services.

The study data reveals that 21.5 per cent of the respondents spend the incentive amount on general expenses of the household. A total of 46.8 per cent spend the money on health expenses comprising both minor and major disease of family members. Critical was to find on whom the money was spent but the respondents refused to reveal. However some proportion of the money is saved for the future of the children; 12.4 per cent of respondents considered spending money on child's education while 6.2 per cent on post natal care of the new born. The female participants in the FGD put forward that the money cannot be used in appropriate way in different heads as the amount is not substantial for meeting all needs associated with the new born. The concern regarding the amount has been spoken about also in the context of Rajasthan JSY beneficiaries [8] wherein they used the amount for antenatal care and transportation for deliveries only.

The amount was, nevertheless providing financial support to the families registered under JSY. 78.9 per cent expressed their belief on JSY and its assistance in the family health expenditure. This has helped them directly or indirectly to be in a better financial condition.

V. CONCLUSION

JSY beneficiaries in the two districts have shared similar experiences. In spite of the district geographical and health rank differences, the scheme of JSY has reached to the marginalized. The majority of the respondents from Scheduled castes and OBC explain the extent of reach. JSY has been able to reach out through the community engagement. Unlike Orissa, [9] wherein community media was used to create awareness, here word of mouth has been efficient in bringing in more families under the scheme. The scheme has definitely made critical impact increasing the institutional deliveries in the state of Bihar from 13.3 to 18.6 [10, 1] and specific to these two districts. On the contrary, keeping in mind the Bihar state MMR 312 per 1 00 000 births, it is to be reminded that the JSY has reached only a few sections. In spite of its current good reach, many more sections of the population are to be touched, motivated and registered with JSY.

The major component of JSY is the cash incentive to the mothers. The PHRN in 2009 found in their study about delay of cash payment beyond one month of delivery. In our research 68 per cent have received on delivery; one major reason for such improvement is the disbursement of amount by the check not cash. But complexity arises with the fact who receives the amount. Herein among the respondent population, 69 per cent receives amount by self. It is mandatory as the checks bear the respective names, which has disabled the husbands or any other

member of the family. The study has not been able to tap the decision making power after collecting the amount.

The study acknowledges that the cash assistance provided has provided certain support in health expenditure of the families of the beneficiaries. They can spend it on transport cost for facilitating institutional deliveries. In a study in Rajasthan, the women have expressed the lack of transport facility and the increasing cost in transportation as a major barrier in institutional delivery. [8] Thus the cash assistance in these districts helping in transportation cost could indicate the increasing institutional delivery and reducing financial burden as a whole.

The study as nevertheless identified areas of improvement of the JSY implementation. Not always a cash incentive could lead to socio-economic development. Health is crucial for development; the Government must take extensive effort to build in infrastructure nearer to the communities or enhance commuting facilities. Aashish Bose supporting this wrote 'reduction of maternal mortality should focus on creation of health infrastructure and ensuring road connectivity in rural areas rather than merely doling out money to poor families.' [11] Even in the provision for cash assistance, payment at different stages is to be encouraged than single time disbursement. Focus must be given on Antenatal cash assistance based on perinatal and antenatal check-ups.

VI. ETHICAL CONSIDERATION AND LIMITATION

Reproductive Health and sexuality is a taboo for discussion among the rural population in Bihar. Critically when it is the female members discussing delivery and other activities related to baby birth, it is under discussed. In a patriarchal society, it is not considered indecent for the females to talk about their delivery and birth conditions. Ethical limitations of not asking too personal question as it is considered as individual domain of decisions related to birth and caring was kept in mind. A formal consent was received from the female beneficiary taking part in the study along with consent from the male counterparts. Language being a limitation, both Hindi and Maithili were used in collecting data. However the study due to cultural limitation and language barrier could not touch on details of decision making factors and players in determining the utilization of the JSY incentive. Thus this provides scope for further research on exploring the factors determining social ladder movement of the beneficiaries after JSY registration and access to the amount.

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Integrated Coastal Zone Management for South Andaman Coast Using Remote Sensing and Geographical Information System

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Abstract- The purpose of the study was to develop an integrated coastal zone management plan for South Andaman Island and for this study, three dimensional elevations models; coastal biodiversity and landuse/ landcover pattern changes were analyzed. Spot 1993 and IRS-P6 Jan 2007 Satellite imagery was used for estimating the landuse changes. Three dimensional elevations models, drainage pattern and landuse change map were overlaid for developing an integrated coastal zone management for South Andaman Island which will enable for the sustainable development and management of this island.

Index Terms- CRZ, Remote Sensing, GIS, South Andaman Island.

I. INTRODUCTION

Coastal zones occupy less than 15% of the earth's land surface but are inhabited by roughly 60% of the world's population (Bhibhu Prasad Tripathi) Coastal habitats such as coral reefs, coastal mangroves, sea grass beds maintain a fragile balance in the ecosystem. The importance of the coastal ecosystem is to be understood in its interdependence and inter-relatedness to various other ecosystems. This ecological complexity is further compounded by the fact that people staying along the coast have a unique and cultural connection with the coast.

In addition to farming and fishing, the two major coastal industries, there are also other development interests in the coastal region. Then are activities for which foreshore facilities are essential, for example, ports, harbors, jetties, wharves and quays. All these new development pressures are in addition to demands already being made by existing coastal inhabitants. India's lengthy coast stretches over 6000 km, supporting numerous fishing communities and driving the economies of coastal villages, towns and cities. The Indian coast-line can broadly be divided into four areas i.e. the Gujarat Saurashtra-Kachch Coast, the West Coast, the East Coast, the Andaman Nicobar and Lakshadweep coast.

There are three broad classes of human intervention that threaten India's marine environment which are maritime trade, exploitation of ocean resources and on-land coastal development (Rosencranz and Shyam Diwan, *Environmental Law and Policy in India*, (2nd ed., OUP: New Delhi, 2002) at pg.475) Moreover, population explosion and growing economic development are the two main components of threats to

ecosystem. Other activities such as aquaculture, coastal mining and tourism have also been blamed for the pollution of the coast.

The aim of the paper is to understand the scheme of the Coastal Regulation Zone (CRZ) notification, its efficaciousness and study and if amendments have diluted the original notifications from 1991 to 2011. In addition to this, others goals of this study are demarcating the ecologically sensitive areas, buffer zoning, sustainability development and management of South Andaman island.

II. SECTION I

REGULATORY MECHANISM PRIOR TO CRZ

1. Foreshore development was initially regulated by building rules under local town and country planning laws or the land revenue code. (**Regulating the Coast**) Concern for the coastal eco-system began gathering momentum only in 1981 with the first central initiative on 27 November 1981 when Prime Minister Indira Gandhi wrote to the state Chief Minister's expressing distress at a degradation and "misutilisation" of beaches. (A. Rosencranz and Shyam Diwan *Environmental Law and Policy in India*, (2nd ed., OUP: New Delhi, 2002) at pg.475.)In the letter, Mrs. Gandhi suggested that upto 500 m from water level at maximum tide be kept clear of all activity. Following this, working groups were set up in 1982, and in July 1983, the MoEF issued the Environment Guidelines for Development of Beaches.

2. The effect of this was that the states actually took steps to prevent new projects from coming and several large government projects re-located away from the coastal zone in view of the directive. (A. Rosencranz and Shyam Diwan *Environmental Law and Policy in India*, 2nd ed., OUP: New Delhi, 2002) at pg. 477) For a few years Mrs. Gandhi's communication was widely accepted because it came from the PMO. However after her, due to intense lobbying from the tourism industry, there was a relaxation in the restrictive coastal zone ruling.

COASTAL REGULATORY ZONES

In 1991 the Central Government through the Ministry of Environment and Forests under Section 3(1) and 3(2) of the EPA, 1986 read with rule 5(3) of the EPA rules drafted the Coastal Regulation Zone notification in 1991.

The Coastal Regulation Zone (CRZ) Notification operates on the precautionary principle. Recognizing the rapid

degradation of the coastline due to unplanned industrialization and urban development, it is a step taken by the Government to prevent further de-cay of the coastal eco-system, while allowing it time to revive. So, under the Notification, certain construction activities are completely prohibited within the CRZ areas, and those permitted are to be strictly regulated by the enforcing authorities.

CONTENT OF CRZ NOTIFICATION

The CRZ Notification addresses the problem of coastal zone management in two ways. (See paras 2 and 3 of the CRZ notification). First by outright prohibition of certain activities and second by regulation of certain activities. The notification depending on varying characteristics, location and intensity of protection required has classified the coastal areas into four zones.

CRZ I area according to the notification is the area between Low Tide Line(LTL) and High Tide Line (HTL) and areas that are ecologically sensitive and important like national parks, marine parks, sanctuaries, reserve forests, etc. In the CRZ I area no new construction activity will be permitted within 500 meters from the High Tide Line except that needed for carrying treated effluents and waste water discharges into the sea. This zone is considered No- development zone.

The CRZ II area consists of areas that have already been developed upto or close to the shoreline. All cities and other built substantially built up areas which have infrastructural facilities such as water supply and have roads etc. fall into this zone. In these areas building activity is prohibited on both the seaward and landward sides of existing structures and all existing structures are to conform to local building regulations.

In the case of Ramnathan v. State of Tamil Nadu (**Appeal No. 1287/1995, Madras High Court**) the Madras High Court held that the CRZ norm cannot be tested with reference to each of the building situated on the seashore and, therefore once it is found that the area is a developed area and there are buildings and roads in the said area which are nearer to the sea, then the impugned construction would fall on the landward side.

CRZ III area consists of areas that are relatively undisturbed and includes rural areas and also areas in legally designated urban areas which are not substantially built up. In these areas 200m from the HTL toward the landward side is declared as NDZ.

CRZ IV category includes Andaman Nicobar, Lakshadweep and other small islands. In these areas dredging and under water blasting in and around coral formation are not permitted.

The CRZ notification provides that in ecologically sensitive areas construction of beach resorts shall not be permitted. However it is permitted between 200m and 500m in the CRZ III area subject to the prior approval of the MOEF and certain conditions laid down in the notification. The rights of traditional inhabitants of the coastal areas i.e. fisher folk etc. are recognized in this notification and they are permitted to construct new or resurrect old dwellings.

In *Goa Foundation v. Diksha Holdings Pvt Ltd. and others* (**(2001) 2 SCC 97**) the construction of a hotel was challenged on the ground that it would cause ecological or environmental damage of the coastal area and the pristine beach with sand

dunes. In the facts of the case the plot fell in CRZ-III and was indicated as settlement under the Goa, Daman and Diu Town and Country Planning Act. The court found that the resort was not being constructed on sand dunes. The court held that while maintaining and preserving ecology and environment the development of the state also has to be kept in mind.

ENFORCEMENT AUTHORITY UNDER THE NOTIFICATION

Enforcing the CRZ Notification involved the identification and demarcation of the CRZ all along the coastline. Under the CRZ Notification 1991, implementing agencies are the Central Government through the Ministry of Environment and Forests (MOEF) and the State or Union Territory Government, through Department of Forest, Environment and Ecology (DFEE).

In the judgment delivered in Council for Indian Council for Environ-Legal Action Case (**1996 (5) SCC 281**) on April 18, 1996, the Supreme Court observed that authorities under whose jurisdiction the implementation of the CRZ Notification has fallen were overworked and had limited control. It directed that Coastal Zone Management Authorities (CZMAs) be set up, in order to supervise the implementation of the CRZ Notification and also provide advice to the MoEF and the GoI on issues of coastal regulation. (**MR. SHYAM DIWAN**) Consequently, by Government order dated November 26, 1998, the National Coastal Zone Management Authority (NCZMA) and the various State Coastal Zone Management Authorities (SCZMAs) came into existence.

FUNCTION OF CZMAS

The responsibilities entrusted to the CZMAs included ensuring compliance of CRZ, supervising and advising on changes in classification of CRZ, holding inquiries into alleged violations and taking action against violators. The authority also has power to review the cases either suo motu or on the basis of complaint made by an individual or an organization functioning in the field of environment but does not have the powers to grant clearances of any kind to development projects.

THE COASTAL ZONE MANAGEMENT PLAN (CZMP)

The CRZ Notification directs the administrations of the coastal states and union territories to prepare Coastal Zone Management Plans (CZMPs). (**The CRZ notification**) Preparing CZMPs means identifying and classifying CRZ areas along the coast in accordance to guide-lines laid down in the Notification, or as specified by the MOEF. This includes demarcation of the lines of HTL, LTL, 200 m from HTL and 500 m from HTL, and then a classification of the said areas as CRZI, CRZII, CRZIII or CRZIV.

CZMPs were to be drawn up to help identify the area within which the Notification and its restrictions apply. The various administrations along the coast were given a period of one year to prepare the CZMPs, according to Para (3) (3) (I) of the Notification. However, even after three years of the publication of the Notification, none of the state or union territory governments had prepared the needed CZMPs which meant that there was no way of knowing whether land by the sea was within the CRZ or not, and so whether the prohibitions and regulation of activities applied there or not. This reflects the lack

of inclination on part of the State governments to enforce the notification.

In the IECLA case the Supreme Court directed all coastal states to file before it affidavits indicating the steps taken by them to implement the CRZ notification in their respective states and also to answer the charges of violation which had been brought to its notice by concerned citizens. The court further directed the states to prepare the CZMPs. Within six months of the decision all the coastal states had prepared their CZMPs. **(The Scheme of CRZ Notification)**

III. SECTION II

AMENDMENTS TO CRZ

The coasts are the preferred destination for infrastructure projects like construction of ports, urban infrastructure, highways, resorts, oil and gas exploration, reclamation for real estate development. With development along the coast and the banks of tidal water bodies being restricted, there was pressure from industrialists, hoteliers and developers to have the provisions relaxed. Environmentalists and fisher folk, on the other hand, wanted the provisions to continue as it protected the coastal environment. The justification of the government for the amendments is that difficulties are being faced by the inhabitants of the areas falling within the CRZ and there is a need for infrastructural facilities in these areas.

The first amendment, dated August 18, 1994, was the result of the intense pressure the hotel and tourism lobby put on the Government of India (GoI) regarding the Notification. Their contention was that the restrictions under CRZ severely limited their scope of work. As a consequence, the B.B. Vohra Committee was set up by the Central Government. **(1996 (5) SCC 281)**

Acting on the recommendation of the Vohra Committee the government relaxed the 1991 notification. The amendment:

- a) Significantly reduced the mandatory CRZ of 100 m for rivers, creeks, etc. to 50 m.
- b) Gave expansive powers to the Central Government, which could now grant per-mission for construction on the landward side within 200 m from HTL according to its discretion.

However this was challenged later in *Indian Council for Environ-Legal Action v. Union of India*. The Supreme Court held that the amendment reducing the width of the zone from 100 m to 50 m in respect of rivers, creeks and backwaters was contrary to the object of the EPA and may lead to serious ecological damage. Also the amendment did not contain any guidelines as to when the discretion was to be exercised and gave unbridled power. The court struck down the amendment as being violative of Article 21. **(1996 (5) SCC 281.)**

In 1995 the Supreme Court issued an interim injunction in the *Shrimp Culture Case*, prohibiting the setting up of new shrimp farms or the conversion of agricultural lands for aquaculture purpose in the coastal stretches of Andhra Pradesh, Tamil Nadu and Pondicherry. **(S. Jagannath Union of India, 1995)** this injunction was extended to all the coastal states in August 1995.

On 31 January 1997 the CRZ Regulations were amended a second time to overcome the practical difficulties faced by the

islanders of Andaman and Nicobar. The second amendment was the result of complaints from the people of; the Andaman and Nicobar Islands that they were facing problems due to restrictions on drawl of ground water and the prohibition of sand mining in force under this Notification. So, from January 31, 1997, it was decreed that groundwater could be drawn (manually, for drinking purposes only, and with permission from the administration) in areas where there existed no other.

A third set of amendments was introduced on 9 July 1997 to reduce 'the difficulties being faced by the local people and also for construction of essential facilities in the coastal zone'. This was, supposedly, in answer to difficulties various coastal people claimed to be facing because of the CRZ restrictions on construction activities. It can be seen that under the guise of providing for the problems faced by locals the government actually took care of a variety of interest groups. The amended notification sanctioned, inter alia, with conditions:

1. The storing of certain petroleum products within existing port limits of existing ports
2. Acquisition of landward so that existing fish processing units could install additional equipment and undertake pollution control measures
3. The construction of ports, harbors, jetties, wharves, quays, slipways, bridges and sea-links and other facilities (necessary for other permissible activities under the Notification)
4. The expansion and modernization of existing ports, harbors, etc.
5. The manual drawal of groundwater where no other source of water can be found from 50 to 200 m. From HTL in case of seas, bays and estuaries, and within 200 m from HTL or the CRZ, whichever is lesser, in case of rivers, creeks and back-water
6. The construction of dispensaries, schools, public rain shelters, community toilets, bridges, roads, jetties and facilities required to provide for water supply and, drainage and sewerage, within CRZI, for traditional inhabitants of the Sunderbans Biosphere Reserve area (West Bengal).
7. The reclamation of land for facilities essential for operational requirements of ports and harbors within existing port limits, but not for commercial proposes like shopping and housing complexes, hotels and entertainment activities
8. In addition to repairs of existing structures, construction for activities permissible under the Notification was also allowed in CRZ III areas.

Addressing the prohibition of sand mining in the Andaman and Nicobar Islands, the fourth amendment provided that sand mining could be allowed in non-degraded areas, upto September 30, 1998.

The Fifth Amendment followed the deadline after which sand mining in the Andaman and Nicobar Islands was to come to a complete halt. The date was extended by a year, to September 30, 1999, and consequently annual plans for the years 1999-2000 and 2000-2001 were requested to regulate quantity of sand mined.

Demarcation of HTL is a fundamental step to implementing the CRZ Notification. This was however not done even years after the Notification first stipulated that it be done. In the sixth amendment, dated December 29, 1998, the responsibility to

demarcate the HTL is granted to authority or authorities so authorized by the Central Government.

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The latest amendment brought on May 21, 2002 seeks to open up CRZ-III areas for industrialization and development. It allows "non polluting industries" to be set up in the 200-meter zone from the high tide line (HTL) of the coast in CRZ-III areas if they fall under special economic zones (SEZs).

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ENFORCEMENT AUTHORITY UNDER THE NOTIFICATION

Enforcing the CRZ Notification involved the identification and demarcation of the CRZ all along the coastline. Under the CRZ Notification 1991, implementing agencies are the Central Government through the Ministry of Environment and Forests (MOEF) and the State or Union Territory Government, through Department of Forest, Environment and Ecology (DFEE).

In the judgment delivered in Council for Indian Council for Environ-Legal Action Case (**1996 (5) SCC 281**) on April 18, 1996, the Supreme Court observed that authorities under whose jurisdiction the implementation of the CRZ Notification has fallen were overworked and had limited control. It directed that Coastal Zone Management Authorities (CZMAs) be set up, in order to supervise the implementation of the CRZ Notification and also provide advice to the MoEF and the GoI on issues of coastal regulation. (**MR. SHYAM DIWAN**) Consequently, by Government order dated November 26, 1998, the National Coastal Zone Management Authority (NCZMA) and the various State Coastal Zone Management Authorities (SCZMAs) came into existence.

FUNCTION OF CZMAS

The responsibilities entrusted to the CZMAs included ensuring compliance of CRZ, supervising and advising on changes in classification of CRZ, holding inquiries into alleged violations and taking action against violators. The authority also has power to review the cases either suo motu or on the basis of complaint made by an individual or an organization functioning

in the field of environment but does not have the powers to grant clearances of any kind to development projects.

THE COASTAL ZONE MANAGEMENT PLAN (CZMP)

The CRZ Notification directs the administrations of the coastal states and union territories to prepare Coastal Zone Management Plans (CZMPs). (**The CRZ notification**) Preparing CZMPs means identifying and classifying CRZ areas along the coast in accordance to guide-lines laid down in the Notification, or as specified by the MOEF. This includes demarcation of the lines of HTL, LTL, 200 m from HTL and 500 m from HTL, and then a classification of the said areas as CRZI, CRZII, CRZIII or CRZIV.

CZMPs were to be drawn up to help identify the area within which the Notification and its restrictions apply. The various administrations along the coast were given a period of one year to prepare the CZMPs, according to Para (3) (3) (I) of the Notification. However, even after three years of the publication of the Notification, none of the state or union territory governments had prepared the needed CZMPs which meant that there was no way of knowing whether land by the sea was within the CRZ or not, and so whether the prohibitions and regulation of activities applied there or not. This reflects the lack of inclination on part of the State governments to enforce the notification.

In the IECLA case the Supreme Court directed all coastal states to file before it affidavits indicating the steps taken by them to implement the CRZ notification in their respective states and also to answer the charges of violation which had been brought to its notice by concerned citizens. The court further directed the states to prepare the CZMPs. Within six months of the decision all the coastal states had prepared their CZMPs. (**The Scheme of CRZ Notification**)

IV. SECTION II

AMENDMENTS TO CRZ

The coasts are the preferred destination for infrastructure projects like construction of ports, urban infrastructure, highways, resorts, oil and gas exploration, reclamation for real estate development. With development along the coast and the banks of tidal water bodies being restricted, there was pressure from industrialists, hoteliers and developers to have the provisions relaxed. Environmentalists and fisher folk, on the other hand, wanted the provisions to continue as it protected the coastal environment. The justification of the government for the amendments is that difficulties are being faced by the inhabitants of the areas falling within the CRZ and there is a need for infrastructural facilities in these areas.

The first amendment, dated August 18, 1994, was the result of the intense pressure the hotel and tourism lobby put on the Government of India (GoI) regarding the Notification. Their contention was that the restrictions under CRZ severely limited their scope of work. As a consequence, the B.B. Vohra Committee was set up by the Central Government. (**1996 (5) SCC 281**)

Acting on the recommendation of the Vohra Committee the government relaxed the 1991 notification. The amendment:

a) Significantly reduced the mandatory CRZ of 100 m for rivers, creeks, etc. to 50 m.

b) Gave expansive powers to the Central Government, which could now grant per-mission for construction on the landward side within 200 m from HTL according to its discretion.

However this was challenged later in Indian Council for Enviro-Legal Action v. Union of India. The Supreme Court held that the amendment reducing the width of the zone from 100 m to 50 m in respect of rivers, creeks and backwaters was contrary to the object of the EPA and may lead to serious ecological damage. Also the amendment did not contain any guidelines as to when the discretion was to be exercised and gave unbridled power. The court struck down the amendment as being violative of Article 21. **(1996 (5) SCC 281.)**

In 1995 the Supreme Court issued an interim injunction in the Shrimp Culture Case, prohibiting the setting up of new shrimp farms or the conversion of agricultural lands for aquaculture purpose in the coastal stretches of Andhra Pradesh, Tamil Nadu and Pondicherry. **(S. Jagannath Union of India, 1995)** this injunction was extended to all the coastal states in August 1995.

On 31 January 1997 the CRZ Regulations were amended a second time to overcome the practical difficulties faced by the islanders of Andaman and Nicobar. The second amendment was the result of complaints from the people of; the Andaman and Nicobar Islands that they were facing problems due to restrictions on drawl of ground water and the prohibition of sand mining in force under this Notification. So, from January 31, 1997, it was decreed that groundwater could be drawn (manually, for drinking purposes only, and with permission from the administration) in areas where there existed no other.

A third set of amendments was introduced on 9 July 1997 to reduce 'the difficulties being faced by the local people and also for construction of essential facilities in the coastal zone'. This was, supposedly, in answer to difficulties various coastal people claimed to be facing because of the CRZ restrictions on construction activities. It can be seen that under the guise of providing for the problems faced by locals the government actually took care of a variety of interest groups. The amended notification sanctioned, inter alia, with conditions:

1. The storing of certain petroleum products within existing port limits of existing ports
2. Acquisition of landward so that existing fish processing units could install additional equipment and undertake pollution control measures
3. The construction of ports, harbors, jetties, wharves, quays, slipways, bridges and sea-links and other facilities (necessary for other permissible activities under the Notification)
4. The expansion and modernization of existing ports, harbors, etc.
5. The manual drawal of groundwater where no other source of water can be found from 50 to 200 m. From HTL in case of seas, bays and estuaries, and within 200 m from HTL or the CRZ, whichever is lesser, in case of rivers, creeks and backwaters.
6. The construction of dispensaries, schools, public rain shelters, community toilets, bridges, roads, jetties and facilities required to provide for water supply and, drainage and sewerage,

within CRZI, for traditional inhabitants of the Sunderbans Biosphere Reserve area (West Bengal).

7. The reclamation of land for facilities essential for operational requirements of ports and harbors within existing port limits, but not for commercial proposes like shopping and housing complexes, hotels and entertainment activities

8. In addition to repairs of existing structures, construction for activities permissible under the Notification was also allowed in CRZ III areas.

Addressing the prohibition of sand mining in the Andaman and Nicobar Islands, the fourth amendment provided that sand mining could be allowed in non-degraded areas, upto September 30, 1998.

The Fifth Amendment followed the deadline after which sand mining in the Andaman and Nicobar Islands was to come to a complete halt. The date was extended by a year, to September 30, 1999, and consequently annual plans for the years 1999-2000 and 2000-2001 were requested to regulate quantity of sand mined.

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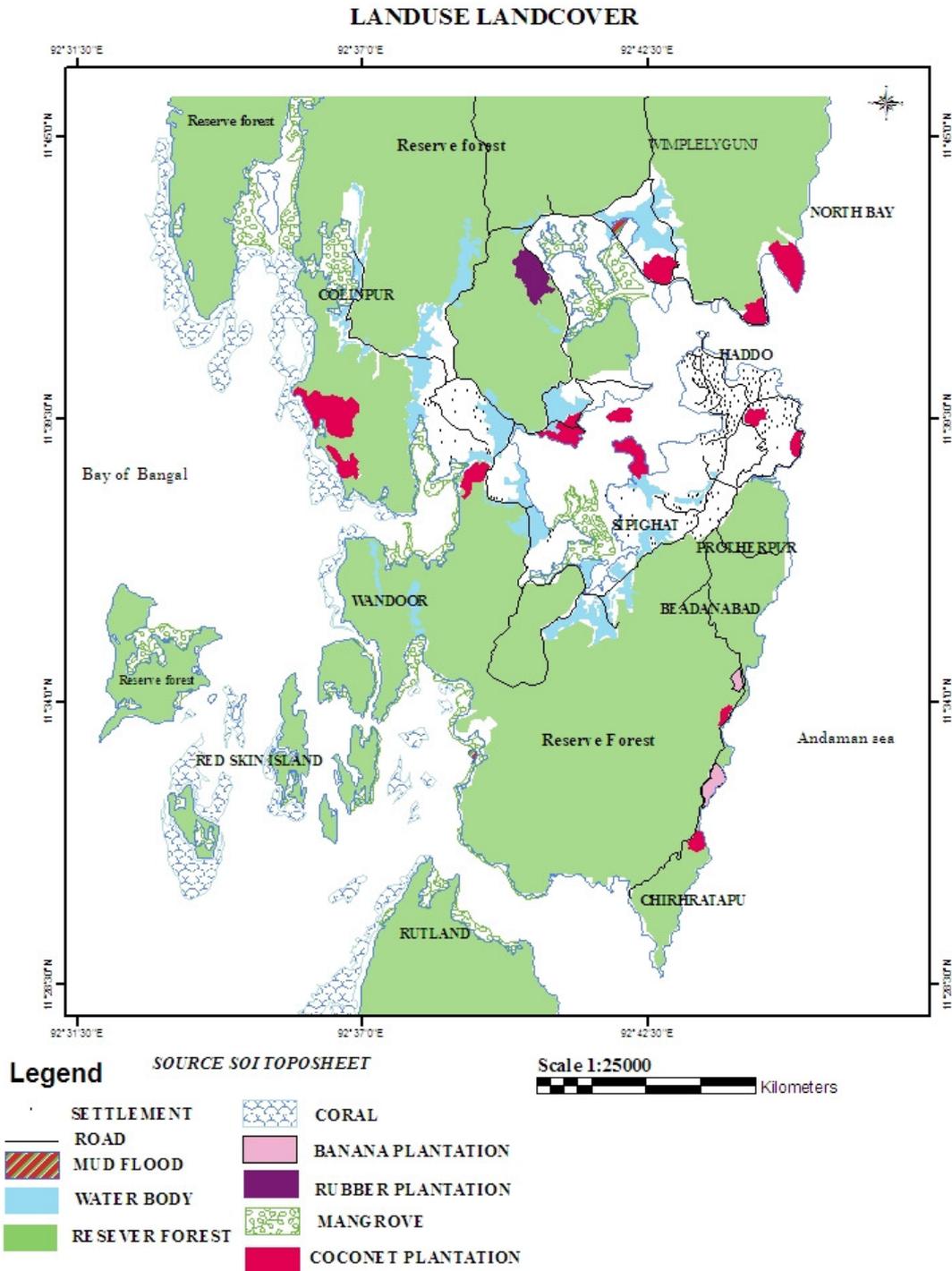
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V. STUDY AREA

South Andaman Island is the southernmost island located at Bay of Bengal latitude of 11° 47'N 92° 39'E Archipelago Island and the total area is 1,347.7 km²(520.35 sq mi) Highest elevation 456.6 m (1,498 ft) Highest point Koiob the Great Andaman and is home to the majority of the population of the

Andaman Islands. Port Blair, the capital of the islands, is located on the southern part of this island. Some areas of the island are restricted areas for non-Indians; however, transit permits can be obtained from the Home Ministry. Like the rest of the archipelago, it was struck by the 2004 Indian Ocean earthquake, leading to many deaths on the island. South Andaman is the third largest island in the island group. It is located immediately south of Middle Andaman Island, from which it is separated only by a

narrow channel, a few hundred meters wide. The island is 93 km long and 31 km in width. Its area is 1348 km². It had a population of 181,949 as of the 2001 census. South Andaman is less mountainous than the more northerly of the Andaman Islands. *Koib* reaches a height of 456.6 m



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Figure1: Landuse landcove of South Andaman Island 1993

LANDUSE LAND COVER 2010 OF SOUTH ANDAMAN

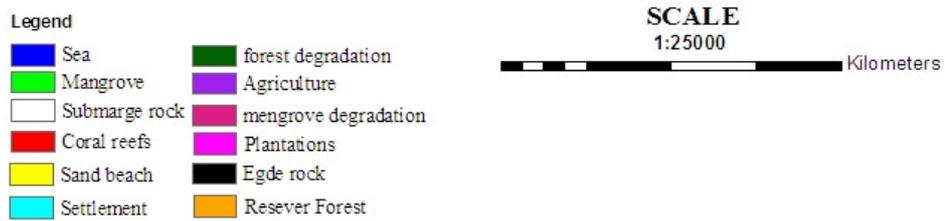
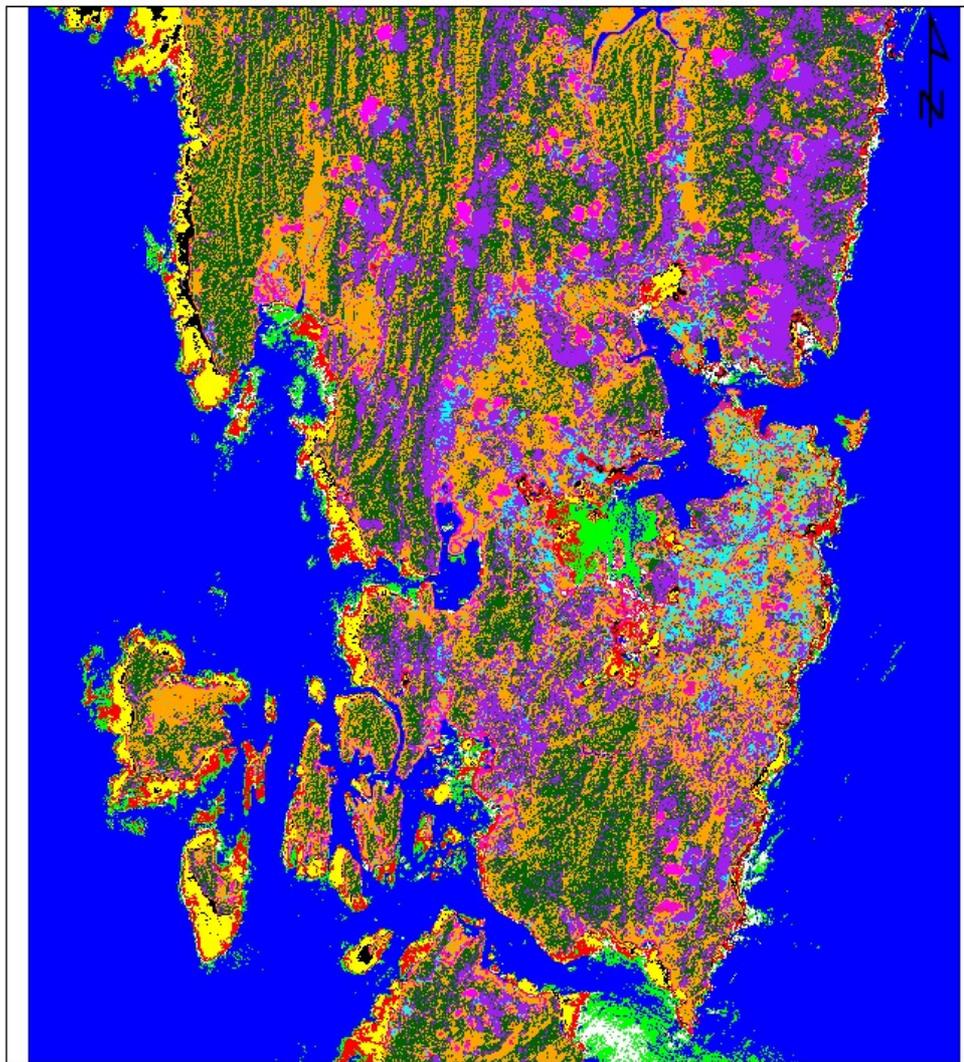


Figure2:

Landuse landcove of South Andaman Island 2010

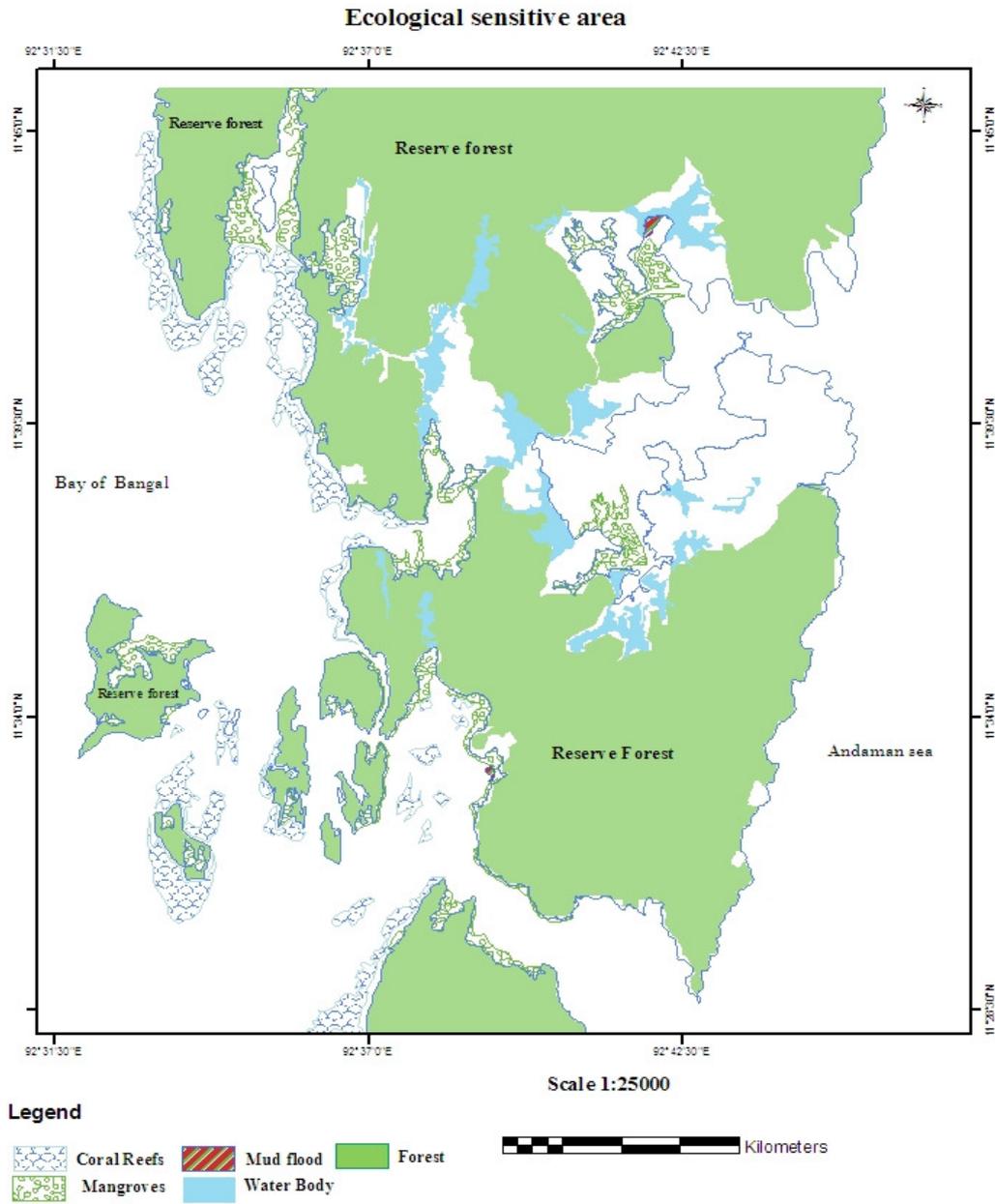


Figure3: Ecological Sensitive Area of South Andaman Island

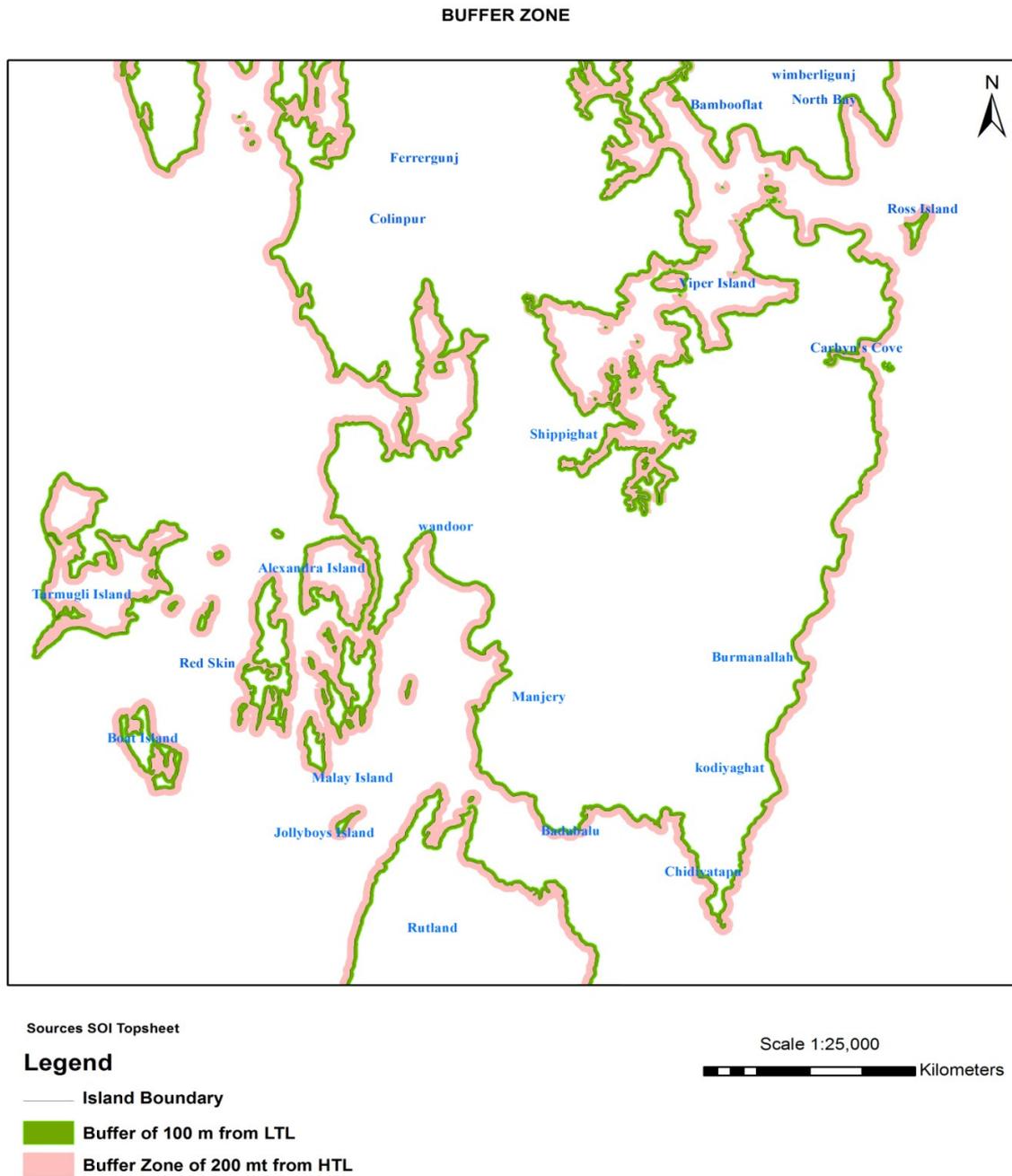


Figure5: BUFFER ZONE AREA OF SOUTH ANDAMAN ACCOUNTING TO 2011 CRZ

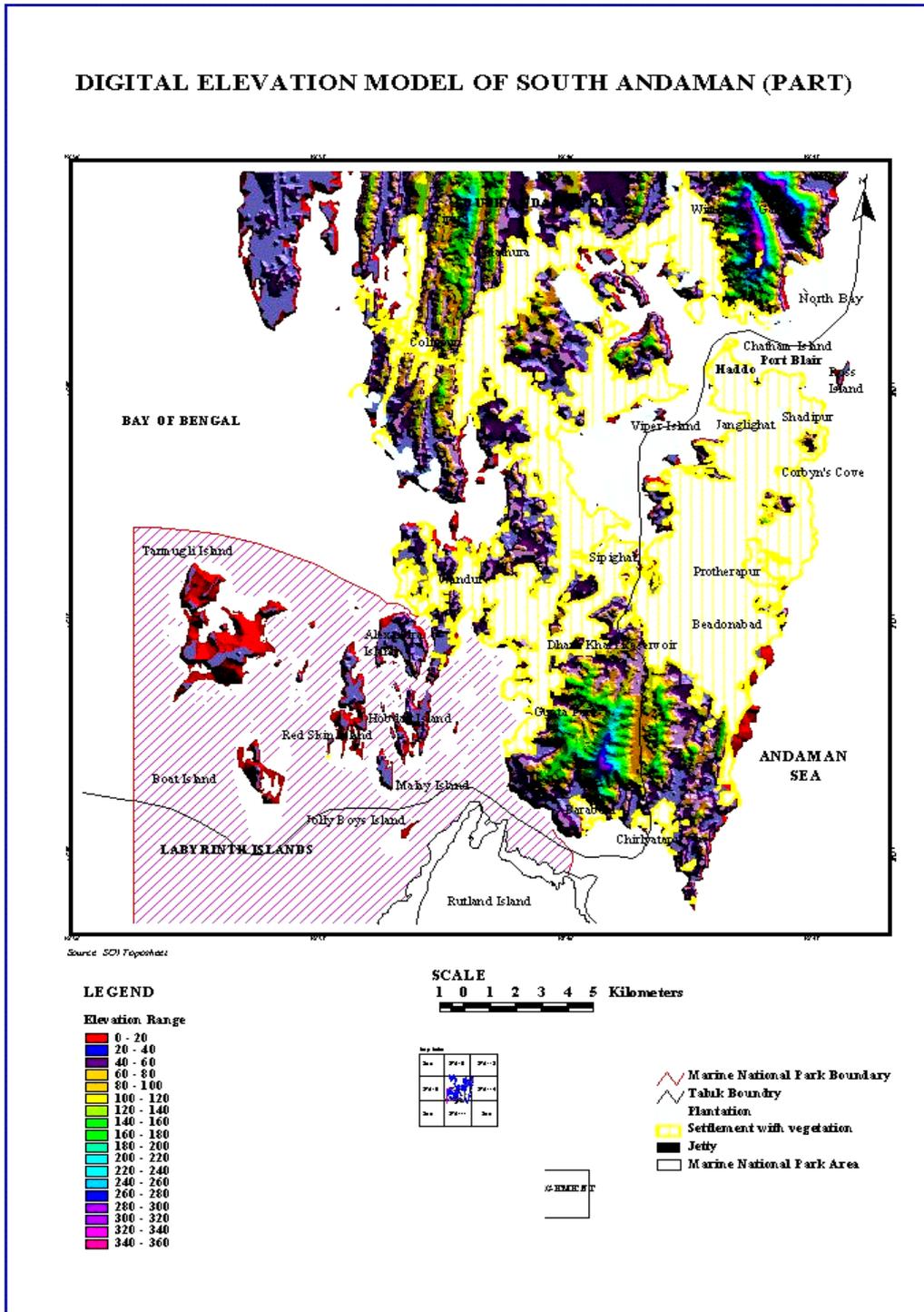
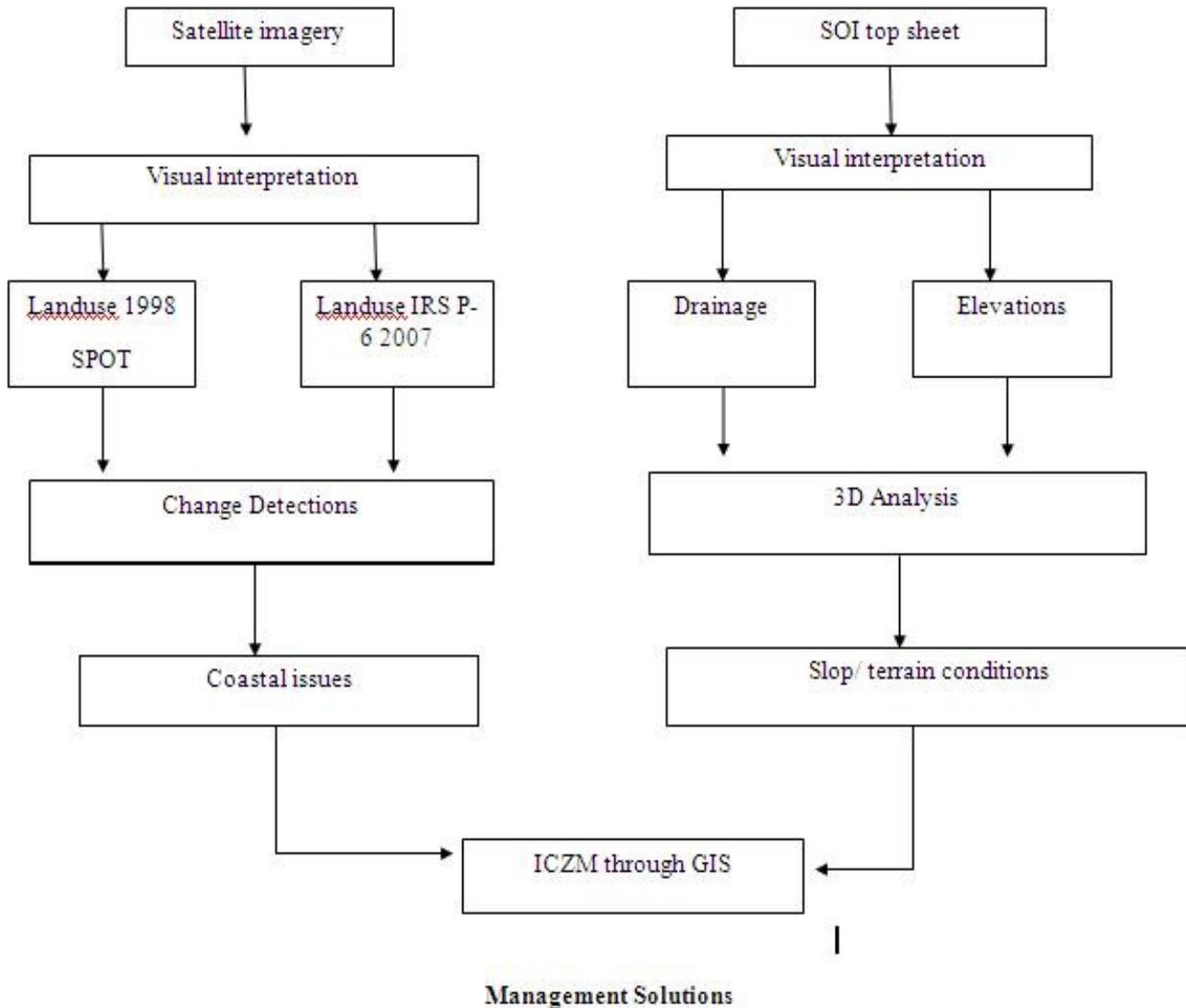


FIGURE6: Digital Evaluation Model of South Andaman Island

VI. METHODOLOGY

Methodology adopted for the study is given below.



VII. RESULT AND DISCUSSIONS

Landuse Change:

For sustainable utilizations of land ecosystem it is essential to know the nature characteristic extent and locations of soil resources it quality, productivity, suitability and limitations for various landuse. (Chaurous et al 1996). In order to improve the economic conditions of the area without further deteriorating the bio-environment every bit of the available land has to be used in a mast rational way this require the present and past and

landuse/land cover data change are costly ,low in accuracy and not present a picture of a large area.

Remote sensing because of its capability of synoptic viewing and respective coverage provide full information on landuse and land cover due to natural and human activity are be observed using current and archived remote sensing data (Loung 1993)

3-Dimenesional Model:

Slop of the island observed through digital Elevations model is as follow the central part 0°to 20° south eastern 10°-40° southern 0°-20° northern western 10°-20°and northern western

10°-20° and north eastern part 25°-80° it is observed that mostly peak where other part of the island are found moderate slope.

Drainage:

Stream process in any terrain are controlled not only by climatic conditions, but lithology and geology structure also have great control as influence the nature of flow, erosion and sediment transportations the degree of dependence varies with the physical and chemical properties of rock the permeability the structure characteristic and the degree faulting / fracture also effected the extent to which the materials can be detached by fluvial process (Derbyshire et al., 1981) the role of rock type and geology structure in the development of stream network can be better understood by study the nature and type of drainage pattern observed in South Andaman Island area were dendritic in nature. The pattern exhibits those mountains in origin. The stream generally followed a steep slope in northern portions of the island the stream generally follow a slope in northern portions but they follow a gentle slope in southern portions as the island. Depending upon the elevations of terrain drainage pattern and river flow directions, particular site were specified for erecting dam. However subsurface study is also necessary to find the exact locations erecting a dam. South Andaman has enough potential for fresh water supply the following locations are supply for pumping to meet out the demand of south Andaman.

Coastal Issues:

Degradations in mangrove are observed in northern portions of the island. Development of settlement area and more sedimentation in coastal environment are the major issues for the degradations of mangrove loss in reserved forest as attributed to the development of settlement area the loss in forest is observed at northern portions of the island, gentle slope and sparse forest cover, favour the development of settlement in this portions sand area was found to have decreased in almost all the part of the island this may be due to sand mining or due to natural process.

Management issues:

Tourism is a main sector of the world economy accounting for nearly 11 percent of global (Topfleri 1999) nature based tourism now comprise 20 percent of the world travel market and ecotourism 7 percent (TIES 1999) according to report presented at a WTO seminar Spain early this year 20 million European consider the environment as their main motive for travel (WTO 1999) there is general agreement that supported conservations actively contributed to local community development and lead to greater understanding and appreciations of the nature and culture environment however conservations is the primary objective of ecotourism.

Ecotourism is the concept that grew from the need to meet the objective of nature conservations while recognizing the right to local people to utilize their locally imposed of the western model of protected area management in area where local people relied on nature for their injustice of the western model of protected area management sight to implement a more considerate form of conservations.

Tourism was introduced as a tool for natural conservations to compensate for reduced consumption of forest produced

income for community is greater through the community involvement in tourism enterprise. The process called ecotourism (Lincoln International 1998). In South Andaman Ecotourism site selections was observed based on the criteria where sandy beach was available slope of the terrain was less than 20° and the ground water of good quality was available slope of the quality was available on the criteria site of ecotourism were suggested for the selected for Indian portions of the island.

The location of site for constructions plays the primary role in the effectiveness of any artificial recharge structure (Jothiprakash et al. 1997). Extensive studies have been carried out by several workers in delineating ground water potential / prospective zone Geographical Information System (GIS) has been found to be effective tool. In recent year, extensive use of Indian topographical map collateral information and field check has made it easier to establish the base line information for ground water prospective zone. (Singh et al 1993; Chi and Lee, 1994, Hardass et al; 1994 Tiwari and Rai; 1996 Das et al; 1997, Pradeep, 1998, Subba Rao and Prathap Reddy 1999, Thomas et al: 1999, Harinarayan et al 2000, Muraudher et al., 2000, Obi Reddy et al, 2000).

In South Andaman Island the constructions of artificial recharge structure are suggested based on the criteria where slope was less than 30°; high drainage density and buried pediment zone where present based structure were suggested at the selected portions of the island.

Utilitarian approach is suggested for sustainable management of the coastal resources in South Andaman.

- ❖ No development activity should be promoted in wet land area.
- ❖ No development activity should be promoted within 10 meter buffer of 1st, 2nd and 3rd order streams and within 20 meter buffer for river.
- ❖ Erosion activity of the stream should be checked in the highest elevations by erecting an anti-erosion structure.
- ❖ The ICZM plan must strictly follow for the better of South Andaman Island.
- ❖ No permanent concrete structure should be developed in this Island.

VIII. CONCLUSION

In recent years, the country's coastal stretches have become a pressure point for indiscriminate and unsustainable development pressures. There is considerable debate regarding the CRZ with the hoteliers etc. lobbying that it is anti-development and the environmentalists stressing that relaxation in the CRZ Notification would only encourage pollution and asking for its strict enforcement.

The CRZ Notification was promulgated with the intention bringing a balance between infrastructure development and preservation of the eco-system along the coastline. However from the very beginning the enforcement agencies have been extremely apathetic w.r.t. the CRZ Notification. One of the major criticisms leveled against the CRZ Notification is that it ignores deliberately issues of public participation and, local contexts and issues. This neglect, along with the SCZMA inaction, has led to a clash of functions between the duties of the local bodies like

panchayats and municipal corporations and the designated coastal authorities.

In a paper authored by the Former Secretary, MOEF, Government of Karnataka, Capt S. Raja Rao has attempted to address the problems of implementation of the CRZ. He states categorically that most problems have arisen because the coastal state authorities have not taken the implementation of the Notification seriously. According to him hastily prepared CZMPs and inadequate, non-participate consultations, even among the government officials themselves are to be blamed for the problems being faced. It can be seen that the failure of the CRZ is because of the reluctance of the government to enforce it. The letter written by Ms. Indira Gandhi which did not have any authority apart from being the diktat of the Prime Minister resulted in the development activity being severely restricted. In the present context the government has been conceding the demand of the powerful lobbies by diluting the notification through amendments.

In *Goa Foundation v. Konkan Railway Corporation* the central government decided to lay a broad gauge between Bombay to Mangalore via Goa. The court held that the CRZ notification prescribes that there would be restriction on the setting up and expansion of industries operation or processes in the said areas and land reclamation bunding could not be considered as industry. So the CRZ notification did apply to this case. The Court observed that no development is possible without some adverse on ecology and environment but public utility projects cannot be abandoned and it is necessary to adjust the interests of the people as well as the necessity to maintain the environment. It can be seen from the several decisions on CRZ that of late the attitude of the judiciary has not been very supportive of strict enforcement. One tends to come to the conclusion after looking at the case law that rather effectively preventing pollution of the coastal areas, the CRZ notification has become more of a law regulating land use with litigation on questions of fact as to the category to the CRZ and other such questions of evidence.

Landuse change detections, 3dimensional modeling and drainage patter were studies it found that there is decrease in sand, forest cover and mangrove the decrease is the attribute to the development of settlement through 3d elevations model and drainage pattern, site for dam constructions and borehole locations where identified by integrating landuse, 3d elevation and drainage map ICZM plan map was prepared and site for ecotourism and artificial recharge was suggested according to the ICZM plan map management solutions were also if this plan implementing this would be immense for South Andaman Island.

ACKNOWLEDGEMENT

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- [17] The other amendments have been promulgated under Environment (Protection) Rules, 1986, rule 5(4), which states, "Notwithstanding anything contained within sub-rule 3, whenever it appears to the Central Government that it is in public interest to do so, it may dispense with the requirement of notice under Clause (a) of sub-rule 3."
- [18] *S. Jagannath v. Union of India*, 1995 (3) SCALE 126. The Aquaculture Authority was set up via Notification dated February 6, 1997, by the Central Government under Section (3) (iii) of Environment (Protection) Act, 1986. The Authority was set up to regulate the shrimp culture industry in coastal areas. The duties of the Authority, as per the Notification, inter alia, were: Ensuring the closure, demolition and removal of all existing aquaculture activities by March 31, 1997, from CRZ areas as indicated in CZMPs .Ensuring no shrimp culture pond can be constructed or set up within CRZ.

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Implication of India's Look East Policy with human trafficking mainly women that reflect Social chaos and armed conflict

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Abstract- The North-Eastern tip of India consisting of contiguous seven sister states- Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and the state of Sikkim – constitutes a unique narrow passageway connecting the Indian subcontinent to East and South-East Asia and acts as a crucial corridor for human migration between these areas. Globalisation via Look East Policy has been identified with a number of trends, most of which have developed since World War II. These include greater international movement of commodities, money, information, and people, development of technology, organisations, legal systems, and infrastructures to allow this movement. Globalisation is aimed at placing the world under a unitary economic framework of free market capitalism. The globalised system is based on certain principles which require certain constants. It is a “complex world transformation whereby the mobility of capital, organisations, ideas, discourses, and peoples has taken an increasingly global or transnational form”. In this process, people become increasingly interdependent on and interconnected with one another in what they produce and what they purchase, although not equally across borders. Numerous aspects of globalisation impact the workforce, including poverty, in developed, developing, and transitional economies and the use of immigration policy to alleviate shortages in particular occupations. Any discussion of globalisation must acknowledge the international debt crisis and payment conditions directed at debtor nations by the World Bank and International Monetary Fund. Strategies defined to alleviate the debt of poor nations include the enforcement measures of fiscal austerity, abridging social and health care spending, and international trade agreements that rarely, if ever, benefit the developing nations. To help meet their debts to international institutions, many Third-World nations encourage women into four gendered production networks: export production, sex work, domestic service, and micro-finance (income generation).

Index Terms- India's Look East Policy, Globalisation, Four gendered production networks, Strategic imperatives.

I. INTRODUCTION

Human Trafficking is a crime against humanity. It involves an act of recruiting, transporting, transferring, harbouring or receiving a person through a use of force, coercion or other means, for the purpose of exploiting them. Every year, thousands of men, women and children fall into the hands of traffickers, in their own countries and abroad. Every country in the world is

affected by trafficking, whether as a country of origin, transit or destination for victims. UNODC, as guardian of the United Nations Convention against Transnational Organized Crime (UNTOC) and the Protocols thereto, assists States in their efforts to implement the Protocol to Prevent, Suppress and Punish Trafficking in Persons (Trafficking in Persons Protocol).

In addition to the criminalization of trafficking, the Trafficking in Persons Protocol requires criminalization also of:

- Attempts to commit a trafficking offence
- Participation as an accomplice in such an offence
- Organizing or directing others to commit trafficking.

In this globalising world, growing numbers of immigrants are seeking a better life in another country; increasingly, they are women. (Arya and Roy, 2006; George, 2005 cited in Browne, Braun 2008) Globalisation promotes the movement of people, but migration is also a basic process of globalisation. Globalisation is working both as push and pull factor to migrants (Misra, 2007); as a result those women, who migrate due to economic compulsion, do not receive equal wages as compared to men. All this increases the stress in the family, especially the womenfolk, to provide clean food and water. The magnitude of the problem grows by unexpected folds due to wars and conflicts rising in the shadow of the new global world order. Whereas older people, women and children tend to stay in the refugee camps close to conflict areas, younger men and women search for opportunities for global migration. Political and gender repression by dictatorships, military regimes and some fundamentalist patriarchal rulers have also led to increasing numbers of refugees. Among all this the process of illegal migration and trafficking has become another matter of concern. There are estimates that 2.5 million women, men, children are trafficked within and across the border at the very least, and one-third of these are trafficked for economic purposes other than sexual exploitation. Pointing out at the very outset of the paper that people largely used to migrate in search of better haven and economic opportunities, there are estimates to suggest that nearly one out of six people in this world, more than one billion people, are crossing national borders as migrant workers. Of these one billion, 72 per cent are women. Traditionally, migration has been mostly a male phenomenon because men had the freedom to travel and a duty to maintain the financial upkeep of the family. Migration was a men's world, migrants' jobs were male jobs and migrants' rights men's rights. More recently globalisation has created conditions for feminisation of migration, and the number

of women who migrate alone, as men do, to make money for themselves and/or to support their families, is increasing. In women's migration, their role in society, their autonomy and capacity to take decisions play a major role. In women's migration, gender discrimination acts as a powerful factor. In feminist migration studies, the main focus is on the causes and conditions of women's migration. Unlike the traditional feminist migration studies, the recent works on feminist migration have challenged the concepts and scale of the study. These studies have challenged the conventional understanding of nation, society and challenging the national and international scales of migration, ask additional questions about the nation and migration, most centrally the question: 'Whose nation?' These also try to explain that the very construction of the nation and national scale are not the right categories as they are constructed as a result of gender politics and discrimination. In other words, gender analysis of migration examines how the social, economic and cultural contexts of an individual force him/her to flee. In this study, feminists have also focused on the gender politics of identity construction, and the complex relationships between identity and the production of migration and place. It is important to understand the causes and consequences of international migration from a gender perspective because hierarchical social relations relating to gender play an important role in shaping the migration experiences of migrants, whether male or female. Understanding whether migration occurs because of gender inequality or whether migration itself helps to perpetuate gender disparities, is valuable to guide the formulation of policy and measures to address the specific needs of women who migrate. (UN Report on 2004 Women and Migration).

When it comes to environmental migration, women are more affected than men. IOM (2009) has noted: "Statistically, natural disasters kill more women than men, and kill women at a younger age than men. Behavioural restrictions and poor access to information and resources can directly affect a woman's chances of survival during a natural disaster or its aftermath. Their role as the main caregivers in many societies also means that women tend to look more after their children's safety before their own." This statement clearly shows that women are more vulnerable to environmental migration.

ALTHOUGH trafficking is not a new concept as in history there were traditions of treating humans as slaves, in today's globalised and democratised world the form of human trafficking has changed. It refers to the illegal trade of humans for sexual exploitation and forced labour. Young children, teenagers, men and women—all are victims of human trafficking and they are subjected to force, fraud, or coercion for the purpose of sexual exploitation or forced labour. (US Department of Health and Human Services) In other words, a person, who is coerced, deceived or forced to move within her/his country or to another country for the purpose of exploitation, is a victim of trafficking. (GAATW Working Papers Series, 2010) The United States State Department (2010) data shows that an "estimated 600,000 to 820,000 men, women, and children [are] trafficked across international borders each year, approximately 80 per cent are women and girls, and up to 50 per cent are minors. The data also illustrates that the majority of transnational victims are trafficked into commercial sexual exploitation."

The Palermo Protocol to Prevent, Suppress and Punish Trafficking in Persons, especially Women and Children (2000), defines trafficking as follows:

Trafficking in persons shall mean the recruitment, transportation, (transfer, harbouring or receipt of persons, by means of the threat or use of force or other forms of coercion, of abduction, of fraud, of deception, of the abuse of power or of a position of vulnerability or of the giving or receiving of payments or benefits to achieve the consent of a person having control over another person, for the purpose of exploitation. Exploitation shall include, at a minimum, the exploitation of the prostitution of others or other forms of sexual exploitation, forced labour or services, slavery or practices similar to slavery, servitude or the removal of organs. (United Nations General Assembly, 2000)

People smuggling and trafficking in humans are generally viewed as two distinct offences. In general smuggling involves: Delivering persons into the country they wish to enter illegally and then leaving such persons to their own devices. It usually involves a voluntary act entailing a payment of a fee to provide a passage to a particular destination. (Bernadette and Susan 2008)

II. LITERATURE REVIEW

1. Apart from economic reasons, people also migrate due to change in environment and such persons are generally referred to as Environmental Migrants. Such people get uprooted due to earthquakes or floods leading to forced displacement; this phenomenon is commonly present where there is a slow onset of environmental change or the degradation process such as desertification or abrupt changes in weather affecting those who are directly dependent on the local environment for their living causing them livelihood stress. (Dun and Gemenne)
2. Feminist theorists further tend to study the identity related aspects like cultural, geographic studies of migration in order to address the migrants' cultural identities as represented in their locally specific views of mobility, but they do so according to a different understanding of identity and subjectivity. (Silvey 2004)
3. In this globalising world, growing numbers of immigrants are seeking a better life in another country; increasingly, they are women. (Arya and Roy, 2006; George, 2005 cited in Browne, Braun 2008)
4. Globalisation is working both as push and pull factor to migrants (Misra, 2007); as a result those women, who migrate due to economic compulsion, do not receive equal wages as compared to men.
5. The UN Protocol sets out a definition of 'trafficking in persons'; strengthens avenues for border control and responses by the judiciary and establishes prevention policies. (Bernadette and Susan 2008)
6. The evolution of international trafficking in women and girls appears to be closely linked to two areas: i) changing demands for women's labour in the global political economy, and ii) the changing patterns of international migration. The shift in the role of women in migration from being dependents of male migrants to

becoming the major economic agent in many developing countries has become increasingly visible. (Kojima 2007)

III. NEED OF THE STUDY

The present economic structure creates conditions where the demand for cheap migrant labour is accompanied by declining wages, benefits and safety standards. Migrant workers, especially women migrant workers, are paid at a lower rate than local workers.

IV. STATEMENT OF THE PROBLEM

The problem of trafficking in persons for the purpose of sexual and other forms of exploitation is not new, but a comprehensive international, regional and national attention to the issue is recent. It is estimated that four million people are trafficked or smuggled across international borders each year. The trafficking of women and girls for prostitution and forced labour has also become one of the fastest growing areas of international criminal activity.

V. OBJECTIVES OF THE STUDY

The paper emphasis to point out the relative consideration of India's Look East Policy with the human trafficking and trying to verify whether the majority of victims of human trafficking have been highly concentrated as women or not.

VI. HYPOTHESIS OF THE STUDY

Although men, women, children, adolescents and adults are all victims of human trafficking, the majority of victims have been highly concentrated as women. Data shows that women are more vulnerable than men because they experience multi-dimensional exploitation. In all parts of the world, because of gender bias women's role in society has always remained subordinate and they are treated as second class citizens of society. Even in the globalised world, which has created social and economic opportunities for all sections of society, poor unskilled workers have been among the first to suffer retrenchment and unemployment. These reasons make women more susceptible to trafficking.

VII. RESEARCH METHODOLOGY

The data collection comprises of primary data collection, secondary data collection and informal discussions. The data for the study are collected through personal interview, discussion with different persons concerned and 'The Imphal Free Press & Sangai Express (Manipur English Daily newspaper)' etc. are chosen for the purpose of the present study.

The type of sample used for the selection of respondents is the Multi – stage sampling.

VIII. SCOPE OF THE STUDY

The periods of proposed research work are cover from the year 1826 to 2011. However, if it is necessary, the research work may be extended prior to 1826 and subsequent years after 2011.

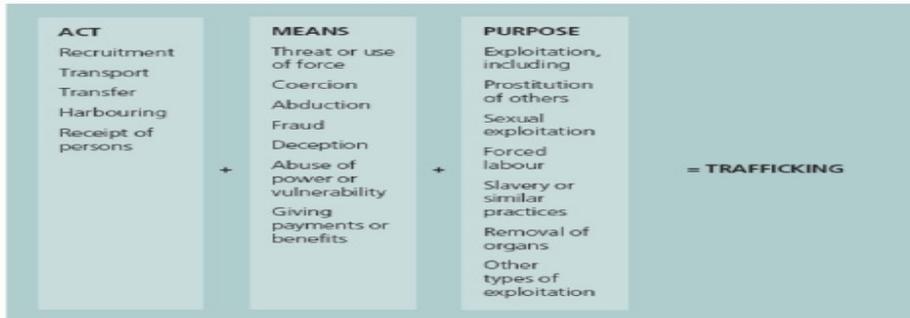
IX. RESULTS AND DISCUSSIONS

(GAATW, Global Alliance against Trafficking for Women, UNHCR and UNICEP) In most cases, the traffickers take advantage of the vulnerabilities of the victim. In other words, we can say that they are the outcome of economic and social poverty, driven by gender inequality, lack of good governance, and social segregation and so on. (Baruah 2005) "The widespread assumption that most trafficking incidents start with kidnapping and coercion is far from true and has been validated by many recent researches on this issue. Most trafficking starts as a migration experience; which could be legal or illegal; is for economic (employment) or social (marriage) reasons. It may have elements of deception in it from the beginning but the process of force and coercion comes into play after the initial first steps toward movement has happened." (Ibid.: 3)

Many people assume that migration and trafficking are the same but there are differences in these two different movements. Movement is central to both migration and trafficking and this commonality between the two builds a complex relationship. Sometimes the element of coerced movement is found to be absent especially in the case of the bonded labour system where men, women and children may be exploited in their own place of origin without having to cross geographical borders. These people were already living in an awful situation; their life becomes more vulnerable after they got trafficked. Trafficked people do not have the opportunity of informed consent with respect to the experiences they undergo. (United Nations 2000: ESCAP 2003) There are also certain technicalities which make the whole concept of trafficking limited. For example, take the case of exploited migrants; they are also victims of offences on themselves but these do not always lead to trafficking. However, the majority of trafficked people are exploited migrants. So there is a need to broaden the whole debate on trafficking. The crucial factors in distinguishing between the two will be in the nature of consent: the intention of the agency between the information made available at the start of the journey as compared to the circumstances they find themselves to be in at the end of the journey.

X. FINDINGS OF THE STUDY

Elements Of Human Trafficking-



To ascertain whether a particular circumstance constitutes trafficking in persons, consider the definition of trafficking in the Trafficking in Persons Protocol and the constituent elements of the offense, as defined by relevant domestic legislation.

UNODC offers practical help to States, not only helping to draft laws and create comprehensive national anti-trafficking strategies but also assisting with resources to implement them. States receive specialized assistance including the development of local capacity and expertise, as well as practical tools to encourage cross-border cooperation in investigations and prosecutions.

The Root Causes of Migration

Understanding those forces that compel people to migrate is necessary to understand the process of migration. There are countless factors which force people to leave their home, but poverty, injustice, armed conflicts and natural disasters are the major reasons that make most of the people to move from their native place. Estimates say that in the last 30 years, the number of international migrations has doubled to 191 million worldwide, (Renaud, Bogardi, Dun and Warner 2007) These are economic migrants, refugees and internally displaced people fleeing persecution and victim of human trafficking. Besides this, there are roughly 30-40 million undocumented migrants worldwide, comprising around 15-20 per cent of the world's migrant population. (Ibid.) The International Organisation for Migration (IOM) has estimated that almost half of the world's migrants are women. In today's developed world, 59.9 per cent migration compared to the 45.7 per cent of the developing world are women. Women are increasingly migrating as workers themselves. The economy is playing a major role in women's migration and women are migrating both as qualified professionals as well as domestic workers, cleaners and etc.

It is the lack of viable economic opportunities at home that often pushes workers to migrate in search of better options. If we see this process through the angle of globalisation, we come to know that globalisation has led to widen the gap between the rich and poor people. Global economic policies, initiated through liberalisation of the market and the structural adjustment policies (SAPs) of the international economic institutions like the World Bank and International Monetary Fund, are major causes of the

gap in income and employment opportunities, displacing workers from their local livelihoods.

Women mainly migrate to join a migrant husband (family reunification) or to marry someone living in a different country. "While working in Hong Kong I experienced many things—the way people treat a dependent or independent woman. I have gained much experience and my confidence has grown. Now, I have a say in decision-making at home. My husband does not shout at me. I have bought a piece of land and four rickshaws and I am creating a means of livelihood for four other families," said Sushila Rai, a Nepalese migrant domestic worker. (Jolly and Reeves, 2005) In addition, those women, who might have migrated for other reasons, often do not want to return home because of the fear of losing their autonomy. Migration can provide a very important source of earning for migrant women and their families, and also give them greater autonomy, self-confidence and social status. At the same time, migrated women can also face stigma and discrimination at every stage of the migration process. Before departure, women can be confronted with gender-based procedures and corrupt agents. Gender inequality, poverty and violence can force women to migrate or enable women to be trafficked. (Jolly and Reeves, 2005)

In the present economic system high demand for the service of women has been created but at the same time their capacity for negotiations has decreased. In the present market-oriented economy women are in greater demand as they are paid very low and exploited easily. As Renu Sharma (2007) put it, "The gender discrimination they suffer and exclusion from the economic and political arenas makes them socially vulnerable subjects. This kind of socially created conditions of women as marginalised social groups is the key element in their oppression and exploitation."

Trafficked women frequently come from regions where there are few employment opportunities for women and where women are dependent on others and lack access to resources to change their situation. At the same time, their social status also plays a leading role in women's trafficking. (Miko 2002)

Trafficked women and girls often presume that they will work in legitimate occupations but at the end they find themselves trapped into forced prostitution, marriage, domestic work, sweatshops and other forms of exploitation that are similar to slavery. The debate about trafficking is more concerned on the

causes of trafficking than on the strategies to fight against the problem. (Chew and Jordan 2002)

Finally, UNODC initiatives on strengthening partnerships and coordination occur through its participation in inter-agency groups such as ICAT, UN.GIFT and GMG and its management of the UN Trust Fund for Victims of Trafficking in Persons.

XI. RECOMMENDATION AND SUGGESTION

Actions to prevent trafficking include the dissemination of information on the modes used by traffickers to attract and deceive women, the dangers involved and the legal channels open for migration, as well as the provision of better employment opportunities in the country of origin. A number of international instruments outline the human rights of migrants. In order to prevent trafficking, there is a need for dissemination of information on the modes used by the traffickers through which they attract and deceive women and legal channels. Human trafficking is threatening the power, legitimacy and effectiveness of states on a global scale. There are many questions which have arisen due to the process of migration. How should we deal with migrants? Should illegal migrants be granted certain rights? If yes, then what kind of rights and how many rights? And if no, then should we leave them in the same vulnerable condition? There is no single answer to these questions. What is needed is a balanced approach. We have shown above that gender always remains at the centre of both migration and trafficking and in both these two processes, which are linked to each other, women are in a more miserable condition. No doubt, human trafficking is becoming one of the most serious threats to human rights as this phenomenon is both the cause and the consequence of human rights violations. The trafficked persons exploited as workers have been deprived of their freedom of movement, denied access to health care and deprived of their right to life. Lack of rights and social inclusion for migrants and trafficked persons makes the situation horrific.

The problem of trafficking needs to be checked, as it is creating new kinds of threats to the security of women and children. Stringent laws and international cooperation are imperative to fight against this problem. At the same time collaboration and coordination between state and non-state actors are also important as these can help evolve new sources of income and survival for all those women who are facing this problem.

UNODC's strategic approach to combating trafficking in persons and the smuggling of migrants is founded in the full and effective implementation of the Protocols, and can be best understood as having three interdependent and complementary components:

- (1) research and awareness raising;
- (2) promotion of the Protocols and capacity-building; and,
- (3) the strengthening of partnerships and coordination.

The adoption in 2000 by the United Nations General Assembly of the *Protocol to Prevent, Suppress and Punish Trafficking In Persons, Especially Women and Children* marked a significant milestone in international efforts to stop the trade in people. As the guardian of the Protocol, UNODC addresses

human trafficking issues through its Global Programme against Trafficking in Persons.

XII. CONCLUSION

Certain obstacles like lack of infrastructural development, absence of enthusiastic response from local people, frequent insurgencies, poor governance in the states, the easy availability of arms and weapons from across the international border to be utilized in armed movements and criminal activities impede increased relations between North-East India and South East Asia. Moreover, the geographic location of the North-Eastern region makes it more vulnerable to be the core of hostility with massive negative outcomes.

There are enough avenues through which North East India can be related to South-East Asia. Racial, linguistic and cultural similarity prevails among the people of North-East India and those of South-East Asia. If the concerned governments really strive to translate their policies into reality their collaborative endeavours would invariably revive age-old cultural and historical bonds. To highlight the linguistic attachment it should be stated that it is an area of extensive linguistic diversity with predominantly three language families represented- Austro-Asiatic, Indo-European and Tibeto- Burmese.

Austro-Asiatic languages are now spoken by a single group in North-East India (the Khasi) but they are also found in East India and South-East Asia reflecting that they might have been more frequent in North-East in the past. Indo- European language is spoken from Europe to Central and South Asia with their easternmost occurrence in Nepal, Bangladesh and North-East India. Tibeto- Burmese languages are a branch of Sino-Tibetan family which is mainly spoken in North-East India, China and South-East Asia. Thus North-East India sets up an important linguistic contact zone.

Through centuries there has been exchange of peoples, goods and services between our North-East and countries of South and South-East Asia. The Ahom of Assam migrated several centuries ago from the Shan state of Burma where the language spoken is almost identical to that spoken in Laos and Thailand. The Chins from Myanmar migrated over the past centuries to Manipur and Meitei of Manipur have ties for over 2000 years with the Burmese of Myanmar. Similar migration has also occurred to North-East from Yunnan province of China. Boosting people to people contact transcending political barriers is an imperative for facilitating cultural interaction among various regions. In contemporary era, physical connectivity is of utmost importance as it channelizes the means to accelerate the movement of goods, people and services and thereby acts as a gateway to reviving economic enterprise.

XIII. SCOPE FOR FURTHER STUDY

What distinguishes the present engagement with East Asia from previous ones is the fact that it is operating on multiple fronts; India's historical, cultural and ideological links are being complemented by growing economic interdependence and multilateral cooperation from the movement of capital and

Comparison of Pattern Matching Techniques for Host Based Intrusion Detection System

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Abstract- This project analyzes the security status of computer network, generating of network attack graph is a hot topic in this domain. After analyzing network security attributes including the host, user privilege, connection relation, etc., the model of computer network security status space is built.

Index Terms- Network Security, Intrusion Detection

I. INTRODUCTION

The rapid growth of the network influences the economy, politics, culture and many aspects of the society. The deeper and wider the network applications is, the more obvious and more complex the computer and network's security problems are. Hackers and virus can find more ways to launch attack with the development of the network technology. The security problem of computer network is more complex. In this project we use attack graph to provide a view of network security status. This article presents a method to generate attack graph for network security analysis based on security status space. In actual implementation environment of the host computer, the system visitors can be classified according to the capability to access the system resource. A lot of researchers have described on this direction. Synthesizing the attacker's starting point and object, host information and network topology information, the graph-based description represents the threat to security of information system, and it is called an attack graph. According the definition of SSP, the SSP may be used to describe the attack graph. When the node transfers, the SS of attacker is changed. To analyze the network security, based on the analysis of network security incidents and attacker's actions, we make several assumptions. In this project we use a forward-search, breadth-first and depth-limited attack steps limited attack route producing algorithm to find the attack routes, then utilize the tools to generate attack graph. The attack route producing algorithm is described as following: From the initial network state, it finds all network states the attacker could get directly, and adds these network states into State queue, It chooses a state from State queue as Cur state, and finds all network states which could be got directly from Cur state as New states. If a state is new, then it would be added into State queue. If the State queue is empty, the algorithm finishes. When each attack depends on the previous attack on attack route, the attack route is called minimal attack route. Contrast to the method that has been previous used, our method can directly find all minimal attack routes. At the same

time, in attacker's point of view, breadth-search guarantees to find all of the attack routes.

II. PREVIOUS WORK

As an important aspect of network security, evaluating the computer security through the analysis to the computer network is very important and could protect us from being hacked. Vulnerability scanning is a traditional way to conduct network security analysis. This method can check whether or not there are any known vulnerabilities. This technique is just suitable to check system security qualitatively partially but cannot check a whole system. The ways to find the complex attack paths or list which can lead to changes of the system status are presented by analyzing the security model. For example, the earliest concept of attack graph a method named Privilege Graph is developed. The other model provides for modeling chains of network exploits. Some researchers analyzed these Unix-based systems security using model-checking technique.

III. PROPOSED SYSTEM

A. Initialize Network

In actual implementation environment of the host computer, the system visitors can be classified according to the capability to access the system resource. The system Assign Privileges, Assign Roles, Assign Visitors, Compute Connection Relation, Save Connection Relation

B. Process Logs

To the attacker who attempts to exploit the target it is a process, which needs to be performed step by step. The attack can be represented by a two-tuples Attack_rule=(Preconditions, Postconditions), in which Preconditions is the preconditions set, Postconditions is corresponded results set. The preconditions set includes four elements which is represented as Preconditions={Src_privilege, Dst_privilege, Vuls, Protocols}. Src_privilege represents the lowest privilege class which attacker should have on the host where the attacks are launched. Dst_privilege represents the highest privilege class which attacker should have on the object host. Vuls represents the vulnerability which the attack rule depend on. Protocols describe the needed connection relation between the attack host and the object host. In general we Create Attack Tuple, Assign

Preconditions, Assign Post Conditions, Generate Attack Rules Create Security Status Space.

C. Generate Attacks

Synthesizing the attacker's starting point and object, host information and network topology information, the graph-based description represents the threat to security of information system, and it is called an attack graph and it can be described in the attack graph. In this module, we use nodes of attack graphs Determine Source, Determine Destination, Compute Security Space, Check for Node transfer and change in relations, Create attack Graph.

D. Analyse Attacks

In this module we use a forward-search, breadth-first and depth-limited (attack steps limited) attack route producing algorithm to find the attack routes to generate attack graph. From the initial network state, it finds all network states the attacker could get directly, and add these network states into State queue. It chooses a state from State queue as Cur state, and finds all network states which could be got directly from Cur state as New states. If a states new, then it would be added into State queue. When each attack depends on the previous attack on attack route, the attack route is called minimal attack route. In general we Apply forward Search, Apply Breadth First Search, Apply Depth limited Search, Find all network states, Retrieve and display Routes.

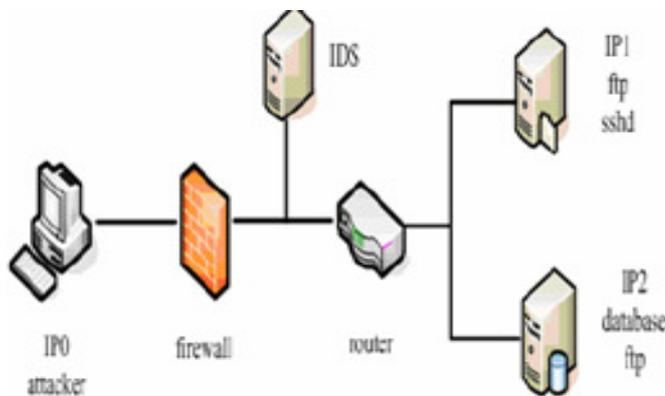


Figure 1: System Architecture

The concept of the paper is implemented and different results are shown below

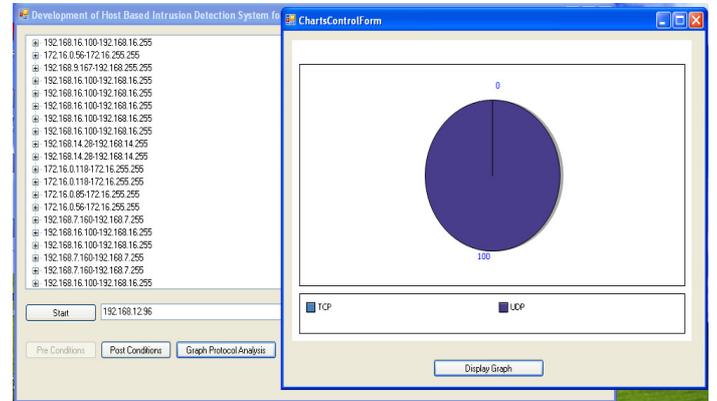


Figure 2: Protocol Analysis of captured packets

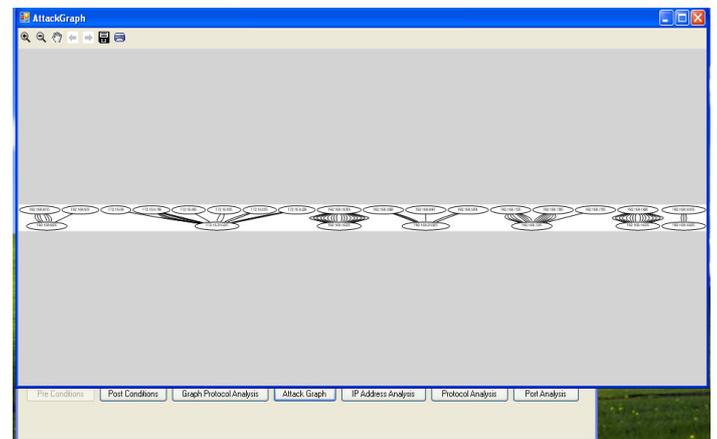


Figure 3: Detection of Intrusion System.

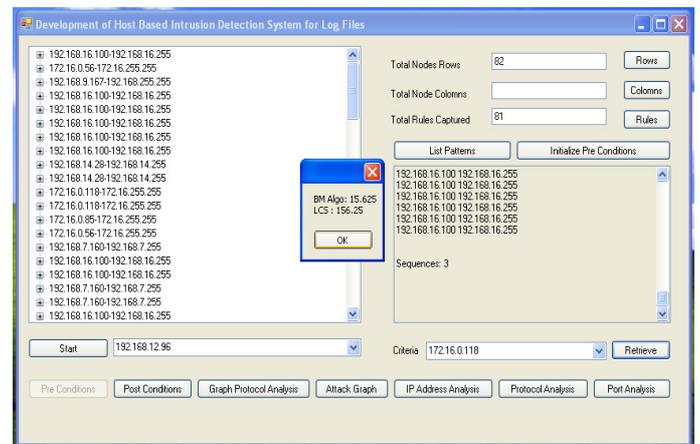


Figure 4: Comparison of Delay Time.

IV. RESULTS

The Fig 6, and Fig 7 shows the real time results compared.



Figure 5: Proposed System Comparison

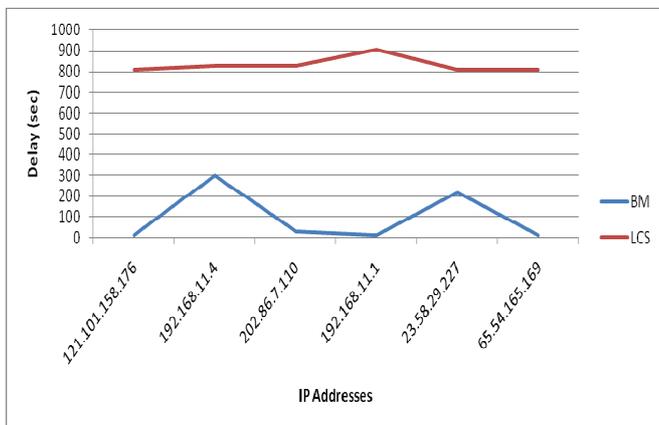


Figure 6: Proposed System Comparison

Performance Analysis

The paper has been implemented in .Net technology on a Pentium-IV PC with 20 GB hard-disk and 256 MB RAM. The proposed paper's concepts show efficient results and has been efficiently tested on different systems.

V. CONCLUSION

The tools to generate attack graph based on security status space for network security analysis are designed and implemented, and the experiment indicates the method is usable and effective. Many related research should be done in the future, the results from network scan tools should be used in the tools. The generating algorithm should be optimized and the method to analyze attack graph should be further studied.

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Effect of different sublethal concentrations of Manganese on the levels of cortisol in *Garra gotyla gotyla*

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Abstract- The objective of this study was to evaluate the possible effects of manganese (Mn) exposure on variations of cortisol levels in *Garra gotyla gotyla*. LC₅₀ value of manganese after 96 hours was found to be 3.2mg/l for *Garra gotyla gotyla*. Three replicates of 10 fishes were subjected to three sub-lethal concentrations of manganese i.e. 0.64mg/l, 1.28mg/l and 1.92mg/l (20%, 40% and 60% respectively of LC₅₀value of manganese) for 1, 5 & 9 weeks. Blood samples were isolated from the fish following the exposure to measure the levels of cortisol and compared to the control group. We observed significant increase(p<0.01) in the levels of cortisol of three groups of fish after 1st week of exposure to three doses of manganese as well as significant decrease in the cortisol of three groups exposed for 5th & 9thweek. The rate of decrease in group III (exposed to 1.92 mg/l of Mn) was higher than that of group I & II (exposed to 0.64 mg/l of Mn and 1.28 mg/l of Mn).

Index Terms- Manganese exposure, Cortisol, *Garra gotyla gotyla*

I. INTRODUCTION

The hormone cortisol in fish has been identified as a metabolic hormone (Vijayan et al., 1994) having multifaceted action. It is also considered as an important stress hormone produced in fish (Mommensen et al., 1999). Cortisol is the predominant corticosteroid in most of the teleost group (Handerson & Garland, 1980). The secretion of cortisol is dependent on factors such as temperature (Strange, 1980; Davio et al., 1984; Barton & Schreck, 1980 & Barton & Zitzow, 1995), time of day (Davis et al., 1984 & Barton et al., 1986), wave length of light (Volpato & Barreto, 2001), background of color tanks (Gilham & Baker, 1985), nutritional state (Barton et al., 1988), presence of disease (Barton et al., 1986), season (Pickering & Pottinger, 1984), reproduction (Shankar & Kulkarni, 2007). Besides these factors heavy metals are also known to affect cortisol levels in fish (Richard et al., 1998).

The catabolic action of cortisol is responsible for the mobilization of energy reserves (gluconeogenesis) and lipolysis (Leach & Taylor, 1982; Sheridan, 1986). Cortisol has also been shown to play important roles in intermediary metabolism, growth, ionic and osmotic regulation, reproduction, immune functions (Wendelaar, 1997 & Mommensen et al., 1999). Undoubtedly, the growing evidence supporting the importance of cortisol in maintaining homeostasis, together with the ease of measuring cortisol and the magnitude of cortisol response to stress, make it convenient measure and the predominantly reported stress indicator.

The objective of present study is to evaluate the effect of different sub lethal concentrations of manganese on the levels of cortisol in *Garra gotyla gotyla*.

II. MATERIAL AND METHODS

➤ Animals and experimental conditions

Live specimens of *Garra gotyla gotyla* were collected with the help of cast net and were brought to the laboratory avoiding stress and injury as much as possible. Prior to onset of metal treatment, the fish were acclimatized to the laboratory conditions for approximately a fortnight. During this period fishes were fed with natural diet which included portion of aquatic plants, vegetables, debris and mud as the fishes were herbivores in nature. The 96 hrs LC₅₀value of manganese was determined as 3.2mg/l. Manganese stock solution were made from MnSO₄, added subsequently to dechlorinated tap water in the plastic tubs (capacity of 50L) to obtain test concentrations 0.64mg/l, 1.28mg/l and 1.92mg/l (20%, 40% and 60% respectively of LC₅₀value of manganese). The examined fishes were divided in to three groups exposed to three sub lethal concentrations of Mn 0.64mg/l, 1.28mg/l and 1.92mg/l (20%, 40% and 60% respectively of LC₅₀ value of manganese). Control groups were the fishes maintained in normal, aerated tap water. The water in each plastic tub was replenished daily to keep the metal concentration unchanged. The experiment had three replicates and in each replicate 40L of water was added and 10 number of *Garra gotyla gotyla* was taken in each experimental tub.

➤ Measurement of the levels of cortisol:

Blood was taken from the heart of the fish with non heparinized syringe, collected in plastic Eppendorf tubes. After centrifugation, blood plasma was removed and the samples were then analyzed for measuring the levels of cortisol by Radioimmunoassay following the methodology adopted by Tort et al., 1998.

➤ Statistical analysis of data :

The data was statistically evaluated by analysis of variance and paired sample t test using SPSS 17 version.

III. RESULTS AND DISCUSSION

Exposure of *Garra gotyla gotyla* to different sub lethal concentrations of manganese (Mn) 0.64mg/l, 1.28mg/l and 1.92mg/l (20%, 40% and 60% respectively of LC₅₀value of manganese) caused a significant variation in plasma cortisol level (Table 1). After first week in the manganese exposed (0.64mg/l,

1.28mg/l and 1.92mg/l sub lethal conc.) fish the cortisol levels were significantly elevated (175.2ng/ml in 20%group., 198.5ng/ml in 40% group and 230.0ng/ml in 60%group) compared to control (109.8ng/ml). On the 5th week, cortisol titer decreased to 156.0ng/ml in 20% group, 170.2 ng/ml in 40% group and 160ng/ml in 60% group. A further sharp decline was evident by 9th week in 60%group (125.0ng/ml) whereas, cortisol titer was 142.5mg/l and 156.5 mg/l respectively in 40% and 60%groups and at this point the cortisol levels were still not restored to normal values and significantly different from those observed in the control groups.

Exposure to manganese appears to elicit a transient stress response in *Garra gotyla gotyla*. Significantly elevated cortisol titers were evident on first week. Our results contrast with earlier reports on the relationship between cadmium and cortisol (Pratap & Wendelaar, 1990). Elevated cortisol was also observed in Sockeye salmon exposed to different concentrations of Cu for 1-24 hrs. (Donaldson & Dye, 1975), in rain bow trout exposed to different concentrations of chromium (Hill & Fromm, 1986), in rainbow trout exposed to different sublethal concentrations of cadmium (James & Wigham, 1986) and in adult *Onchorhynchus* exposed to sub lethal levels of cadmium (Richer et al., 1998).

Changes in cortisol levels under the effect of manganese in *Garra gotyla gotyla* might show that energy needed under the effect of metal was compensated through glucogenic pathway. Increase in cortisol level implies an increase in glucose level in fish blood. Similar viewpoint have been given by Karayug et al., 2010 while studying the changes in cortisol level under the effect of cadmium in *Clarias gariepinus*.

Data from table clearly indicates that fish subjected to lower concentration of manganese (0.64mg/l, 1.28mg/l) showed a slight cortisol decrease, whereas, those treated with the higher metal value (1.92mg/L) revealed a higher decrease. This might be because the fish could provide an adaptation to the low Mn values, while that for the higher concentration seem to characterize exhaustion. During this phase some physiological changes have been adapted by fish, permitting homeostasis return. The hypothalamus-pituitary interregal axis (HPI) is a system responsible for the adaptative potential and stimulation of this system leads to intensified or reduced secretion of numerous hormones (Donaldson et al., 1990). Exhaustion leads to down regulation of the system through negative feedback. This disables the fish to react appropriately to other eventual stressors. HPI axis involves atrophy of the interrenal tissue, which is a slow process that caused decreased cortisol levels (Flodmark et al., 2002). Lowered or absent of cortisol response in exhaustion status, observed in fish exposed to toxicants for long period of time (Friedman et al, 1996 & Hontela et al., 1997) and present author is opined of existence of such exhaustion status in fish, *Garra gotyla gotyla* in response to Mn metal and thus a subsequent decline in the level of cortisol.

As the major mineral corticoid in fish cortisol is known to control the branchial sodium uptake in fish, by stimulating of Na⁺/K⁺ -ATPase activity and by promoting the proliferation of the chloride cells, the location of this enzyme activity (Dharmamba, 1975). Altered Na⁺/K⁺-ATPase activity of the gills has been reported for mercury intoxicated rainbow trout (Lock et al., 1981) and rainbow trout exposed to zinc (Watson & Beamusch, 1980) and presently though Na⁺/K⁺-ATPase activity

has not been determined in gill cell but thought to be really affected in fish, *Garra gotyla gotyla* exposed to manganese metal and exhibiting elevated levels of cortisol.

IV. CONCLUSION

To conclude, above results and discussion denotes that the fish *Garra gotyla gotyla* responded to the manganese exposure as represented by the changes in its blood cortisol level and that the response was dose and time dependent.

Table 1: The levels of cortisol (ng/ml) in blood serum of three groups of *Garra gotyla gotyla* exposed to three sublethal concentrations of manganese i.e. 0.64mg/l, 1.28mg/l and 1.92mg/l (20%, 40% and 60% respectively of LC50value of manganese)

Time Interval	0.64mg/l of Mn (20%)	1.28mg/l of Mn (40%)	1.92mg/l of Mn (60%)
Control	109.8±0.82	109.8±0.82	109.8±0.82
1st week	175.2±0.15	198.5±0.25	230.0±0.13
5th week	156.0±0.35	170.2±0.28	160.0±0.09
9thweek	142.5±0.52	156.5±0.46	125.0±0.22

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A comparative study of changing Family Composition, Structure and Practices in urban area of Kanpur City (U.P.)

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Abstract- The present study was conducted in Kanpur district of Uttar Pradesh. The aim of research study was to assess the changing Family Composition, Structure and Practices in urban area of Kanpur City. Purposively 80 families of middle socio-economic strata were selected for the study. A survey was conducted using a self-structured questionnaire with close ended questions, to collect the data regarding changing Family Composition, Structure (Changing role, power and status, Changes relationships and Practices (Changing marriage patterns and other family practices). Data was analyzed in terms of mean, frequency and percentage.

Findings reveals that 81.25% families were nuclear, Role, power and status was given according to age of person in family (86.25%). There were families having normal (37.50%), good (31.25%), very good (8.75%), poor (22.50%) dyadic relationship with their extended families, Families having good (25.00%), average (46.25%), very good (5.00%), poor (23.75%) dyadic relationship with their kinship reference group, Families with monogamy (100.00%), endogamy (73.25%), exogamy (26.25%) marriage practices, families were in favor of arranged (41.25%), arranged love (28.75%) and love (30.00%) marriages, families in favor of marriage after 25 years (51.25%), marriage between 21-25 years (40.00%), marriage between 18-21 years (8.75%), families following marriage rituals of marriage (100.00%), families in favor of financial exchange during marriage (96.25%) and families against of financial exchange during marriage (3.75%), Families having their own residence and lineage system (100.00%), families following democratic (61.25%), authoritative (33.75%), permissive (5.00%) disciplinary system, families giving preference to their family member for Guardianship and custody of their children ((86.25%) and families, taking help of neighbor, community center for Guardianship and custody of their children (13.75%), families, taking the responsibilities of rearing and bearing of their own children ((100.00%), families able to fulfill (91.25%) and families unable fulfill their familial needs sometimes (8.75%), families very careful about health and hygiene of their family members (90.00%), were less caring about health and hygiene of their family members (10.00%), families planned regular saving for present and future of their family members (85.00%), families irregular in saving for present and future of their family members (15.00%). families were supporting their working/ non working members of their family (100.00%)

I. INTRODUCTION

The family is a complex and dynamic institution in India. For many decades, several studies were carried out to understand this complexity. In India, people learn the essential themes of cultural life within the bosom of a family. In most of the country, the basic units of society are the patrilineal family unit and wider kinship groupings. The most widely desired residential unit is the joint family, ideally consisting of three or four patrilineally related generations, all living under one roof, working, eating, worshipping, and cooperating together in mutually beneficial social and economic activities.

Family patterns are conceptualized in terms of family composition. A household is one of the dimensions of the family pattern. It is a residential and domestic unit composed of one or more persons living under the same roof and eating food cooked in a single kitchen (Shah, 1973). The family has been and continues to be one of the most important elements in the fabric of Indian society. The bond that ties the individual to his family, the range of the influence and authority that the family exercises make the family in India not merely an institutional structure of our society, but accord give it a deep value. The family has indeed contributed to the stability to Indian society and culture. Today, the Indian family is subjected to the effects of changes that have been taking place in the economic, political, social and cultural spheres of the our society. In the economic sphere, the patterns of production, distribution and consumption have changed greatly. The process of industrialization and the consequent urbanization and commercialization have had drastic impacts on the family. Migration to urban areas, growth of slums, change from caste oriented and hereditary occupations to new patterns of employment offered by a technological revolution, the cut-throat competition for economic survival and many other economic changes have left their impact on the family. Briefly speaking, these changes in the socio-economic-political-cultural milieu of our society have led to changes in the structures, functions, roles, relationships and values of the family.

Family is the foundation stone of society. It teaches us to be social. It teaches us to digest the fact that there is a common interest, which may be more important than individual interest. Thus, it may require to be given up in favour of family interest. It modifies individual behaviour and cultivates tolerance, patience,

respect for others, love and affection, dedication, care and sacrifice. It checks selfishness and restrains rigidity. In fact, a family is the first institution that cultivates social values and social behaviour among individuals. Social values are basically family values written at large. Had the family been absent, concepts like nationalism could never originate. Traditional Asian societies have survived for thousands of years mainly because there has been a consistent emphasis on enforcing family values. Collapse of the family system simultaneously leads to social breakdown. With the advent of urbanization and modernization, younger generations are turning away from the joint family form. One of the most striking features of contemporary societies is the presence of a range of family variations, from the most traditional, extended families with strict, gender based sex roles to the modern dual career families based on liberal, equal sex roles and to adults cohabiting without marriage. The term "alternative family patterns" suggests family patterns that result from personal circumstances outside one's control (death of a partner, infertility) or from socio-economic conditions (male migration, work participation of women). In the Indian context, most family variations are a result of personal or socioeconomic circumstances. Experimental or chosen lifestyles like living without marrying, and being childless voluntarily are restricted to an extremely small group of people. The following are the most commonly observed family variations in India. Single parent families, Female headed households, Dual earner career families, Childless families, Adoptive families. Thus this study was planned assess changing family composition, structure and practices in urban area of Kanpur city of Uttar Pradesh.

II. OBJECTIVES

- To assess the changing family composition in urban area.
- To assess the changing family structure in urban area with respect to following:
 - Changing role, power and status in family
 - Changes in familial relationships
- To assess the changing family practices in urban area of Kanpur city with respect to following:
 - Changing marriage patterns and
 - Changing other family practices

III. METHOD

The study was carried out in Kanpur city of Uttar Pradesh (India). Purposively eighty, families of middle income group, were selected for the study. A survey, was conducted using a self- structured questionnaire with close ended questions to collect the data regarding changing family composition, structure and practices in urban area. Data was analyzed in terms of mean, frequency and percentage.

IV. RESULTS AND DISCUSSION

Table: 1- Percentage distribution regarding changing family composition in urban area.

Type of families	Total (N=80)	
	No.	%
Nuclear	65	81.25
Joint	15	18.75
Alternate	0	00.00

Table.1 reveals that 81.25% families were nuclear where as only 18.75% were joint. There were no families of alternate family type out of selected families. Banerjee S. (2010) explains In Indian cities, families aspire to an improved lifestyle, which they recognize is possible with fewer children. Reflecting the rise of the nuclear family in urban India, these households are small in size—88% have 3-4 members and there are no senior citizens in these households. Just 11% have more than two children—again a pointer to how well entrenched the small family norm has become in the urban landscape. According to Kashayap (2004), Industrialization, together with technological development, has brought several new challenges to the family. It has brought significant changes in the structure of urban families that have moved from large extended family systems to more nuclear structures.

Table: 2- Percentage distribution of role, power and status in families in urban area –

Role, power and status in families	Total (N=80)	
	No.	%
According to age	69	86.25
According to gender	11	13.75

As shown in **Table.2**, in most of the families (86.25%), Role, power and status was given according to age of person in family where as only 13.75% gender was the basis for distribution of role, power and status in family.

Table: 3- Percentage distribution regarding familial relationships in urban area –

Familial Relationships	Total (N=80)							
	V. good		Good		Average		Poor	
	N o.	%	N o.	%	N o.	%	N o.	%
Relationship with extended Family members	7	8.75	2	31.25	3	37.50	1	22.50
Relationship with Kinship	4	5.00	2	25.00	3	46.25	1	23.75

As shown in **Table.3**, 37.50% families were having normal dyadic relationship and 31.25% families had good dyadic relationship with their extended families. Only 8.75% families

were having enmeshed dyadic relationship with their extended families where as 22.50% families were not connected/poorly connected to their extended families. 46.25% families were having normal dyadic relationship and 25.00% families had good dyadic relationship with their kinship reference group. Only 5.00% families were having enmeshed dyadic relationship their kinship reference group whereas 23.75% families were not connected/poorly connected to their kinship reference group. areas. Kashyap (2004) explains in his study, with urbanization and migration, kinship bonds have been weakening in urban areas. However, there is also evidence that the kinship system is changing, adapting itself to the newer demands. In urban areas, this extended kinship system has proven to be a viable organization even today, as it has facilitated the adaptation of its individual members to city life by providing shelter and other material assistance. Along with the change in the structure of the family from the traditional joint or extended family systems to the evolving nuclear form, changes have also been observed in role relationships and authority among family members. Norms of interpersonal relationships are gradually becoming more egalitarian and reciprocal Kashayp (2004).

Table: 4 - Percentage distribution regarding changing Marriage practices in urban area –

Marriage practices		Total (N=80)	
		No.	%
Marriage patterns	Monogamy	80	100.00
	Polygamy	0	00.00
Selection of Marriage partner	Exogamy	21	26.25
	Endogamy	59	73.25
Types of Marriage	Love marriage	24	30.00
	Arranged marriage	33	41.25
	Arranged-Love marriage	23	28.75
Age of marriage	Below 18 years	0	00.00
	18-21 years	7	8.75
	21-25 years	32	40.00
	Above 25 years	41	51.25
Marriage Rituals	Present	80	100.00
	Absent	0	00.00
Financial Exchange during Marriage	Present	77	96.25
	Absent	3	3.75

The concept of Indian wedding has seen drastic changes, over the last few years. In the yesteryears, the ceremony was a brief affair, confined to an economical budget, even though the guest list was long. On the contrary, in the present time, the occasion is generally celebrated in an elaborated way, with number of rituals that are conducted before, during and after it.

The **table 4** shows that 100.00% of the families had adopted monogamy marriage pattern (on man to one woman) because polygamy (plurality of women/men to one men/women) illegal in present scenario. Most of the families (73.25%) were giving endogamy marriages (marriage within a specified group) (26.25%), where as exogamy marriages (marriage out of a specified group) are also increasing in present scenario. According to article (site given below) Until some time back,

marrying a person belonging to some other caste or religions was strictly not permitted by the families. With the modernization of the Indian society and social awareness of the people, inter-caste and inter-religion marriages have become a common sight. This is primarily due to the acceptance of the concept of love marriage. Nonetheless, people with an orthodox or conservative outlook of life are still firm about marrying within the same caste, community and religion. Contrary to this thought, people in the present time do believe in solemnizing weddings of two different individuals belonging to different family background and culture.

41.25% families were in favor of arranged marriages where as 28.75 % were in favor of arranged love marriages. Only 30.00% favored for love marriages. According one research article (site given below)the custom of arranged marriages has been a part of Indian culture since the fourth century. The practice was begun primarily to maintain and pass on the family traditions from one generation to the other. It is still prevalent in both rural and urban parts of India, former being more inclined towards the system. In fact, arranged marriages are in majority, because not all people have accepted the concept of love marriage. However, with the changing time, people in India have accepted the concept of love marriage, which is otherwise considered against the Indian culture. People in the rural India are now more liberal, when it comes to love marriages. Therefore, both arranged and love marriage find equal importance in the wedding scenario of India.

51.25% families were in favor of marriage after 25 years where as 40.00% were in favor of marriage between 21-25 years. Only 8.75% favored for marriage between 18-21 years. No one favored for marriage before age of 18.

All 100.00% were following marriage rituals of marriage. In 96.25% families financial exchange during marriage was common only remaining 3.75% were against of financial exchange. *Kashyap (2004) says* Marriage in India is still a socio-religious institution that takes place between two families rather than two individuals. It is still arranged by parents and members and the kinship group with class and caste positions and religion as important considerations. However the youth in India now want to have a say in the choice of marriage partners, though they do not mind their parents arranging their marriage as long as they have a say in it. In the present times, though patterns of partner selection vary in terms of extent of choice given to the young man or woman, family approval is essential for the marriage to actually take place. Among the urban educated youth, the traditional concept of marriage as a sacrament, a social obligation, and for the perpetuation of the lineage, is slowly being sidelined by the concept of marriage, for love, companionship and individual happiness.

Table: 5- Percentage distribution regarding changing Other Family Practices in urban area-

Other Family Practices		Total (N=80)	
		No.	%
System of Lineage	Present	80	100.00
	Absent	0	00.00
Residence facility	Present	80	100.00
	Absent	0	00.00
Disciplinary system	Democratic	49	61.25
	Authoritarian	27	33.75
	Permissive	4	5.00
Guardianship and custody of children	By Self	69	86.25
	By others	11	13.75
Responsibilities of child bearing and rearing	Present	80	100.00
	Absent	0	00.00
Maintenance of familial needs	Able to fulfill	73	91.25
	Unable to fulfill sometimes	7	8.75
Managing death in family	Present	80	100.00
	Absent	0	00.00
Management of family health and hygiene	Care for health and nutrition	72	90.00
	less care for health and nutrition	8	10.00
Earning and savings for future of family	Regular	68	85.00
	Irregular	12	15.00
Supporting family members	Supporting Working/ Non-working members	80	100.00

All families (100.00%) were having their own residence and lineage system. In 96.25% families' financial exchange during marriage was common only remaining 3.75% were against of financial exchange. Most of the families 61.25% were following democratic disciplinary system where as 33.75% were following authoritative disciplinary system. only 5.00% family were permissive to their children.

Most of the families (86.25%) were giving preference to their family member for Guardianship and custody of their children where as 13.75% were taking facilities of neighbor, community center. In spite of some social changes, such notions as sharing a child with uncles, aunts and grandparents continue in many households. Only recently has the Western press noted new ideas about sharing child-rearing roles among the family community. Closeness has not meant lack of guidance or discipline for Indian children. Indian families advocate early learning, believing that children can and should start young. Indian families believe in strict discipline--obedience, even passivity, in children is enforced, according to Babyzone. Today's Indian families continue much as they did in the past, with the notable move from extended to nuclear families in some regions. This can lead to lack of support or lack of stress, depending on the family's views. While not having a parent or aunt close by to help with responsibilities can mean more work,

it can also mean less unwanted advice and more personal space. While Dr. Spock's "Child and Baby Care" was published in the mid-20th century, his ideas of parenting have only come to the attention of Indian families more recently. Some of Dr. Spock's ideas, such as feeding on demand and not leaving children alone for long periods, already formed part of Indian parenting styles.

All families (100.00%) were taking the responsibilities of rearing and bearing of their own children. 91.25% families were able to fulfill their familial needs whereas 8.75% were unable fulfill their familial needs sometimes.

90.00% families were very careful about health and hygiene of their family members. Only 10.00% were less caring about the same.

85.00% families were planned regular saving for present and future of their family members where as 15.00% were irregular in saving for the same. All families were supporting their working/ non working members of their family.

V. CONCLUSION

In light of present study and other research review it can be concluded that majority of families of middle socio-economic status are has brought about radical changes in family composition, family structure (role, power and status and familial relationships) and family practices (marriage patterns and other family practices). Urbanization of families is continuously causing for change in structure, composition and practices of family but still family ritual, care for younger and older in family, supporting working/non-working member and some other family practices are untouched even modernization has been added to families. Evil like financial exchange during marriage is also present in most of the families. There is need create awareness among families regarding importance of joint families, family structure and practices.

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A Case Report of Clivus Chordoma

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Abstract- In the present study 50 skulls (dry specimens) of known sex were studied in detail. In one of the male specimen a very well defined tubercle measuring 3 mm by 5mm was observed on the clivus at the junction of upper 1/3 and lower 2/3.

Clivus meningiomas and clivus chordomas are the common conditions in this region. Lateral and frontal tomography help in diagnosis.¹ The symptoms produced are because of the compression on the brain stem or arteries and nerves related.

Index Terms- clivus, chordoma, brainstem meningiomas, blood vessels, nerves

I. INTRODUCTION

Clivus is formed by the union of basiocciput and basisphenoid. Basiocciput develops from fusion of four occipital sclerotomes. Incidentally this junction also marks the cephalic limit of notochord. Cellular remnants of notochord are seen in the cephalic and caudal regions of the notochord and formation of chordomas is also seen in these two regions.² Chordomas are considered locally invasive, accounts for 1% of intracranial tumors. They may occur at any age but usually seen in adults.³ Incidence of sacro coccygeal chordoma is more compared to clivus chordoma. The symptom of clivus chordoma is because of the compression effects on the pons, related cranial nerves, basilar artery and its branches. Condition can be diagnosed by lateral and frontal tomography.

II. MATERIALS AND METHOD

In the present study 50 skulls (dry specimens) of known sex were studied in detail (male 27 female 23), in one of the male specimen a well defined tubercle measuring 3mmx5mm was observed with sharp tubercular apex. It was situated at the region of the junction between basiocciput and basisphenoid and this region is intimately related to covering meninges and pons, related blood vessels, nerves. The tubercle was central in position.

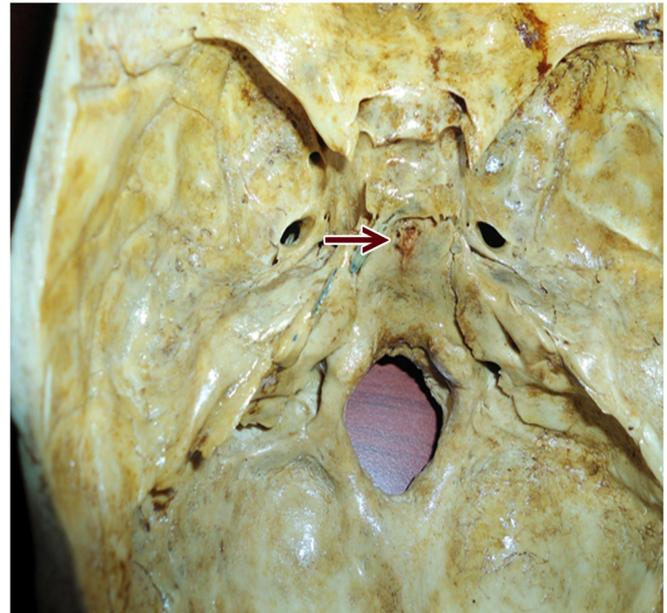


Fig: Arrow showing tubercle at the clivus

III. DISCUSSION

Chordomas are rare, slow growing tumors arising from the remnant of notochord. The incidence is more in sacrococcygeal region, next comes the clivus, they being caudal and cephalic limit of the notochord. The cellular remnants of the notochord left behind results in slow growing neoplasm, sacrococcygeal or clivus chordomas. Pressure symptoms in clivus chordoma include headache, diplopia, dysphagia, dysarthria and sensory changes in the face.⁴ The pressure symptoms could be because of the compression on basilar artery and its branches or nerves.

MRI and CT scanning help to diagnose the condition. Families with multiple affected members have been reported but still not considered as hereditary. The treatment of choice for chordomas of skull base would be surgical. Some groups advocate universal administration of radiotherapy for clivus chordoma.⁵

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Antenatal Care the Essence of New Born Weight and Infant Development

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Abstract- The objectives of the research study were to study the birth status of the new born, born in Government and Private hospitals, to examine the effect of antenatal care on birth outcome and to study the effect of birth weight on developmental outcomes of infants at Six months of its age. The sample consists for the research method was 904 births of both government and private hospitals of Dharwad city constituted the sample. All births were measured within 24 hours of delivery. From the birth register and baby's information sheet required information was collected and mothers were interviewed with the help of interview schedule after delivery to elicit the necessary information. Correlation of co-efficient was applied. Results reveals that that antenatal care of mother was significantly and positively associated with weight of the newborn indicating that more number of visits and treatment taken during pregnancy was related to their outcomes in addition to their previous antenatal care of the mother was also statistically significant with present outcomes in terms of weight. Better weight of babies was found among mothers who had received antenatal care, throughout their pregnancy period. Incidence of low birth weight babies was found much more among mothers who did not receive any antenatal care during their pregnancy period. The study concludes that the proper antenatal care during pregnancy decreases the complications for both mother and infants. The birth weight increased with increased total number of antenatal care.

Index Terms- Antenatal care; Birth status; Birth weight; Infant development

I. INTRODUCTION

Antenatal care is the systemic medical supervision of women during pregnancy. Its aim is to preserve the physiological aspect of pregnancy and labour and to prevent or detect, as early as possible, all that is pathological. Early diagnosis during pregnancy can prevent maternal ill-health, injury, maternal mortality, foetal death, infant mortality and morbidity Dr Haldipur (2006). Hence, the earlier in pregnancy a woman comes under the supervision of an obstetrician, the better. Pregnancy, Labor and birth of a child are important milestones in a couple's life. Regular medical care and understanding the unknown events during pregnancy can make childbirth an extremely enriching and joyful event.

Antenatal care begins with 'history-taking' and is followed by a complete examination of the pregnant mother. Thereafter, the mother-to-be receives advice and instructions about her mode of life, diet and regular antenatal check-ups till labour sets in.

Antenatal care The care that mother had received during pregnancy which included IFA tablets, TT, blood and urine test and total of this is categorised as follows. Total of this score is a antenatal care. These groups were further categorized into booked (Antenatal care received) and unbooked (not antenatal care received).

'Be good to your baby before it is born'. This aphorism serves to emphasize the importance of medical care during pregnancy (known as antenatal care). The care is so important because, the fetal organs are actively developing during the first 12 weeks of pregnancy (this crucial period is called 'organogenesis'.) The embryo is highly susceptible to external insults during this time, so that any damage can lead to crippling birth defects Malpani (2012). Hence a need was felt to study how antenatal care affects on new born in terms of its impact on birth weight. The objectives were formulated for the study are listed as follows:

- To study the birth status of the new born, born in Government and Private hospitals
- To examine the effect of antenatal care on birth outcome
- To study the effect of birth weight on developmental outcomes of infants at Six months of its age.

II. METHODOLOGY

A list of hospitals was obtained from district health office of Dharwad. There were totally 16 hospitals in Dharwad city. Among them 14 were private hospitals and 2 were government hospitals. The fourteen private hospitals were contacted and two of these hospitals were selected on the basis of number of cases they admitted in their hospitals and who were cooperative. Both the government hospitals were selected (as the number of government hospitals were only two).

Concentrated efforts were made to visit all the selected four hospitals regularly for a period of three months to know the prevalence of developmental delays among infants.

Mothers were interviewed with the help of interview schedule after delivery, to elicit the necessary information. The secondary data was collected from birth register, case sheets and baby's information sheet. Information provided by the mother was cross checked with the case records. Newborn's length was measured with the help of infantometer. The data consisted of both primary and secondary sources. All the information was collected within 24 hours of birth of newborn.

All the consecutive birth in the selected four hospitals during the period of 3 months was recruited for the study. A total sample of 627 from government and 231 private were included in the study. Among a total sample of 904, low births weights were

229, normal birth weight were 616, preterm 29 and 30 were still birth.

To test the developmental outcomes and developmental delays of infants at 6 month among various birth status viz., low birth weight, normal birth weight and preterm only those who were residing in the Dharwad were selected. A minimum of 25-30 samples were selected from each of the four categories viz., low birth weight with and without complications and normal birth weight with and without complications. The newborns were grouped in to several categories considering the Apgar score too. Thus the total sample constituted 121 infants (14%) out of 904 live births.

The scales employed were self-constructed questionnaire to assess the birth status of infants. Bayley scale for infant development (BSID-1993), Test for screening developmental delays developed by National Institute for the mentally handicapped, Secunderabad (2000), and Apgar rating scale (APGAR, 1953).

Student 't' test was employed to know the significant differences in the psychomotor and mental development between low birth weight and normal birth weight infants and chi-square

to know the association of birth complications with developmental outcomes.

Table 1. Percentage distribution of newborn with birth status (N=904)

Groups	Total
Still birth	30 (3.3)
Preterm	29 (3.2)
Low birth weight	229 (25.3)
Normal	616 (68.1)
Total	904 (100.0)

Figures in the parentheses indicate percentages

There were totally 904 newborns recruited for the study (Table 1). Among these 616 infants were normal birth weight weighing more than 2500 grams at birth. About 26 per cent of newborns were low birth weight weighing less than 2500 grams at birth. The per cent of still birth was 3.3 and pre term was 3.2 percent.

Table 2. Percentage distribution of birth status groups by booked and unbooked case (N=904)

Groups	Hospitals	Antenatal care		Total
		Booked	Unbooked	
Stillbirth (n=30)	Govt.	8 (36.3)	14 (63.7)	22
	Pvt.	2 (66.7)	1 (33.3)	3
	Govt.	1 (33.3)	2 (66.7)	3
	Pvt.	1 (50.0)	1 (50.0)	2
Preterm (n=29)	Govt.	4 (25.0)	12 (75.0)	16
	Pvt.	5 (62.5)	3 (37.5)	8
	Govt.	1 (50.0)	1 (50.0)	2
	Pvt.	3 (100.0)	-	3
LBW (n=229)	Govt.	53 (39.0)	83 (61.1)	136
	Pvt.	22 (84.6)	4 (15.4)	26
	Govt.	11 (20.0)	44 (80.0)	55
	Pvt.	8 (66.7)	4 (33.3)	12
Normal (n=616)	Govt.	313 (79.6)	79 (20.4)	392
	Pvt.	127 (97.7)	3 (2.3)	130
	Govt.	40 (80.0)	10 (20.0)	50
	Pvt.	43 (97.8)	1 (2.2)	44
Total		642 (71.0)	262 (29.0)	

Figures in the parentheses indicate percentages

Table 2 shows Percentage distribution of birth status groups by booked and unbooked cases. There were a higher percentage of booked cases (71%) than unbooked cases (29%). The percentage of unbooked cases was found higher in government hospitals than in private hospitals. While the prevalence of booked cases was higher in case of private hospitals.

The percentage of booked cases was found higher in normal birth weight groups ranging from 80 to 97 per cent. While in case of low birth weight higher percentage was found in unbooked cases. Similar observation was found in preterm cases. where in the prevalence of birth complications was higher among unbooked cases than booked cases.

Table 3. Correlation of antenatal care and weight of the newborn

Factors	Weight of the newborn
Present antenatal care	0.420***
Previous antenatal care	0.163***

*** significant at 0.001 level of probability

Note : Antenatal care includes – No. of visits to hospitals, blood and urine test, IFA tablets taken and other treatment taken during pregnancy, (which was advised by gynaecologist).

III. IMPACT OF ANTENATAL CARE ON NEWBORN WEIGHT

Impact of antenatal care on weight of the newborn was computed by applying co-efficient of correlation which is presented in table 3. The table reveals that antenatal care of mother was significantly and positively associated with weight of the newborn indicating that more number of visits and treatment taken during pregnancy was related to their outcomes in addition to their previous antenatal care of the mother was also statistically significant with present outcomes in terms of weight which shows that lack of antenatal care affects the health condition of the mother which leads to poor outcomes of their pregnancy especially in terms of weight of their newborn.

The results revealed that the percentage of antenatal care received was found higher in normal birth weight group. A significant relation was found with weight of the newborn. The results are in line with Patil et al. (1993) and Das et al. (1981) who revealed that more number of antenatal visits resulted better birth weight of the newborn. The findings in the present study revealed that among newborns with complications a higher percentage of mothers made 5-8 visits.

The prevalence of low birth weight was found more in unbooked cases (78.2%). Some of the mothers (9.5%) had taken only few tablets. The reason mentioned were baby will grow bigger size (65.3%), vomiting (38.3%), heart burning sensation (28.9%). The results are in line with Naik and Wantamuthe (1998), Khan and Mathur (1989), Yadav (1987), Trivedi et al. (1986) and Kamaldoss, Abel and Sampath kumar (1992) who concluded that small for gestational age newborns were found to be significantly related to antenatal care of the mother. The rate of low birth weight was low for booked cases than unbooked cases and who did not receive antenatal care experienced very high perinatal morbidity and still birth. In case of newborns with complications same trend was observed. In case of preterm (16 out of 29) and still birth (18 out of 3) were found to be unbooked cases. This lack of antenatal care of the mother might be resulted in still birth.

Table 4. Influence of birth weight and length on PDI and MDI (6 months) of infants

	PDI	MDI
Weight	0.534***	0.534***

*** Significant at 0.001 per cent of probability

Influence of birth weight on PDI and MDI

Weight of the newborn at birth was positively related to psychomotor and mental developmental indices of infants. It might be the reason that better weight at birth makes better health condition, similarly lower weight is an indication of IUGR may result in a deficit which continues to persist even at six months. The result are in line with Bohm *et al.* (2002).

IV. CONCLUSION

Labour and delivery is the end of pregnancy and beginning of new life. Antenatal care plays an important role to achieve a successful labour and delivery process. Regular antenatal classes help in the physical and mental preparation of women and help them relax during those last months. Antenatal care ensures maternal foetal health wellbeing and also prepares women physically fit for labour, delivery and the postpartum period. Regular visits to the doctor during pregnancy are aimed to ensure that the health of the pregnant women and the growing foetus is well maintained. When all stays well and proper care is taken, the pregnancy is generally low risk.

Better weight of babies was found among mothers who had received antenatal care, throughout their pregnancy period. Incidence of low birth weight babies was found much more among mothers who did not receive any antenatal care during their pregnancy period. Antenatal care decreases future complications. the birth weight increased with increased total number of antenatal care

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Approach for Protecting Control Frames Using Access Point Protocol

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Abstract- In the present communication scenario of 802.11 wireless local access network there is virtually no way to control frames and due to this a range of network allocation vector based denial of service attacks are possible. The convenience of 802.11-based wireless access networks has led to widespread deployment in the consumer, industrial and military sectors. However, this use is predicated on an implicit assumption of confidentiality and availability.

While the security flaws in 802.11's basic confidentiality mechanisms have been widely publicized, the threats to network availability are far less widely appreciated. In fact, it has been suggested that 802.11 is highly susceptible to malicious denial-of-service (DoS) attacks targeting its management. A novel approach for protecting control frames by generating a unique message authentication code using inter access point protocol for key distribution and key management is proposed.

Index Terms- CTS, RTS, MAC, IAPP, WEP

I. INTRODUCTION

The most common way to access internet now-a-days is by using wireless communication link. IEEE 802.11 Wireless Local Area Networks (WLAN) is most popular wireless technology all over the world because of low cost, easy deployment, simplicity and robustness against failures due to the distributed approach of its medium access control (MAC) protocol. In recent years, the popularity of real-time and multimedia applications is growing rapidly. A typical wireless network has an access point (which acts as a base station) and stations communicating using IEEE (Institute of Electrical and Electronics Engineers) 802.11 defined protocols[1]. IEEE 802.11 MAC layer (Medium Access Control) classifies communication in to three types of messages - Management, Data and Control messages. Currently IEEE is in the process of standardizing IEEE 802.11w standard (an extension to the current set of 802.11 standards)[6] to secure the management frames. For protecting data messages Wi-Fi Alliance[2] defined a set of standards called WPA (Wi-Fi Protected Access) [3]and WPA2[4] and later IEEE proposed 802.11i standard. Control frames which are commonly used for bandwidth reservation and acknowledgement purpose cannot be secured by the above mentioned standards making the network susceptible to attacks using these frames. The purpose of this paper is to protect the control work which is to protect the control frame in an infrastructure network. Due to this, a range of network allocation vector based denial of service attacks are possible.

An attacker can use the control frames to make the medium unavailable by reserving the bandwidth using RTS-CTS (Request to Send – Clear to Send) or CTS to- self mechanism even if he is not part of the network. The attacker can replay the captured RTS frame or CTS frame or he can inject a fake CTS frames in to the network. Due to this all the stations present in the network will update their NAV (Network Allocation vector) timers and defer their transmissions. The proposed solution does not only protect the RTS and CTS frames but all the control frames including "Block Acknowledgment" introduced in IEEE 802.11e standard. This paper proposes a solution for protecting the control frames in an infrastructure network. As first step we propose the key generation and key distribution protocol using IAPP framework. Using this key we generate a message authentication code(MAC) for control frames. To countering replay attacks, we present a mechanism to generate sequence number which ensure that the MAC generated is unique.

In Section II we describe the related work done in this area. In Section III we describe the system model, and in Section IV we describe in detail the proposed model. In Section V we present evolution results, and in Section VI, we provide conclusion.

II. RELATED WORK

A great deal of research has already been focused on 802.11 network security. IEEE 802.11 standard proposed WEP (Wired Equivalent Privacy) which uses RC4 algorithm to protect the data messages by using a pre-shared key. Most of this work has focused on weaknesses in the wired equivalency protocol (WEP) intended to provide data privacy between 802.11 clients and access points. As the RC4 algorithm has been identified to have vulnerabilities and weak keys. The Wi-Fi Alliance, working in conjunction with the IEEE, has brought a strong interoperable Wi-Fi security specification to market in the form of Wi-Fi Protected Access (WPA). Wi-Fi proposed a scheme named WPA (later WPA2) to protect the data messages by generating per-packet keys. Although no security solution can claim to be "bullet-proof," WPA represents a quantum leap forward in Wi-Fi security. WPA is built on standards-based interoperable security enhancements. It brings forward features of the forthcoming IEEE 802.11i standard that can be implemented immediately. WPA not only provides strong data encryption to correct WEP's weaknesses, it adds user authentication which was largely missing in WEP IEEE 802.11w standard proposed to provide security protection for all management frames. IEEE 802.11f [7] proposed a method to exchange secured data between access

points. All of the above mentioned standards failed to protect control frames. A solution to protect against the denial of service (DoS) attacks caused by using RTS-CTS mechanism was proposed by John Bellardo and Stefan Savage [5] which uses prior transmitted RTS to validate the current received CTS. It also verifies whether data is being transmitted immediately after the received CTS and if there is no data message transmitted after the CTS frame then NAV update is invalidated. The above mentioned mechanism is insufficient against an intelligent attacker who can send a dummy RTS prior to transmission of CTS frame and dummy data packet after the transmission of CTS frame. Another significant issue is that there has been no solution proposed to protect the network from DoS attacks caused by an attacker using CTS-to-Self.

III. SYSTEM AND MODELS

A. Network Model

The architecture of the network model comprises of several access points (AP) and stations (STA1, STA2, Rogue Station) present in the same channel. All the stations and access points present in the network must be IEEE 802.11i/WPA/WPA2 and IEEE 802.11w compliant. This type of network ensures data integrity as well as management frame integrity. Fig.1 shows a prime example how WLAN network complements the IT and network solutions already being used by the households, enterprises and public organizations.

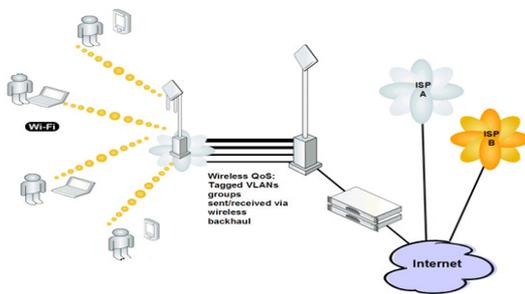


Fig 1: Simple Wireless Network

B. Attack Model

Generally there are various types of attacks possible on the network by the rogue stations and rogue access points. We are assuming the attacks using rogue access points are not possible in this model, as access points need to authenticate with a trusted entity before they can obtain the keys for control frames. Attacks possible through rogue station and their consequences are explained in the following sections.

1) Attack Sources

In this paper we are proposing solutions for attacks caused by outsider attackers. The goal of the attacker is to make the entire channel unavailable for the other STAs and APs to communicate by occupying the entire bandwidth. We do notice that an attacker can also be an insider, e.g., stations or APs part of the network. Since our solution is based on shared keys, it is not possible for the proposed solution to prevent insider attackers

from forging others' packets. The security mechanism countering insider attackers is scheduled for our future work.

2) Attack Methods and Consequences

This sub-section describes the types of attacks possible and their consequences.

RTS replay attack: Suppose STA1 needs to send data to AP, then it can send an RTS frame with duration field set to the time required to transmit the data frame after DIFS (Distributed Inter-frame Space – Minimum time a station or an AP needs to wait before transmitting a frame using Distributed co-ordination function). AP verifying that the request is from a valid station, will send the CTS response within SIFS (Short Inter-frame Space – maximum time within which the response frame needs to be transmitted) with duration field set to the duration requested. STA1 then sends the data frame to AP and receives the acknowledgement in return (confirming the receipt of the packet by AP). The rogue station can listen to the channel and capture the RTS frame sent by STA1 and retransmit it to the AP at a later time. This scenario is depicted in Fig 2. When the AP sends CTS in response to STA1 it is rejected as the actual sender of this replayed RTS was not STA1 but the rogue station. But STA2 on seeing the CTS frame will update its NAV timer. If the attacker is an intelligent attacker he can modify the duration field of the RTS frame with a very large value (according to the IEEE 802.11 standard [1] the maximum possible value is 32767 microseconds) making STA2 wait for long time to start before transmitting while STA1 can still transmit the packets because it has not updated the NAV timer

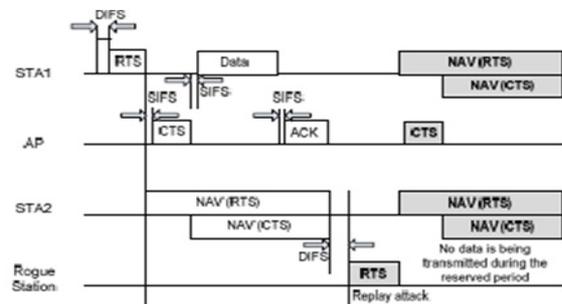


Fig 2: IEEE RTS replay attack

CTS replay attack: In this case the rogue station can listen to the channel and capture the CTS frame sent by an AP in response to any RTS sent by STA1 and replay the same frame. As in the previous case, STA1 rejects the CTS frame and will not update its NAV timer. STA2 upon receiving the CTS frame updates bits NAV timer with the duration field indicated in the CTS frame. Hence STA2 will defer transmissions until the NAV timer expires.

Injecting fake CTS frames: In this type of attack the rogue station can form fake CTS frames and transmit it. This type of attack is more powerful than all the above mentioned attacks as all the stations (STA1 and STA2 in this case) and APs present in the network will update their NAV timer. All the stations and APs present in the channel within hearing range will defer their transmissions as indicated by the CTS frame. An intelligent

attacker can use this mechanism to put off others from transmitting data by periodically transmitting the CTS frame.

IV. CONTROL FRAME PROTECTION APPROACH

To secure the control frames in a wireless network we start with a method for key generation and distribution using IAPP framework. Subsequently, a message authentication code (MAC) is generated using this key. This does not suffice to counter the replay attacks described in the section above. In order to counter this, we developed a sequence numbering scheme which will ensure that the MAC generated is unique.

The message authentication code can be applied to all types of control frames even for new frames like Block ACK Request, Block ACK defined in IEEE 802.11e and IEEE 802.11n standards. In this section we describe how key generation and distribution is done and then proceed to explain the extensions to the existing control frames. Lastly, we describe how the sequence number is updated to counter the replay attacks.

A. Key Generation and Distribution

The proposed model uses the IAPP framework for key distribution and key generation. IAPP was introduced in IEEE 802.11f standard to achieve a multivendor access point interoperability with in a distribution system. Initially an AP scans the channel for other APs. If other APs are available then it establishes a TCP (Transmission Control Protocol) communication link to exchange the key and the current sequence number information. If the access point scan results show no APs in the same channel then it will generate a key 'K' using key generation protocol and initializes the sequence number - 'S' with a random value. Whenever a new station connects with the AP, the key 'K' and current sequence number 'S' maintained by the access point will be transmitted to the station using a TCP connection. Using TCP connection ensures that the key is disclosed to the station only after the 802.1x 4-way handshake is successful, which means that key information is given to station after it authenticates with the AP. The key 'K' also needs to be updated whenever a station disconnects with an AP present in the DS and also at periodic intervals to maintain confidentiality.

1) Generate Key

Initially the AP scans the entire channel for a certain scan interval to find other active APs present in the same channel. During this interval if no other APs are found in the same channel, then "Generate Key" primitive is initiated. The "Generate Key" primitive starts key generation process using a trusted entity generally a back-end authentication server and the key 'K' generated is passed on to the stations connected with the AP, as well as to other access points that form an infrastructure network in the same channel.

2) Key request

If the scan result is successful (which means that other APs are found in the same channel) then the AP sends a "Key request" to the other access point using IAPP. If more than one AP is present in the channel, the AP can choose to request key from any AP present in the scan list.

3) Key transfer

This primitive is used whenever an AP gets a "Key Request". The request is validated based on the authentication provided by the other AP and the key is transferred to the other AP using a secured communication channel, preferably a wired network.

4) Key update initiate

Any AP present in the channel can initiate this request and send an update request to all the other APs present in the channel. The new key 'K' will be generated and is sent along with the request.

5) Key update response

On receiving the "Key update initiate" request, the AP's present in the channel send the key to the stations through the wireless medium. "Key update response" will be sent after updating the keys for all the stations connected to the AP.

6) Key update successful

On receiving "Key update response" from all the APs the initiator who initiated the "key update initiate" request will send "Key update successful" message to all the APs. In return the APs send the timestamp information at which the new key 'K' should replace 'K' to all the stations.

B. Control Frames format according to new model

Message authentication code is generated by using the HMAC [9] algorithm over the SHA-1 cryptographic hash function [10]. The reason for using SHA-1 cryptographic hash function is that many station adapters already have this cryptographic hash function in either their software or hardware layers. Using an existing algorithm reduces the overall cost of the updating the system, hence SHA-1 is preferred even though extensions for SHA-1 were proposed. The message authentication code is appended to the control frames using which the receiver validates the authenticity of the message. SHA-1 cryptographic hash function generates a 160 bit message authentication code. Fig 3 represents process flow diagram.

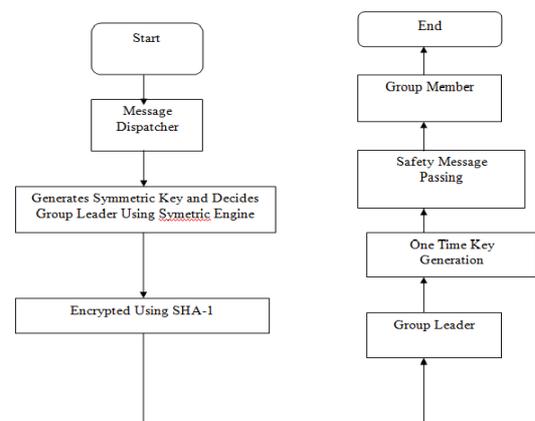


Fig 3: Process flow chart

To prevent replay attacks, the sequence number 'S' is appended to the message. A 4 byte sequence number is chosen to prevent replay attacks and also the key needs to be updated for

every 212 hours of operation. (Considering that Sequence number is updated for every 178us as derived in the next section) The frame check sequence (FCS) which is the part of initial 802.11 RTS and CTS frame is removed to reduce the overhead as MAC can be used in the place of FCS. The extended RTS and CTS formats are depicted in Figure 4.

C. Updating Sequence number 'S'

The initial network sequence number is given to the station whenever it connects to the access point. From there the station needs to update the sequence number for every 'N' micro seconds. The station uses its own internal clock called 'Real Time Clock' (RTC) to update the sequence number. The sequence number 'S' is a 32 bit sequence number and once the sequence number reaches (232 -1) it will wrap. The sequence number is updated based on time interval rather than using packet count. Packet count requires that every control packet transmitted by the station or an access point be heard by all the stations, otherwise there is a chance that the CTS frame sent by a Station is rejected as duplicate or a replay. The time interval by which the sequence number is updated should not be too short as synchronization in wireless medium is not too accurate. At the same time, the time interval should not be too long as the attacker can attack using the replay mode.

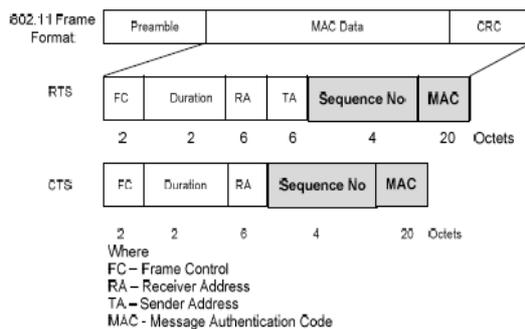


Fig 4:RTS and CTS frame formats according to new model

Estimation of 'N'

We estimated the value of N considering that the station is transmitting a data packet of very small duration immediately after transmitting the CTS. To avoid replay for this case, the N should be equivalent to the duration value in the CTS frame. But there is a chance that all the stations may not receive the CTS frame (hidden node problem), so the best way to approximate 'N' is by considering size of the smallest data packet and use that as reference to calculate duration:

$$N = (SIFS + Data_{dur} + SIFS + AC_{dur} + CTS_{replay_preamble_dur})$$

where,

SIFS: Short Inter-frame space.

Datadur: Time required for transmitting the data packet on air.

Ackdur: Time required for transmitting the Acknowledgement frame for the previous data packet on air.

CTS_replay_peamble_dur: CTS Packet preamble duration.

Using the above equation, we estimated the value of 'N' for all the supporting 802.11g and 802.11b rates. If the maximum speed supported by the network is 54Mbps then the sequence number must be updated for every 150us. Synchronization mechanism provided by the IEEE standard ensures that all the stations have the same RTC clock.

V. PERFORMANCE ASSESSMENT

Our proposed model is intended to counter the RTS or CTS replay attack as well as injecting fake CTS DoS attacks caused by not securing the control channel. In this section, we present the simulation results showing that our proposed model counters the above three types of DoS attacks. In this section we first describe our security assessment and then proceed to protocol performance evaluation.

A. Security Evaluation

We have used NS2 (Network simulator 2) to model the network and the attacks. The rogue station is capable of replaying RTS and CTS frames and injecting CTS-to-self frames in the network. The AP, STA1 and STA2 are modeled according to the proposed solution. All types of traffic TCP, UDP can be created between the stations and the AP. For each of the below mentioned attacks we evaluated the percentage of attacks that were successful.

1) RTS replay attack

This scenario is created by setting the RTS threshold of all the stations STA1, STA2 and AP in the network to a very less value and a TCP connection was setup between a station and an AP. The rogue station is programmed to capture the RTS frame sent by STA1 and retransmit the same after the previous Exchange is complete. We have seen that all the retransmitted RTS frames are being discarded by other stations and access points as the sequence number present in the replayed RTS frame is no longer valid.

2) CTS replay attack

In this case after the rogue station retransmits a previously captured CTS frame, all the other STA's and AP's discarded the CTS frame as the sequence number indicates that the frame transmitted is a duplicate frame.

3) CTS attack

After observing the previous data transfers, the rogue station tries to approximate the sequence number and uses this to transmit the control frames with a previously captured MAC. At the receiving end, all the STA's and AP's discarded the CTS frames as the MAC of these frames is invalid. In all the above mentioned attacks, the percentage of attacks that were successful is 0%.

B. Protocol Performance Evaluation

The main computation overhead involved in this mechanism is in generating the Message Authentication code using SHA-1 algorithm. But the time required for generating this MAC depends upon the type of implementation - hardware /

software and the speed of the processor etc. But according to our evaluation results the computation overhead involved in this process is almost negligible.

1) *Communication Overhead due to changes in the control frame format*

The changes to the control frame formats may result in reduce network throughput. We evaluated the throughput of an UDP stream with packet size 1500bytes at Data rate 54Mbps using CTS-to-Self mechanism and RTS-CTS mechanism (RTS Threshold – 1000 bytes) and we have observed that the throughput loss due to the changes in the control frame format is very less. The results are tabulated in Table 1. We also calculated the throughput of an FTP application at 54Mbps and we observed that on an average throughput loss of 0.6Mbps was observed for UDP applications.

	UDP Throughput (Mbps)	TCP Throughput (Mbps)
Without RTS-CTS or Without CTS-to-Self	40	24
With CTS-to-Self (old format)	28.4	15.4
With CTS-to-Self (new secure format)	27.6	14.8
With RTS-CTS (old format)	22.1	10.2
With RTS-CTS (new secure format)	21.1	9.6

Table 1: Throught Comparison Results (using old and new CTS frame formats)

2) *Communication overhead due to key management and key distribution.*

The communication overhead in this case depends upon the number of access points and stations present in the channel and the rate at which connections and disconnections happen in the network. Each connection and disconnection results in a key update.

The overhead in this case is evaluated based on the number of stations present in the channel.

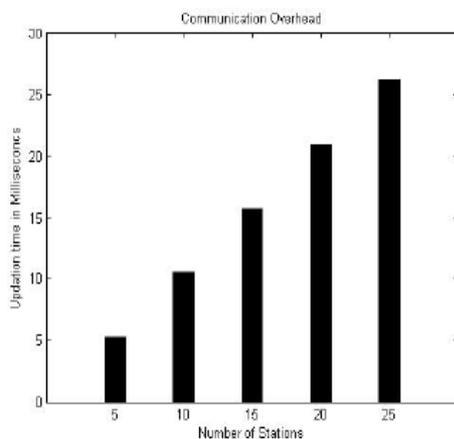


Fig 4: Communication overhead due to key management and key distribution

We can see from Fig. 4 that as the number of stations, present in the channel increase, the communication overhead becomes significant. Communication overhead among APs is not taken in to consideration, as wired communication can be used instead of wireless medium while doing key management and key distribution.

VI. CONCLUSION

A novel approach to counter the replay and fake CTS frame injection DoS attacks caused by not securing the 802.11 control frames is proposed. The solution to improve the current 802.11 control frame protection by generating a unique message authentication code using IAPP framework for key distribution and key management is proposed. SHA-1, the cryptographic hash function which is used in this proposed model to generate MAC for the control frames is supported by most of the current wireless station adapters which in turn makes this approach very cost effective.

As a part of future work we would like to modify the current proposed scheme to counter the insider attacks as opposed to this model, where we were trying to make use of the current existing hardware for cost effectiveness.

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Determination of Kinetic Parameters in Anaerobic Digestion Process Using Distillery Wastes – A Mathematical Approach

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Abstract- Biodegradation offers an eco-friendly option for disposal of waste coming from different breweries and wineries. A model-based analysis through rigorous experimentation has been accomplished to study different aspects of the biodegradation of distillery wastes. Using distillery waste as resource material, energy is derived in the form of biogas containing high percentage of methane which is produced by concerted action of various groups of anaerobic bacteria. The effect of process parameters such as B.O.D. loading, digestion temperature, stirrer speed and cell mass concentration are very much important for biomethanation process. On the other hand kinetic parameters such as maximum specific growth rate, kinetic constant and ultimate methane yield take the leading role in the production of biogas adopting biomethanation process.

By computer analysis of the experimental data model equations relating maximum specific growth rate with digestion temperatures and B.O.D. loading has been developed. Also kinetic constants have been correlated with digestion temperatures and B.O.D. loading.

Index Terms- Kinetic Parameters in Anaerobic Digestion Process, Anaerobic digestion of distillery wastes, Distillery Wastes

I. INTRODUCTION

Anaerobic digestion of distillery wastes has positive effects on depollution of high organic loading, low sludge production, high pathogen removal, high yield of methane rich biogas and low energy consumption.

The increased interest in this process has stimulated mathematical modeling, because it is usually much faster and less expensive to model a system and to simulate its operation than to perform extensive laboratory experiments. The application of sophisticated methods of process control is only possible if mathematical models are available for the system to be optimized [1].

The anaerobic degradation of organic matter is a complicated biological process. The conversion of organic matter consists of several independent, consecutive, and parallel reactions in which close-knit communities of bacteria cooperate to form a stable, self-regulating fermentation that transforms organic matter into a mixture of methane and Carbon dioxide gases. These processes go through six main stages: 1) hydrolysis of biopolymers (proteins, carbohydrates, lipids) into monomer (amino acids,

sugars, and long-chain fatty acids); 2) fermentation of amino acids and sugars; 3) anaerobic oxidation of long-chain fatty acids and alcohols; 4) anaerobic oxidation of intermediary products such as volatile fatty acids; 5) conversion of acetate to methane; and 6) the conversion of hydrogen to methane [2]. Several simulation models of these processes have been proposed by Husain, [3]; Jeyaseelan, [2]; v. Munch., [4]. Angelidaki [5], Boopathy, Larsen and Senior [6], Goyal, Seth and Handa [7], Harada, Uemura, Chen and Jaydevan [8], Gorkia-Calderon, Buffiere, Moletta and Elmalch [9], Blonskaja, Menert and Vilu [10], described the hydrolysis of un-dissolved carbohydrates and the hydrolysis of un-dissolved proteins as separate paths. Their model included eight bacterial groups, 19 chemical compounds, and a detailed description of pH and temperature characteristics. The specific growth and decay rates can also be presented with differing levels of complexity by Angelidaki [5], Hill [11], MocheandJordening [12], Thomas and Nordstedt [13].

The models described require the simultaneous solution of mass-balance equations for each individual substrate and bacterial population. Such a treatment is extremely complex yielding equations with numerous unknown parameters. Therefore, simpler treatments have been developed to predict the dynamic behavior of digesters. The six main groups of bacteria were divided into two major groups: acid producing microorganisms and methane producing microorganisms. [2], [3], [11].

In this study we investigated such a simplified model, which is a modified version of Hill and Barth's model [11]. Although the model is simplified, it still has a large number of unknown parameters and only a little experimental data being available, it makes the parameter identification problem difficult.

The main goal of our work was first to investigate the structural and practical identifiability of the model and, second, based on these results estimate the most important identifiable parameters for three data sets obtained from laboratory experiments.

II. MATERIAL AND METHODS

A semi batch digester was designed and fabricated to carry out the experimental work. This is cylindrical equipment made of mild steel of capacity 10 liters with the provision of feed inlet opening, gas outlet nozzle and pressure measurement nozzle. There is an opening at the bottom through which the

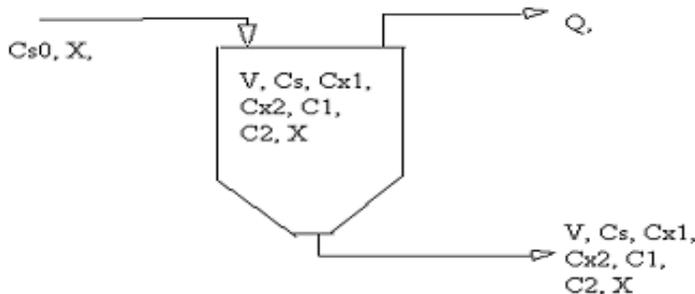
effluent can be discarded after experiment. The digester is surrounded by water jacket to maintain constant temperature of the slurry inside the digester. One limb of the U-tube manometer is connected to the pressure measurement nozzle and the other opening of the U-tube is kept open to the atmosphere. The digester contains two thermometer wells through which thermometers are introduced to measure the temperature of the feed slurry and that of the water in the jacket. The manometer measures the pressure of the produced gas. The digester also fitted with stirrer and motor with a speed-controlling regulator so as to keep the slurry at constant agitation at controlled stirrer speed. A schematic diagram of the digester set-up is given in figure-1.

In order to carry out the biomethanation process 5 liters of distillery wastes slurry of known substrate concentration in terms of B.O.D. loading was fed into the digester in which 1% mixed culture as inoculum was added, which was prepared using cow dung dissolved in distilled water maintaining pH within the range of 6.8 to 7.2 being incubated at 35°C for 7 days under anaerobic condition and preserved in the incubator at 0°C.

In this study three experimental data sets have been used. The first and second data and the experimental methods used to obtain these data were published previously [14] by the authors. The last data set was obtained in the same laboratory using same setup. Biogas generated at different retention days was collected and measured, and the same was analyzed in a gas analyzer [15] to ascertain contents of methane and carbon dioxide in the gas produced. It was found that there was no other component present in the biogas.

III. MODELING

In our model the anaerobic digestion is represented as a three-stage process [16], [11], [17]. During the first hydrolytic stage, the hydrolytic bacteria produce extra cellular enzymes that hydrolyze the organic compounds into simple soluble compound. The second stage is the acid producing stage, in which acid-forming bacteria convert simple organic compounds into volatile acids. During the last, methanogenic stage, methanogenic bacteria convert volatile fatty acids into methane and carbon dioxide.



The interpretation of all variables, parameters and their

dimensions are described under nomenclature.

Overall mass balance:

(Rate of accumulation of substrate within the system) = (Rate of flow of substrate into the system) – (Rate of flow of substrate from the system) + (Rate of utilization of substrate within the system)

$$\text{So, } V \cdot dC_s/dt = L_1 \cdot C_{s0} - L_2 \cdot C_s + V \cdot (r_{su}) \dots (1)$$

For semi batch digester, $L_1, L_2 = 0$

$$\text{So, } dC_s/dt = r_{su}$$

$$\text{Now, } dC_s/dt = r_{su} = k \cdot X \cdot C_s / (k_s + C_s) \dots (2)$$

Overall microorganism balance:

(Rate of accumulation of microorganism within the system) = (Rate of flow of microorganism into the system) – (Rate of flow of microorganism from the system) + (Rate of growth of microorganism within the system).

$$\text{So, } V \cdot dX/dt = L_1 \cdot X_0 - L_2 \cdot X + V \cdot (r_g) \dots (3)$$

For semi batch digester, $L_1, L_2 = 0, X_0 = 0$,

$$\text{So, } dX/dt = r_g \dots (4)$$

Or, $dX/dt = \mu \cdot X$, and from the monod equation we get, $\mu = \mu_m \cdot C_s / (k_s + C_s) \dots (5)$

$$\text{Now, } dX/dt = r_g = \mu_m \cdot X \cdot C_s / (k_s + C_s) \dots (6)$$

Rearranging equation 2 & 5 we get,

$$(dC_s/dt) \cdot \mu_m = (dX/dt) \cdot k \dots (7)$$

Integrating and rearranging the equation within the limit $C_s = C_{s0}, X=0$ and $C_s = C_s, X=X$

$$\mu_m \cdot (C_{s0} - C_s) = k \cdot X$$

$$\text{or, } C_s = C_{s0} - (k/\mu_m) \cdot X \dots (8)$$

If we balance acidogenic and methanogenic bacteria separately we get,

$$dC_{X1}/dt = -\beta \cdot C_{X1} \cdot C_s \dots (9)$$

Mass balance for acidogenic bacteria:

(Rate of accumulation of acidogenic substrate within the system) = (Rate of flow of acidogenic substrate into the system) – (Rate of flow of acidogenic substrate from the system) + (Rate of utilization of acidogenic substrate within the system).

$$dC_{X1}/dt = \beta \cdot C_{X1} \cdot C_s - \mu_1 \cdot C_{X1} / Y_1 \dots (10)$$

Acidogenic microorganism balance:

(Rate of accumulation of acidogenic microorganism within the system) = (Rate of flow of acidogenic microorganism into the system) – (Rate of flow of acidogenic microorganism from the system) + (Rate of growth of acidogenic microorganism within the system).

$$dC_{X1}/dt = (\mu_1 - k_1) \cdot C_{X1} \dots (11)$$

$$\text{from the monod kinetics, } \mu_1 = \mu_{1m} \cdot C_1 / (k_{s1} + C_1) \dots (12)$$

$$\text{from equation 7 & 8 we get, } dC_{X1}/dt = [\mu_{1m} \cdot C_1 / (k_{s1} + C_1) - k_1] \cdot C_{X1} \dots (13)$$

Mass balance for methanogenic bacteria:

(Rate of accumulation of methanogenic substrate within the system) = (Rate of flow of methanogenic substrate into the system) – (Rate of flow of methanogenic substrate from the system) + (Rate of utilization of methanogenic substrate within the system).

$$dC_2/dt = Y_b \cdot \mu_1 \cdot C_{X1} - \mu_2 \cdot C_2 / Y_2 \dots (14)$$

Methanogenic microorganism balance:

(Rate of accumulation of methanogenic microorganism within the system) = (Rate of flow of methanogenic microorganism into the system) – (Rate of flow of methanogenic microorganism from the system) + (Rate of growth of methanogenic microorganism within the system).

$$dC_{X2}/dt = (\mu_2 - k_2) \cdot C_{X2} \dots (15)$$

from the monod kinetics, $\mu_2 = \mu_{2m} \cdot C_2 / (k_{s2} + C_2) \dots (16)$

$$dC_{X2}/dt = [\mu_{2m} \cdot C_2 / (k_{s2} + C_2) - k_2] \cdot C_{X2} \dots (17)$$

Further methane production rate can be derived by,

$$Q = Y_g \cdot \mu_2 \cdot C_{X2}$$

$$\text{Or, } Q = Y_g \cdot \mu_{2m} \cdot C_{X2} \cdot C_2 / (k_{s2} + C_2) \dots (18)$$

Again, (Total cell mass concentration) = (Cell mass concentration of acidogenic bacteria) + (Cell mass concentration of methanogenic bacteria)

$$\text{So, } X = C_{X1} + C_{X2} \dots (19)$$

Differentiating with respect to t we get,

$$dX/dt = dC_{X1}/dt + dC_{X2}/dt \dots (20)$$

$$\text{or, } \mu_m \cdot X \cdot C_s / (k_s + C_s) = (\mu_1 - k_1) \cdot C_{X1} + (\mu_2 - k_2) \cdot C_{X2} \dots (21)$$

$$\text{or, } \mu_m \cdot X \cdot C_s / (k_s + C_s) = [\mu_{1m} \cdot C_1 / (k_{s1} + C_1) - k_1] \cdot C_{X1} + [\mu_{2m} \cdot C_2 / (k_{s2} + C_2) - k_2] \cdot C_{X2} \dots (22)$$

IV. PARAMETERS EVALUATION

The identification problem is difficult to solve because of the high number of parameters to be estimated, the complexity of the model, and the scarcity of experimental data. Therefore, we did not expect all 12 parameters in our model to be identifiable. Consequently, we have to take help of published data about some of the parameters from the studies as made by other researchers.

Determining C_s and dC_s/dt

As we know the X , k , μ_m , and C_{s0} from the data set, which is tabulated in table-1, 2 and 3, we can calculate C_s for each retention days at different initial substrate concentration. The values of C_s for each retention days at different initial substrate concentration are tabulated in table-1, 2 and 3.

It appears from the table-1, 2, and 3 that as the retention days increases C_s is decreases, which is corroborate with the previous workers. dC_s/dt is also evaluated from the C_s vs t plot, which is also tabulated in table- 1, 2 and 3 at 323K digestion temperature for BOD loading of 1.54, 2.12 and 2.74 kg/Cu.m respectively.

Determining C_{x1}

Assuming $\beta = 0.4$ from the literature [11], [16], [12] C_{x1} is calculated using equation 9. C_{x2} is evaluated from equation 19 using the value of C_{x1} and X . The value of C_{x1} and C_{x2} is tabulated in Table-1, 2 and 3 at 323K digestion temperature for BOD loading of 1.54, 2.12 and 2.74 kg/Cu.m respectively.

It is further revealed from Table-1, 2 and 3 that as retention time increases C_{x1} is decreases because more acidogenic biomass is converted into biogas and simultaneously C_{x2} is also increases with increase in retention days.

Determining dC_1/dt and μ_1

Figure 2 shows the plot of $\beta \cdot C_s$ vs inverse acidogenic substrate concentration, $(1/C_{x1})$ at 323K digestion temperature for BOD loading of 1.54, 2.12 and 2.74 kg/Cu.m. Comparing with the equation 10 intercept and slope of the straight lines in figure 2 represents the term μ_1/Y_1 and dC_1/dt respectively from which μ_1 and dC_1/dt have been determined assuming the value of Y_1 as 0.2. The values of μ_1 and dC_1/dt have been tabulated in Table-4.

Determining k_1 and μ_2

Figure 3 and 4 shows the plot of acidogenic and methanogenic cell mass concentration against retention time for different substrate concentration, from which dC_{x1}/dt and dC_{x2}/dt is calculated. Hence, k_1 is estimated from equation 11 as dC_{x1}/dt , μ_1 and C_{x1} is known.

μ_2 is also determined from equation 15 assuming $k_2 = 0.04$ from the literature.[3], [11], [17]. The values of k_1 and μ_2 are tabulated in Table-4.

Determining μ_m from the model equation

Knowing all the parameters and assuming $k_s = 0.82$ from the literature. [3], [11], [18], we estimated the value of μ_m from equation 21 and is tabulated in Table- 4.

Figure 5 shows the variation of maximum specific growth rate from the model equation and maximum specific growth rate from the experimentation against substrate concentration in terms of BOD loading. It is observed from the graph that the deviation is within 5%. So the model equation is simulated and suitable within these data range.

V. CONCLUSION

We investigated a modified nonlinear semi batch digester model, conducting practical identifiability analyses. The results show that the model is practically identifiable and the parameter estimated is reliable.

In addition, we have provided a review of literature concerning the possible parameter values. These values show the possible parameter boundaries, which can assist the work of other researchers in this area, too.

Finally, few main important parameters were estimated. One important feature of the estimation procedure is the simultaneous estimation of the parameters, which make the parameter estimates more reliable.

The results from the parameter estimation show that the model can describe different experimental phenomena.

VI. NOMENCLATURE

C_s = substrate concentration in time 't' in terms of BOD loading, kg/Cu.m DW

C_{s0} = initial substrate concentration in terms of BOD loading, kg/Cu.m DW

C_1 = substrate concentration for acidogenic bacteria in terms of BOD loading, kg/Cu.m DW

C_2 = substrate concentration for methanogenic bacteria in terms of BOD loading, kg/Cu.m DW

C_{x1} = cell mass concentration of acidogenic bacteria, kg/Cu.m DW

C_{x2} = cell mass concentration of methanogenic bacteria, kg/Cu.m DW

L_1 = loading rate in kg/Cu.m

L_2 = discharge rate in kg/Cu.m

Q = methane production rate, Cu.m/Cu.m DW

r_g = Rate of growth of microorganism within the system per unit volume, kg/Cu.m DW

r_{su} = Rate of utilization of substrate within the system per unit volume, kg/Cu.m DW

T = Hydraulic retention time in day.

V = digester volume, Cu.m

X = total cell mass concentration, kg/Cu.m DW

X_0 = initial cell mass concentration, kg/Cu.m DW

μ = specific growth rate of bacteria, day⁻¹

μ_1 = specific growth rate of acidogenic bacteria, day⁻¹

μ_2 = specific growth rate of methanogenic bacteria, day⁻¹

μ_m = maximum specific growth rate of bacteria, day⁻¹

μ_{1m} = maximum specific growth rate of acidogenic bacteria, day⁻¹

μ_{2m} = maximum specific growth rate of methanogenic bacteria, day⁻¹

k = kinetic parameter

k_1 = decay coefficient for acidogenic bacteria, day⁻¹

k_2 = decay coefficient for methanogenic bacteria, day⁻¹

k_s = saturation constant, kg/Cu.m DW

k_{s1} = saturation constant of acidogenic bacteria, kg/Cu.m DW

k_{s2} = saturation constant of methanogenic bacteria, kg/Cu.m DW

Y_1 = yield coefficient for acidogenic bacteria, kg organism/kg soluble organics.

Y_2 = yield coefficient for methanogenic bacteria, kg organism/kg soluble organics.

Y_g = gas yield coefficient, Cu.m/ Cu.m DW

β = solubilization rate per unit of acidogenic biomass, Cu.m/kg.day.

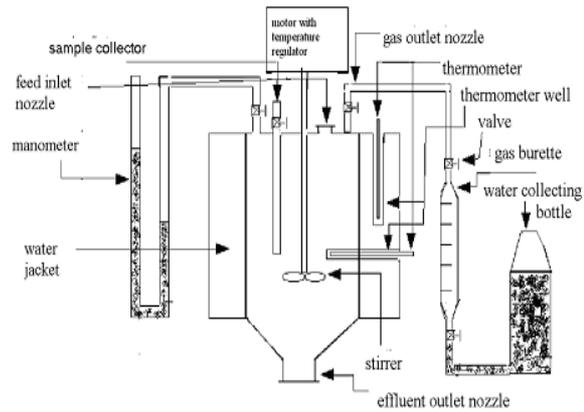
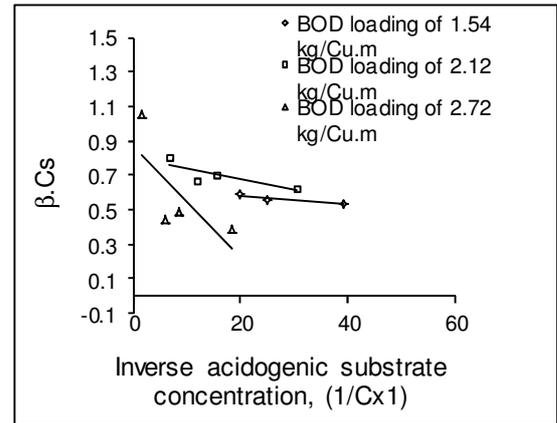


Fig. 1. A schematic diagram of a digester set-up

VII. APPENDIX

Fig. 2. Variation of $\beta.C_s$ against inverse acidogenic substrate concentration for different BOD loading at 323K digestion temperature

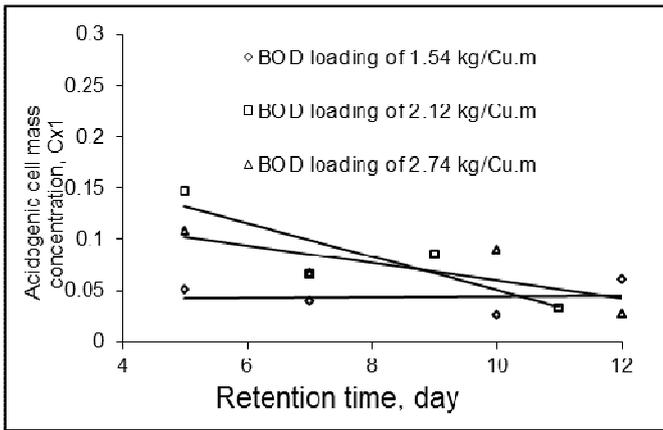


Fig. 3. Variation of acidogenic cell mass concentration against retention time in day for different BOD loading at 323K digestion temperature

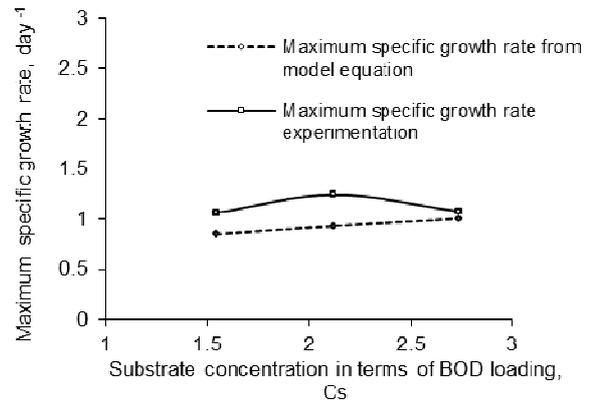


Fig. 5. Variation of maximum specific growth rate from model equation and from experimentation against substrate concentration in terms of BOD loading at 323K digestion temperature

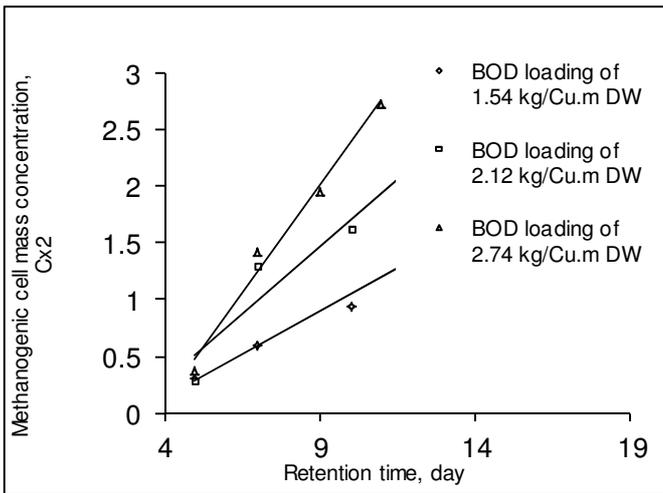


Fig. 4. Variation of methanogenic cell mass concentration against retention time in day for different BOD loading at 323K digestion temperature

Table-1 Results of model parameters for 323K digestion temperatures at B.O.D. loading of 1.54 kg/Cu.m

Retention time, (t)	Cell mass conc. (x)kg/Cu.m DW	Substrate conc. C _s	dC _s /dt	C _{x1}	C _{x2}
5	0.36	1.464	-0.029	0.050	0.309
7	0.64	1.405	-0.022	0.039	0.6
10	0.96	1.337	-0.054	0.025	0.934
12	1.48	1.228	-0.029	0.059	1.42
14	1.76	1.169	0.083	-0.17	1.93

Table-2 Results of model parameters for 323K digestion temperatures at B.O.D. loading of 2.12 kg/Cu.m

Retention time, (t)	Cell mass conc. (x)kg/Cu.m DW	Substrate conc. C_s	dC_s/dt	C_{X1}	C_{X2}
5	0.44	2.006	-0.11	0.14721	0.292
7	1.36	1.77	-0.04	0.065	1.294
9	1.72	1.67	-0.05	0.084	1.635
11	2.16	1.56	-0.02	0.032	2.127
13	2.32	1.52	0.117	-0.19	2.512

Table-3 Results of model parameters for 323K digestion temperatures at B.O.D. loading of 2.74 kg/Cu.m

Retention time, (t)	Cell mass conc. (x)kg/Cu.m DW	Substrate conc. C_s	dC_s/dt	C_{X1}	C_{X2}
5	0.48	2.6310	-0.11347	0.107821	0.372
7	1.48	2.404	-0.06355	0.06608	1.413
9	2.04	2.277	-0.0817	0.089702	1.95
11	2.76	2.113	-0.02269	0.026843	2.73
13	2.96	2.068	0.159095	-0.19231	3.152

Table-4 Values of process parameters for different substrate concentration

Substrate concentration (C_s), Kg/Cu.m DW	μ_1	dC_1/dt	k_1	μ_2	μ_m
1.54	0.125	-0.002	0.12	0.125	0.8521
2.12	0.160	-0.006	0.35	0.33	0.9321
2.74	0.173	-0.032	0.49	0.219	1.005

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Gravitational fields and Transposition in Australian authenticated case

Allan Zade

Abstract- This paper is dedicated to a deeper analysis of Transposition in a gravitational fields and uses the most recent available data from the most prominent case happened in Australia in 2010. That case includes a rare event that was thought to be an atmospheric one for many decades, but this paper shows its direct correlation to the gravitational field of the Earth and the other celestial bodies. Gravitational interrelation between them was put into the examination as a cause and reason for appearance of the phenomenon.

Index Terms- physics, conservative fields, Transposition, Z-Theory, fish, stones, sky, Earth, atmosphere

According to Z-Theory which makes deal with such trajectories (Z-Trajectory in terms of Z-Theory) any object that uses Z-Trajectory becomes undetectable with any of conservative fields or any waves based on any component of those fields¹ including electromagnetic waves. For example, any object that uses Z-Trajectory between points E and F (see figure A) becomes *undetectable* by any means of electromagnetic waves. If an observer watches that phenomenon from any suitable point of the Earth surface he/she is able to see only disappearance of an object around the first point of Z-Trajectory (point E in the figure A) and its reappearance immediately after its passage of the last point of Z-Trajectory (point F in the figure A).

I. INTRODUCTION

An object is able to use two ways of relocation in any conservative field. One of them is visible motion by any possible trajectory from any beginning point to any end point. An object makes interaction with a conservative field at any point of that trajectory. In case of electrically neutral object and celestial body, the object and the body need only gravitational interaction between them. In case of motion around the Earth trajectory of an object can be shown accordingly to figure A.

In that figure, point O means the center of the Earth. OB (and OD) is the radius of the planet. Points A and C are the first and the end points of some trajectory AC shown as a curved line. AB is a true altitude of the object at the first point of its trajectory and CD is a true altitude of the same object at the last point of its trajectory. The points C, E and F are the points located on the same true altitude above zero level. Obviously points B and D are positioned at the zero level of the true altitude.

As soon as an object uses trajectory between points A and C, it makes interaction with the gravitational field of the planet. In that case, force of the field affects energy of the object only if the first and the last points of that trajectory have different true altitude. If those points have same altitude, the field does not change any energy of an object at the last point of a trajectory relatively to the first point of a trajectory. For example, points E and F in the figure A have the same true altitude. Hence any object that uses *any trajectory* between them has the same amount of energy *at both points* because gravitational force produces zero changes in energy of an object. As a result, trajectory itself *becomes unnecessary* for that special sort of relocation, because motion *with interaction* between an object and a gravitational field and *without that interaction* becomes equal and keeps the amount of energy in the object-planet system - *unchanged*. That exactly matches conservation law and makes trajectory *without interaction between an object and any conservative field possible to the actual existence*.

¹ For more details see source [3]

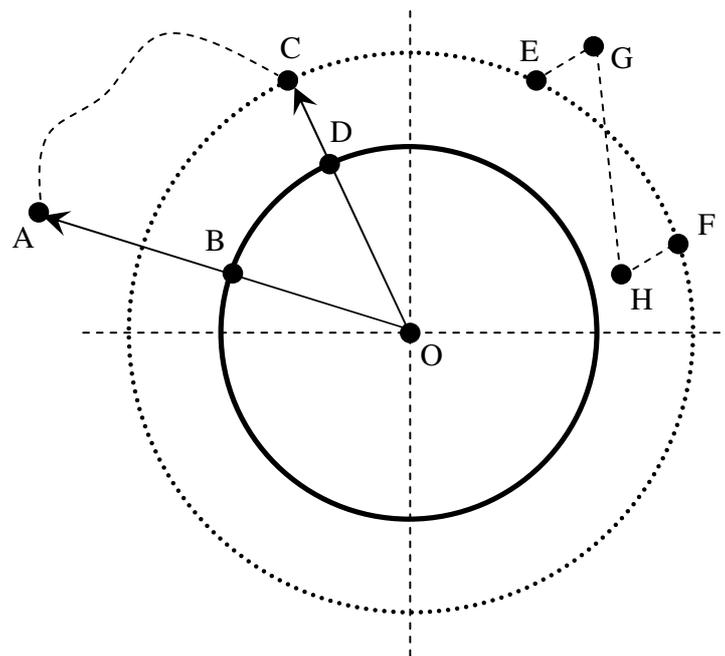


Fig. A

We have some evidences about the real possibility for an object to use Z-Trajectory. For instance source [2] explains in detail that phenomenon in case of A-36 flight (Bruce Gernon experience). That transposition of an aircraft caused its relocation for about 140 miles² and saved significant fuel for its owner. In other words, Z-Transposition in that case happened above Western Atlantic and helped the pilot to reach his point of destination significantly earlier than it was scheduled.

In that case, there was a witness (Independent Observer in terms of Z-Theory) who was able to make observations and tell us critical information about its route in the day of the incident. For instance according to the pilot's report his aircraft A-36 had same altitude before and after some unusual event that Z-Theory calls Transposition. That coincides precisely to the case drawn in the figure A as Transposition between points E and F and shows exact agreement between theory and practice.

Are there any other evidences about the real possibility for existence of Z-Trajectory? We need to understand the presence of many possible ways of observations that Z-Theory predicts. It helps us to answer that question and make another link between theory and practice. Suppose there is a possibility to relocation between two given points which have the same true altitude (points E and F in the figure A). Suppose a bird used Z-Trajectory between those points. In that case, an observer located not far from the point E on the Earth surface notices strange "disappearance" of the bird around point E. His (or her) counterpart located near the point F noticed strange "appearance" of the bird from "nowhere". That happens because an object is undetectable as long as it uses Z-Trajectory (as it mentioned above).

Obviously both observers are able to make notification about appearance and disappearance of the bird only if they make an observation at the moment when an object (a bird) changes its trajectory from regular motion (RW-Trajectory) to Z-Trajectory or comes back again from Z-Trajectory to RW-Trajectory. In that case, casual observation of the bird in the sky makes no sense for the observers because the presence of a bird in the sky is a common observation and nothing "unusual" would be detected by any human observer. An object that comes back from a Z-Trajectory should have some property or characteristic that makes the object incomparable for observation under any given circumstances to force an observer to make a claim about "impossible" observation. For example, in case of aerial observation such property should be any property of an object that is unable to fly. As soon as an observer notices any object in the sky that is unable to fly the observer drives to a nonplus. That is an Australian case explained below in details.

II. RELEVANT OBSERVATIONS

According to news article³ from *NT News, Australia* (February 28th, 2010) entitled '*It's raining fish ... no really*' we have the following description of "impossible event". "NEWSBREAKER Christine Balmer ... had to pinch herself when she was told "hundreds and hundreds" of small white fish had fallen from the sky.

"It rained fish in **Lajamanu** on Thursday and Friday night," she said, "They fell from the sky everywhere.

"Locals were picking them up off the footy oval and on the ground everywhere.

"These fish were alive when they hit the ground."⁴

² According to calculations given in source [2]

³ Source [5]

⁴ Source [5]

Obviously the locals were terrified by such an event because human experience stays in disagreement to the mentioned facts. Moreover, there was not any suitable theory in 2010 that was relevant to such events. As a result, vague concept was used for an explanation which based on “a *tornado hypothesis*”.

“Weather bureau senior forecaster Ashley Patterson said the geological conditions were perfect on Friday for a tornado in the Douglas Daly region. He said it would have been an ideal weather situation to allow the phenomena to occur - *but no tornados have been reported to the authority.*”

“It’s a very unusual event,” he said. “With an updraft, (fish and water picked up) could get up high - up to 60,000 or 70,000 feet. “Or possibly from a tornado over a large water body - but we *haven’t had any reports,*” he said⁵.

Obviously, a weather expert used “a *tornado hypothesis*” as the only one possible way to explain that phenomenon, but according to his own words “*no tornados have been reported to the authority*”. That left a little probability to the existence of “an unnoticed tornado” that was responsible for the observed phenomena.

Unfortunately, Lajamanu is situated hundreds of miles away from the nearest water source with an open surface. Hence a hypothetical “tornado” that stood “over a large water body” should send a fishes to the settlement from a large distance. More than that, those “tornado” should act like an unusually intelligent “weapon” with incredible precession to deliver all the fishes precisely from their usual inhabited place to “the target” located few hundred miles away.

There is one more counterevidence for “a *tornado hypothesis*”. We need to know exactly what is something that we call tornado to use that method of argumentation. “**Tornado** is a small-diameter column of violently rotating *air developed within a convective cloud and in contact with the ground.* Tornadoes occur most often in association with thunderstorms during the spring and summer in the mid-latitudes of both the Northern and Southern Hemispheres. These whirling atmospheric vortices can generate the strongest winds known on Earth: wind speeds in the range of 500 km (300 miles) per hour have been estimated. When winds of this magnitude strike a populated area, they can cause *fantastic destruction and great loss of life, mainly through injuries from flying debris and collapsing structures.* Most tornadoes, however, are comparatively weak events that occur in sparsely populated areas and cause minor damage.”⁶

Hence, a tornado is able to spread debris (and a fishes in the discussing case) at every direction from the point of its location because it is only a violently rotating column of air. If that happened in reality, a large circle area with a tornado in its center should be filled with a fishes frown away from a tornado that stood over a large water body sucking up the fishes accelerating them and sending the hopeless fishes in every direction around a water body. That description stays in opposition to observed facts. *There was an observation of a fishes falling only over a relatively small area.*

“A *tornado hypothesis*” has one more likely explanation for that phenomenon. As Ashley Patterson said: “With an updraft, (fish and water picked up) could get up high - up to 60,000 or 70,000 feet...”. That is true but according to physical appearance of any tornado - “When winds of this magnitude strike a populated area, they can cause *fantastic destruction and great loss of life, mainly through injuries from flying debris and collapsing structures.*”⁷ In other words, Lajamanu should be destroyed utterly and violently as soon as such a tornado comes over the settlement. In that scenario, nobody would be able to tell a story about a fishes coming down from the sky. Obviously that natural consideration stays in opposition to observable facts *again.*

More than that according to observations “The freak phenomena happened not once, but twice, on Thursday and Friday afternoon about 6 pm”⁸. That is the most critical and mind-crushing observation. Even a weather expert *was unable* to make any comment on that fact leaving it unnoticed in his words because there is not any tornado that is possible to rush across Australia like an express train reaching the same settlement “on time” and release a fish cargo right on the “station”. Any thoughts about such possibility drive the human mind to madness.

As a result, “a *tornado hypothesis*” stays beneath criticism. Generally, that assumption causes more questions than gives answers. Obviously another explanation should be given for all those phenomena. That explanation should produce satisfactory basis for each side of clear facts and make some predictions. Z-Theory can be used to obtain answers on all questions in that case. Australians were unable to use that theory for their case in 2010 because theory itself was published a year later in 2011. That theory uses its own way of explanations that remain far away from any atmospheric phenomena justification.

III. PRACTICAL APPLICATION

According to eyewitnesses’ observations, Australian incident has one significant problem that stays in controversy to modern science at the first glance. The problem is that. An ordinal person usually sees a fishes in the water of a lake or a river. Everybody knows that a fishes ever lives in water *below the ground level.* Hence there is *no reason* to see a fish in the sky anywhere especially over a settlement situated at the edge of a desert.

Moreover, from a scientific point of view, “a fishes falling from the sky” should be brought there by some physical process. As soon as a fish appears in the sky without any reason it crushes any acceptable scientific explanation that means *serious violation* of the most fundamental law of physics – conservation law. “Conservation law also called law of conservation in physics, several principles that state that certain physical properties (i.e., measurable quantities) do not change in the course of time within an isolated physical system. In classical physics, laws of this type **govern energy, momentum, angular momentum, mass, and electric charge.** In particle physics, other conservation laws apply to properties of subatomic particles that are invariant

⁵ Source [5]

⁶ **tornado.** (2008). Encyclopædia Britannica. *Encyclopaedia Britannica 2008 Deluxe Edition.* Chicago: Encyclopedia Britannica.

⁷ see above

⁸ Source [5]

during interactions. An important function of conservation laws is that they make it possible to predict the macroscopic behaviour of a system without having to consider the microscopic details of the course of a physical process or chemical reaction.”⁹

“Conservation of energy implies that energy can be neither created nor destroyed, although it can be changed from one form (mechanical, kinetic, chemical, etc.) into another. In an isolated system the sum of all forms of energy, therefore, remains constant. For example, a falling body has a constant amount of energy, but the form of the energy *changes from potential to kinetic*.”¹⁰

A falling fish should have some amount of potential energy that can be changed from potential energy to kinetic energy of a falling fish by the gravitational field of the Earth. Force of gravitational attraction between the Earth and a fish accelerates a fish changing its potential energy to kinetic energy. As a result, a fish falls from a place with higher altitude to an area with lower altitude. That process is well known as free fall.

However, there is one unsolved problem here. Fish in a water of a river has a given amount of potential energy that depends from true altitude of the point of that fish location. *Any process* should do relocation of that fish using some energy to move a fish to the sky. Any process that changes location of a fish from *lower to higher altitude* should spend some energy for that relocation, because elevation of a fish means movement in the opposite direction relatively to the direction of a force of gravitational attraction between the Earth and a fish. If that process uses required amount of energy from “nowhere”, the process causes *serious violation* of conservation law because it brings extra energy to the system *for no reason*. **Conservation law declines existence of such a processes**. Hence modern science pays no attention for such “nonsense”.

As a result, they try to use other possible explanations that provide answers on the main question about the source of additional power that can be appropriate to change energy of those fishes without violation of conservation law. “A tornado hypothesis” uses powerful horizontal, and vertical air motion to give an answer on that question. In that case, moving air that has enough energy spends part of its power to relocation of a fishes and brings them to a higher altitude. However, as it was shown above, that hypothesis stays beneath criticism because of many facts, which remain *in contrary to observations in that case*. Moreover, all attempts to make any acceptable explanation for the incident use only air hypothesis and consider whole case as *an air phenomenon only*. That logical restriction blocks any further attempts for investigations and researches of that phenomenon.

There is one more unanswered question despite of many controversy mentioned above. Is it possible to have a fish to exist or to be transferred to any altitude above an Earth-bound observer without violation of conservation law? At the first glance, that question has only negative answer because as long as an observer walks down a river stream a fishes in the water of a stream ever stay below the observer. That is correct, but that is

only *relative observation*. In the general case of true altitude, we have slightly different situation. Figure B shows that case.

⁹ **conservation law**. (2008). Encyclopædia Britannica. *Encyclopædia Britannica 2008 Deluxe Edition*. Chicago: Encyclopædia Britannica.

¹⁰ **conservation law**. (2008). Encyclopædia Britannica. *Encyclopædia Britannica 2008 Deluxe Edition*. Chicago: Encyclopædia Britannica.

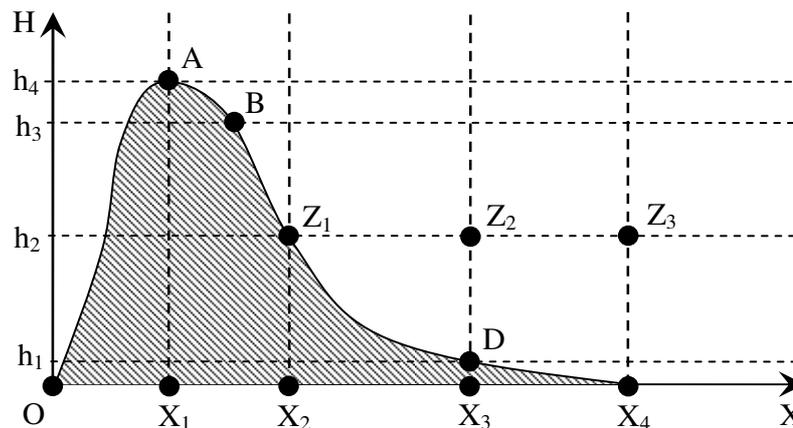


Fig. B

Figure B represents some image mountain O-A-B-Z₁-D-X₄ in coordinate system with two axes X and H. Axe X coincides with zero level of true altitude. Axe H shows height of each point shown in the figure ($h_1, h_2 \dots$ etc.). The mountain is located between points O, and X₄ on axe X and has maximal height h_4 at point A in distance O-X₁ (in a given coordinate system).

Suppose presence of a river that flows down the flank of a hill A-X₄ from the point B. Water changes its altitude from h_3 to zero by moving down the flank of a hill. Suppose an observer stays at point D. He or she seems a river stream with a fishes going down the stream. Obviously an observer sees a fishes below his/her location because an observer locates above the water stream.

Now an observer walks up the stream. Sooner or later a person reaches point Z₁. Obviously everything looks correct in that point - a fishes still remain in the stream, and an observer stays above them. Hence, from the person's point of view, observation of a fishes in a stream does not change between points D and Z₁. Here, delusion of an observer begins.

The person does not notice changes in true altitude of his/her new location, but relatively to the previous location of the observer (point D) true altitude has significant difference. According to the figure, value of that difference is equal to the difference between h_2 and h_1 .

After some time of relaxing at point Z₁, the observer walks down the stream to the point D and restores his/her original location at point D. From the observer's point of view, everything looks perfect again because a fishes are in the stream and the observer stays above them, but in that case, an observer forgets the fishes located up stream at the point Z₁! They have a location in higher true altitude relatively to location of the observer (point D). Hence despite continuous observation of the stream below the observer during his/her walk, location of a fishes at point Z₁ has higher true altitude than an observer at point D. In other words, those fishes remain higher the observer relatively to his/her true altitude.

Appearance of those fishes above an observer located at the point D after their relocation between points Z₁ and Z₂ keeps same true altitude of the fishes and means no changes in energy

of those fishes. In other words, such relocation follows each conservation law and meets all requirements of modern physics, because the process of such relocation changes no energy in the system. As a result, it becomes possible physical process.

The process of transposition has a distinct name Z-Process (in terms of Z-Theory). Transposition changes no energy in a closed system because any object keeps same value of energy just before and immediately after Transposition. Furthermore, a fishes after Transposition between points Z₁ and Z₂ (according to the figure B) remain the same amount of energy as before Transposition. In that case, a fishes falling from "the sky" according to observation of an observer located at the point D make perfect sense.

It is time to look back to figure A. Existence of Z-Trajectory is possible between any number of points with similar true altitude. Those are any point of the circle with radius OC. For example, Z-Trajectory E-G-H-F has shown between points E-F. Z-Trajectory ever shows the shape of the letter Z to be not mistaken with any other sort of trajectory because of image nature of Z-Trajectory. For any Earth-bound observer, Transposition between points E and F causes "disappearance" of an object at point E and its "strange" reappearance at point F. That is a key aspect of observation. Any observer is able only to see motion of an object after Transposition. In Lajamanu case, any observers had seen a falling fishes. That is correct because nobody is able to see Transposition itself. Only after Transposition a fishes fall toward the ground as well as any other object without support in a gravitational field of the Earth.

Moreover, according to figure A number of points with same true altitude are countless and forms exact sphere around the Earth. Cross section of that sphere in the figure's plane is shown as circle with points C, E and F. In other words, unlike common relocation of an object, Z-Process makes possible transposition between two distant points with the same true altitude despite the distance between them. Hence notion of distance is not applicable to Z-Process. It makes perfect sense in Lajamanu case because the nearest river with enough elevation above true altitude of the settlement located far away. Theoretically, any stream inhabited with the same kind of fish (that was observed in the analyzing case) can be used as a source

of a fishes despite a great distance between Lajamanu and that stream.

IV. RELATION WITH OUTER SPACE

According to observations we have following. “The freak phenomena happened not once, but twice, on Thursday and Friday afternoon about 6 pm at Lajamanu”¹¹ Obviously there was not any suitable explanation of that occurrence until today. Z-Theory has enough capacity to explain that aspect of phenomenon too. More than that, such occurrences provide critical support for that theory. Figure C shows explanations of that fact.

¹¹ Source [5]

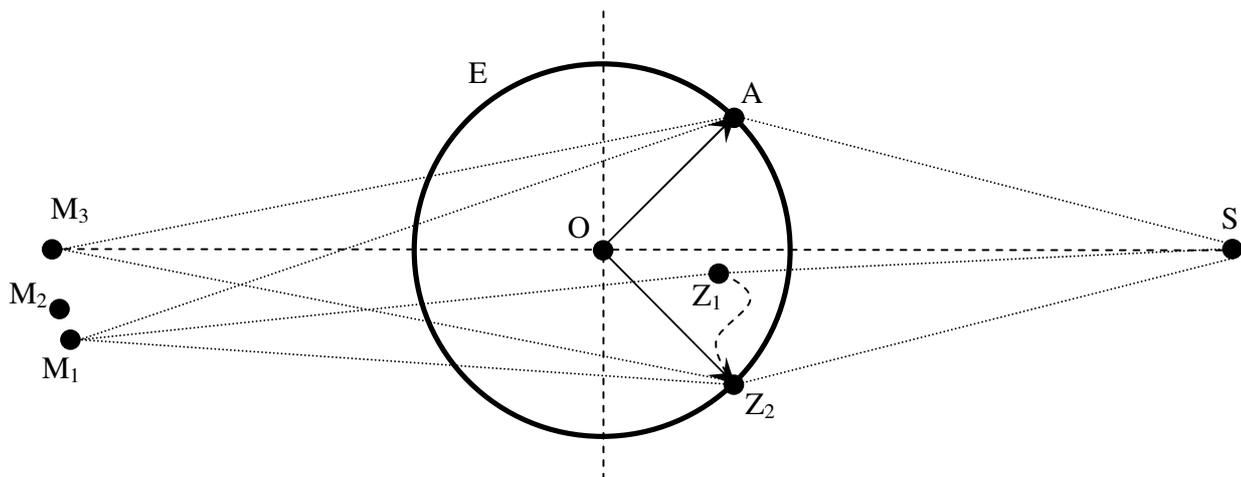


Fig. C

Figure C shows the projection of mutual location of the celestial bodies to the picture plane. Those bodies make the most significant impact on the magnitude of gravitational force around the Earth. Those are the Sun and the Moon. Points M_1 , M_2 and M_3 display projection of location of the center of the Moon for few subsequent days. Point S shows projection of location of the center of the Sun. Point O shows location of the center of the Earth as well as the point of origin of the frame of references. Distance between the celestial bodies is not accurate. Circle E is a projection of the Lajamanu latitude.

To support conservation law Z-Process should remain the same altitude of the first and the end points of Z-Trajectory before and after Transposition. That is correct relatively to any celestial object that has *enough mass* to make a *significant* impact to those points. There are two such bodies in case of the Earth. Those are the Sun and the Moon. Despite of their incomparable masses the Moon is located many times closer to the Earth. As a result, its gravitational influence is comparable with gravitational influence of the Sun.

Suppose an observer has an observation of a fishes falling from the sky at the point Z_2 (see figure C). In Lajamanu case, it was the location of the settlement. According to Z-Theory in that case point Z_1 should exist at the same true altitude relatively to the Earth surface. Moreover to make conservation law precisely correct location of Z_1 and Z_2 should keep following requirements (equal law requirements and equal law equations):

1. $OZ_1 = OZ_2$; that equation sets the same true altitude for both points
2. $SZ_1 = SZ_2$; that equation sets both points at equal distance from the Sun
3. $M_1Z_1 = M_1Z_2$; that equation sets both points at equal distance from the Moon (at the first day of observation of the phenomenon)

In the general case, points Z_1 and Z_2 have different latitudes. Hence they have different distances of their relocation because of earth rotation during any given time. Equal law

equations should be true only in tiny time when both points maintain their locations not far from a given location (Z_1 and Z_2). That coincides with observable facts because phenomenon happened about 6 pm (see above). In other words, *it lasts, not for few hours*. What does it mean for the Z-Process?

Duration of entire revolution of the Earth lasts for 24 hours. In other words, the Earth rotates 360 degree for 24 hours. As a result, all points of the earth surfaces take exactly the same locations after each full revolution. For example, points Z_1 and Z_2 in the figure C take exactly the same locations after 24 hours. As a result, equal law equations become exactly correct *again* after 24 hours. That *gives possibility for Z-Process to come again exactly at the same time (6 pm) at the next day*. It was the appearance of the same Z-Process in both consequent days. In Lajamanu case, they were days of February 25th, 2010 and February 26th, 2010 (Thursday and Friday before February 28th, 2010¹²).

At the next day, February 27th, 2010 the Moon influence reduces because the Moon had a bit more distance from the points Z_1 and Z_2 (point M_3 in the figure C) and equal law equations becomes false. As a result, Z-Process between those points became *impossible* because of conservation law.

Theoretically any celestial body *with enough mass* can cause impact on the possibility to appear Z-Process between any two or more given points. In that case, appearance of Z-Process should have some recurrence as well as recurrence of any other event in celestial mechanics. The observable events should perform *the same way with some duration* that can be *clear* for the observers. Have we such evidences? Certainly we have. According to an eyewitness account we have the facts: "In **2004**, locals reported fish falling from the sky, and in **1974**, a similar incident captured international headlines."¹³ Hence, there is following circle of the same events in **1974, 2004, 2010**.

How long was the period between two subsequent events? Those are $2010 - 2004 = 6$ years and $2004 - 1974 = 30$

¹² Source [5]

¹³ Source [5]

years. That makes perfect sense because **the greatest common divisor** of 30 (year circle) and 6 (year circle) is 6 (year circle). **The greatest common divisor** coincides with the last circle of the two subsequent events (6 years between 2004 and 2010). Suppose the observers have seen full circle of those events. In that case, we have some period between steps of appearances of the whole phenomenon:

1974; 1980; 1986; 1992; 1998; 2004; 2010;
(1)

The given sequence (1) begins with the year of 1974 and goes ahead with 6 year steps. Years when the phenomenon had occurred are underlined. Hence we have four (4) free circles in the years from 1980 to 1998 and three circles with phenomena. Using corresponding full sequence before the year of 1974 and after the year of 2010, we have full approximation for phenomenon appearance:

1872; 1878; 1884; 1890; 1896; 1902; 1908; 1914; 1920; 1926;
1932; 1938; (Circle A)
1944; 1950; 1956; 1962; 1968; 1974; 1980; 1986; 1992; 1998;
2004; 2010; (Circle B)
2016; 2022; 2028; 2034; 2040; 2046; 2052; 2058; 2064; 2070;
2076; 2082; (Circle C)

The great circle mentioned above has a duration for 72 years (2010 – 1938 = 72). It includes two half-circles with duration for 36 years each. First half-circle has one occurrence of the phenomenon at the last year of that half-circle. Second half-circle has two occurrences of the phenomenon at the last year of that half-circle *and six years before*.

According to the calculations, inhabitants of the settlement have been seen second half-circle of the great circle B mentioned above. There is not any information about same phenomena occurrence before the year of 1974 because the closest year of previous circle (A) with possible occurrence of the same phenomenon is the year of 1938. Moreover, same phenomenon should appear in the six-year interval as well as it happened in the years of 2004 and 2010, because of the end of the circle (A).

Looking at the future same calculations allow us to make some predictions about nearest year with possible observation of the same phenomenon. That is the year of 2046, and it should be a year without six-year close appearance of the same phenomenon. As the matter of facts, the phenomenon does not appear in the two subsequent years after 2010 - in 2011 and 2012. That supports calculations given above.

According to Z-Theory, such obvious circles can be caused only by relative motion of the celestial bodies with enough mass. Those bodies are able to make enough influence to the gravitational field of the Earth. The phenomenon appears each time when such a body or association of some bodies reaches some locations with the *same distance from the Earth*.

Jupiter is one from *the most likely candidates* for such a body. "Jupiter is *the most massive planet of the solar system* and the fifth in distance from the Sun. It is one of the brightest objects in the night sky; only the Moon, Venus, and sometimes Mars are more brilliant. ... It takes *nearly 12 Earth years* to orbit

the Sun"¹⁴ In that case duration of the half-circle mentioned above (36 years or 36 full revolutions of the Earth around the Sun) coincides with 3 full revolutions of Jupiter around the Sun. Moreover, full duration of the large circle (72 years or 72 full revolutions of the Earth around the Sun) coincides with 6 full revolutions of Jupiter around the Sun.

V. GEOLOGICAL EVIDENCES

One might ask a question about the existence of independent evidences for all sophisticated reasons mentioned above. That is correct question, and it has correct answer. There is one independent source of facts that actually has no connection with any of inhabitants of the settlement. That is geological data.

As soon as a fishes appear as an objects falling from the sky, the ground of that area should include some evidences of those events. Moreover, if that phenomenon appears with some known period, it should make periodic evidences of its appearance. Figure D shows that conditions.

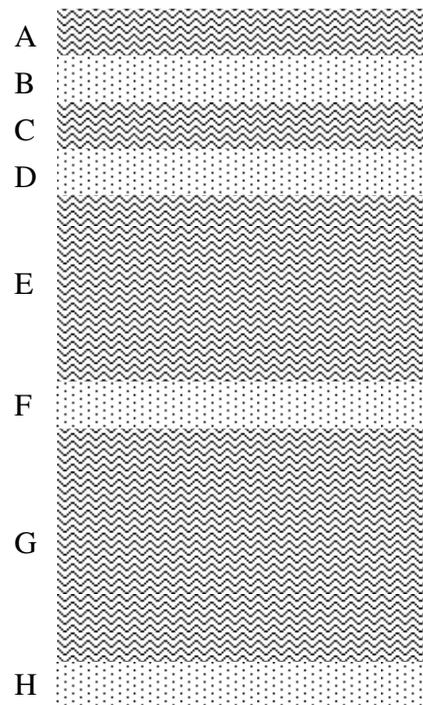


Fig. D

In the figure D letters show geological layers, formed in different times. As soon as the phenomenon occurs with some time it should make geological evidences. In the given case, that evidences should produce some strata according to the period of the phenomenon appearance. In the figure D, those strata are shown as light one. The Dark strata mean periods when geological formation appear without any evidences of that phenomenon.

¹⁴ **Jupiter.** (2008). Encyclopædia Britannica. *Encyclopaedia Britannica 2008 Deluxe Edition*. Chicago: Encyclopædia Britannica.

Suppose the phenomenon occurs without reference to any human observer. In that case, it should make geological evidences according figure D. Each time when the phenomenon occurs it left certain evidences in the geological strata. It should be fish remnant *without any evidences of a sea or river bed sediment*. That is the best distinguish between regular fish remnant from any water space and a remnant of a fishes appeared above a dry area. According to calculations shown above, those strata should be separated with strata which bear no evidences of the phenomena for periods of time when the phenomena did not appear.

Those are strata C, E and G. Stratum C has connections with six-year circle of the phenomenon appearance at the end of a full 72 year circle. Stratum E should make formation during free circles of the second half of a full circle (30 years) and stratum G should appear at free circles of the first half of full circle (36 years).

More than that such geological evidence as strata containing evidences of fish remnant should appear for a long time because of cyclical character of the phenomenon. In other words, they should be available for inspection in the area of the settlement location. Obviously nobody had any geological research in that area because of lack of theoretical support for that activity.

Now we have such support. Moreover, as soon as the process has fixed circle of appearance, geological evidences should appear in a strata which are relatively old and made its formation *before the settlement was found*. An evidence about such geological stratification from that area gives us *direct, and independent prove* for existence of the whole phenomenon, and support words of the eyewitnesses about the same phenomenon happened again and again.

VI. RELATION WITH OTHER PHENOMENA

There are a number of similar incidents, which have strong uniformity. "There is a story of this kind, in the New York Sun, June 22, **1884**. June 16th – a farm near Trenton, N.J. – two young men, George and Albert Sanford, hoeing in a field – stones falling.... The next day stones fell again."¹⁵ That is exactly the same case – two events of "strange" things falling from the sky were separated with *24 hour period*.

There are some other observations around the world about the same phenomenon. For example, "London Times, Jan 13, 1843 – that according to the Courier de l'Isere, two little girls, last of Desember, **1842**, were picking leaves from the ground, near Clavaux (Livet), France, when they saw stones falling around them"¹⁶.

The objects, which appear after Transposition, depend only on the location of the first point of Z-Trajectory (point Z_1 in the figure C). In case of Lajamanu incident, that point coincided with a stream filled with a fishes. As a result, the observers located below the last point of Z-Trajectory (point Z_2) seen similar fishes, which were relocated by Z-Trajectory from some point Z_1 to the point of observation – Z_2 . *In other words, they have seen the same school of fish after Transposition that was*

in the same stream before Transposition. That is answer on the question about the same school of fish that was observed in each event (February 25th, 2010 and February 26th, 2010).

In case of Trenton incident, (mentioned above) same sort of things – *the stones* fell from the sky. Hence in that case first point of Z-Trajectory was situated on a flank of a hill with higher true altitude relatively to the point of observation (see fig. B). That area was filled with stones, and those stones were subjected for Transposition, as well as a fishes in Lajamanu case were subjected to the same method of *relocation*.

Moreover, in Clavaux case, there were no observers at *the day before or the day after* that event, to see the same event separated with 24 hours. I believe in Clavaux was the same example of event sequence - two similar events separated with 24 hour interval. It is quite easy to explain the relationship between phenomena happened in all three areas of observations. If we continue calculations, full 72 year circle mentioned above goes far in the past, and we have some coincidences mentioned below.

1800; 1806; 1812; 1818; 1824; 1830; 1836; **1842**; 1848; 1854; 1860; 1866; (Circle A-1)
1872; 1878; **1884**; 1890; 1896; **1902**; 1908; 1914; 1920; 1926; **1932**; **1938**; (Circle A+0)

Both events shares hollow years of full 72-year circle. Those are internal six-year steps of that circle. Yeas of events match exactly the years of **1884** and **1842**, but because of different location of those events they have different multiplicity with internal steps of the six-year circle inside full 72-year circle. In any case, observations coincide with internal six-year step of full circle.

Because of such interrelation we should call full 72-year circle as **Great Australian Double Event Circle** (GADEC). Coincidence between the first year of that circle and round number of a year had the place in 1800. The circle has full duration for 72 years with 12 internal steps of 6-year each. Obviously the circle can be calculated before 1800.

VII. Z-TRAJECTORY AND THE EARTH'S ATMOSPHERE

As it mentioned above, there was an appearance of the phenomenon in the clear sky, in Trenton and Clavaux cases. In other words, there was not any observation of *a rain, thunderstorm, hurricane, tornado* and etc. that can be explained as a relation between an *atmospheric phenomenon* and "strange" objects falling from the sky *because of a strong wind that sent them there*. That is the most critical observation because it shows *no relationship* between that phenomenon and any atmospheric condition.

At the same time, that observation gives extra support for Z-Theory because that theory makes deal with phenomena that appear in conservative fields. Gravitational field is one of them. From an Earth-bound observer's point of view, those phenomena happened in the atmosphere, as a matter of fact, but gravitational field of the Earth exists everywhere and the atmosphere is the only one location where that field exists. Moreover, the atmosphere itself appears as a result of gravitational interaction between the planet and gases surrounding it.

¹⁵ Source [6] page 21

¹⁶ Source [6] page 20

Those distinguish between atmospheric and gravitational phenomena help us to understand Transposition better than ever. It is able to appear in any condition of the atmosphere, because it *has no relation with any of atmospheric processes*. As a result, Transposition is possible to appear in a calm weather, above plains, islands, seas, oceans and etc. Appearance of any phenomenon of “strange” objects falling from the sky at the same place, and the same time with any atmospheric phenomena *is nothing more than coincidence*.

That coincidence caused a lot of dispute for many decades. They usually try to explain each Transposition phenomenon as an atmospheric one. Obviously those examinations fail ever, and the best example of such a failure mentioned in the section II of this paper.

VIII. CONCLUSION

Common reaction to any information about “strange” objects falling from the sky had the same result ever. According to information from the Lajamanu incident we have these details: “Mrs Balmer, the aged care co-ordinator at the Lajamanu Aged Care Centre, said her family interstate thought she had lost the plot when she told them about the event. “I haven't lost my marbles,” she said, reassuring herself.”¹⁷

That reaction caused some restriction to any reference to those phenomena especially in the *scientific community*. They think that if atmospheric processes are unable to explain those phenomena then no one of those phenomena should be treated as a *trustworthy one*. Obviously it was a result of *failure of theoretical approach* to a physical process that stays far away from any of atmospheric phenomena.

Today Z-Theory gives us description and explanation of that process (Z-Process) and makes all phenomena related to it *understandable and researchable*.

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¹⁷ Source [5]

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Smile Theory of Everything

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Abstract- I would like to thank everything in this universe which is trying to make this place a better place to live. This paper is all about “Smile Theory of Everything (SToE)”. In this theory or religion, the same thing is given in different formats. Format 1: Truth. Format 2: Some methods for smile creation. Format 3: Wow! SuMmEr 2011. Format 4: Festival based method for Smile Creation. Format 5: Birthday based method for optimal Smile Creation. Format 6: Trishul or OM.

Index Terms- Unified theory, Religion, Computer Science, Language, Information, Kindness, Technology

I. INTRODUCTION

There are many ways in which one can bring smile on the face of others. A human can imagine the feel of bringing smile on others face simply by looking his own smile with the help of a mirror.

Summer season may be very hot but some methods may be used for smile creation. These methods can bring coolness and interest even during summer season.

Smile creation is a wonderful field of research. The beauty of this smile creation field is that smile is the final result that one wants no matter what someone does i.e., whether we do “bits, bytes and protocols” or “profits, losses and margins” ultimately it is to smile and make others smile.

In this new unified theory same thing is given in different formats. Section 2 gives Truth which is first format. Some methods for smile creation is 2nd format shown in third section. Smiles discovered or created during summer 2011 are described in Section 4. Application of Smile computing method during a festival is explained in fifth section. Section 6 shows methods I used for getting happiness and satisfaction during a birthday. Final part shows photography art based method or figure taken by author which is the final format shown in this work for smile creation in this high dimensional world.

II. TRUTH

HARE GOD HARE HARE, JESUS ALLAH HARE KRISHNA.
HARE BUDDHA HARE RAMA, HUMAN HUMAN HARE
HARE. TEACHER PROFESSOR HARE HARE. HUMAN
HUMAN HARE HARE. PHILOSOPHY HARE HARE.
COMPUTER SCIENCE HARE HARE. EVERY
DEPARTMENT HARE HARE. EVERY ONE EVERYTHING
HARE HARE. UNIVERSE HARE HARE.

III. SOME METHODS FOR SMILE CREATION

When your friend asks “Do you have good movies?” and you instead of saying No think of another friend who collects good movies and go to that friend as if you want to see movies and ask that friend who has movies “Please give me your hard disk to copy movies” and he may say NO and then you convince him that it will generate lot of happiness for another friend and request him for 5 minutes and finally he will give them and take those and give them to friend who asked you and believe in me he will smile and say thank you and you will feel like swimming(not just flying) in the sky ☺

Your friend may go out of station and suddenly he needs something urgent to be done by you which he cannot do it from there and so you decide to go out but then it may be very hot outside and you may feel like saying sorry I can’t do it to your friend. Then somehow make your brain sleep and without any thinking just go and no matter how difficult it is complete the task and call your friend and say that you have done it and he will say Thank you! Thank you! and you will feel like Yahoo! ☺

May be you have struggled hard for 6 months and gathered material and stored in a secret place so that no one can get it and I think if your goal is solving problem then sharing that material may help friend get an idea and solve it and may be if you don’t share and hide it who knows that problem will remain as problem and so it is difficult but if possible just mail to your group some important thing if your goal is to solve a problem and you don’t matter whether problem is solved by your friend or you and your focus is just to solve the problem and you sharing important things may trigger solving of that problem by your friend ☺

When you go to market and your hands are not full then call your friend whether he wants anything because otherwise he should also come to market to buy that thing and your help surely makes him feel that you are there for him ☺

Your friend may come to your room and say I got admission into best college for higher studies and then what you do just say yes! and dance with him and do whatever you do if you get admission into that college (imagine and then do) because you are x and your friend is y and you both together must make total i.e. $x+y=1$ and $(0+1)$ and $(1+0)$ equals total 1 and if you haven’t understood what I said then in simple words whether you gets admission or your friend gets admission it is equivalent because there is a problem and you both together must solve it and it doesn’t matter whether you solve it or your friend solves it because it is total which is important and not individual value. So your friend getting admission is equivalent to you getting admission and hence smile on his face ☺

When you go out and you see a person trying to sell balloons but no one is buying then just buy two or three and atleast because of you some balloons will be sold and give that

balloons as gift to friends and make them happy. This one act generates happiness at more than one place i.e. your friend and that person selling balloons and you all are happy ☺

There will be many beautiful things that occur in day-to-day life like person returning extra money you gave by chance at canteen instead of keeping it with him and not telling you and a child working nearby saying hello and giving a big smile and your friend fighting for solving problem with great heart and all these things are wonderful and don't forget to share them as it creates a positive impact ☺

There are sites like www.helpothers.org where people post wonderful stories after they do good things and your appreciation for their post makes their day beautiful and who knows it may trigger another kind action by them ☺

When you took your friends umbrella and by chance you exchanged it to very old umbrella at some other place then there is wonderful idea to create smile on your friends face. Because you don't have umbrella it is sure that you will buy one and so instead of giving your friend a old umbrella which is by chance exchanged at someother place and tell him sorry, your umbrella was exchanged just give the new umbrella to him and keep the old one for you and then you will feel like rocking this life ☺

IV. WOW! SUMMER 2011!

One day when you are cleaning your room with water...it may happen that two ants are stuck between water and you may see that and your brain may say "let them die who cares" and just ignore it and take a paper and keep it near ants which are in between water and then two ants climb the paper and believe in me you have saved their life! Hurrah!

One day you may sit in class and your professor may ask "why don't you give a voluntary presentation on this topic?" Then your brain may say "there are no marks! There are no marks! for this and don't say yes " and your heart may say "It is a rare chance to make whole class smile for around 15 minutes" and then you kick the brain and give chance to heart and say "Yes! I will give a voluntary presentation" and later prepare it in such a way that you can make people smile and go and give presentation for free and when you see people laughing and your inner voice says Yes! Yes!

You may have studied a course and you have that textbook and you don't need it anymore and one of your friend needs it. Maybe he never asked the book but call him and ask "do you need this book?" and he says yes and you just go to his room as if you want the book from him and just give him the book and come back and while coming back don't forget to watch the wonderful smile on his face! Awesome!

One day you may be walking from room to mess and in between a person may ask "Do you have any unwanted papers? I will buy it". You just go to your room and find all the papers and you may have some unwanted books and while coming back another person may ask "are you giving these papers away for person standing outside? Can I take them?" and then you give half papers to him and remaining papers to person standing outside. Don't take money from them because it is not a big deal for you. Wow! you created two smiles ☺ ☺

One day it may happen that results are declared and your friend is failed and he has to go out from college and then you

just go to computer centre and then find some inspirational quote or something and then print on a paper and stick it on thick paper and cut it in proper shape and you give it to him. It is not a big deal whether you go for parties with him or not but when he is in trouble you must be there with him or atleast try something for making him feel good. Yeah it is difficult as first you must go to computer centre and search for few hours and then you must go out and print and cut and then giving... doing this is difficult but not doing this is much more difficult if he is really your friend!

Maybe you have come across some post and some great heart wants to clear the confusion and you know the answer and then just reply to post as if your best friend is in trouble and clear confusion because it may have big effect on the other side ☺
Wow ☺

Maybe your friend is in trouble and asks you to come for a walk for an hour and this is the moment you must be there with him and listen to him and go for walk with him and for sometime slap the brain and kick it off if it sends signals like "me me me.." to you and listen to heart which says "help him help him" and this is one of the wonderful kindness acts you have done ☺

You may create account in www.helpothers.org website and join the kindness group where you can find many ways how people across the globe are making this world a better place to live.

V. FESTIVAL BASED ALGORITHM

There are many ways to implement this algorithm and the following implementation was tried. Step 1: Found a wonderful colourful shirt in the room. Step 2: Realized I just wear T-shirts all the time and giving away this colourful shirt doesn't make much damage. Step 3: Found a worker who is good and sincere and also observed that one colourful shirt can make his holi colourful. Step 4: Brain will send signals "Are you giving this shirt to him. Are you gone mad?" and it will give 1000 reasons not to give that shirt to worker. Step 5: Slap the Brain and give the control to heart and give 100000 reasons why you want to give the shirt to worker. Step 6: This is the mind blowing step where you give the shirt and you will find a big smile on the face on worker and also he will say "Thank you" and you will feel like swimming (not just flying) in the sky.

VI. BIRTHDAY BASED METHOD FOR OPTIMAL SMILE CREATION

On Birthdays we may spend thousands and sometimes lakhs in some cases. What I did on my birthday based method is I changed few parameter values. Generally self parameter is more and others in need parameter is less. What I did is I tried to decrease self by some amount and increase others in need and distributed money to others in need also. I found many smiles and that created smile on my face. This overall thing may be termed as "Smile Effect" where each human created smile on the face of other humans. I am unable to express happiness because somethings in life cannot be expressed or published but they can only be felt.

VII. TRISHUL OR OM



Fig. 1: Trishul or OM

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VIII. ACKNOWLEDGEMENTS

I would like to thank everyone.

IX. CONCLUSION

In this paper a new religion or unified theory titled “Smile computing” is introduced. I can’t write here with words because not everything in life can be expressed with words because something’s in life can only be felt with heart. There are many ways to create smiles if you really want to do it. It is beautiful when someone smiles and even more beautiful thing is to know that you are the reason behind it. Summers may be cool and interesting! There is much more but not everything in life can be expressed with numbers like “number of marks obtained”, “number of dollars earned”, “number of times blah blah..” etc because somethings in life can only be felt with heart☺ Wow! Hurrah! Awesome! Mind Blowing! Great! Cool!☺ I will just say the reason “I am wearing that colourful shirt and some friend because of holi bought colours and made that shirt even more colourful with colours and that shirt is no more useful”. This is a small lie. Actually that incident has not happened. Wow! the worker felt really happy after I gave him colourful shirt. You have to try this method on your birthday and many smiles are created by this method. I am unable to express happiness as ENGLISH language is not sufficient to express all the things that happen in life. Also it is observed that BRAIN may give optimal solution as “self=1” and “others=0” and it proves it to be correct. Be careful with this BRAIN. Sometimes give the control to HEART so that you may get results which otherwise are impossible. Finally, in future if you come across miracles that cannot be explained in science then it’s ok because this is high dimensional world. EYE wrote this paper and you find some way to pass your experience or miracle so that this world turns into much better form.

OCLC Systems & Services: A Bibliometric Study

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Abstract- Analyses the articles published during 2006-2010 in the journal 'OCLC Systems & Services', to find the most frequently cited periodicals by the library and information scientists. A list of 515 most common cited periodicals has been prepared. In addition to this, the study identifies the types of publication cited. Authorship pattern of contributions, country-wise, language-wise and subject-wise distribution of frequently cited periodicals are also included.

Index Terms- Bibliometric Study, Bibliometric, OCLC Systems and Services. Bradford's Law and Citation study

I. INTRODUCTION

Library and Information Science being a dynamic research field had attracted information scientists all over the world; consequently, the flow of information in the field has been endless. The growth of scientific literature can be measured by counting the number of journals, papers or abstracts published per unit of time, normally one year.¹ the growth of literature in a particular subject can be studied either by quantitative or qualitative research. This quantitative approach commonly known as bibliometrics has been followed in the present study.

The OCLC Systems and Services started its publication in 1985 published by Emerald Group. Editor of Journal is Dr. Bradford Lee Eden. Journal has been published from U.K. Frequency of the journal is quarterly.

This journals coverage the following area

- Digital libraries
- Digital repositories
- Digital cultural content services
- Web metadata standards
- Web markup languages
- Digital preservation
- Imaging and digitization techniques
- Usability studies

II. OBJECTIVES

1. The objectives of the present study include the identification of:
2. Major sources of information;
3. Core journals;
4. Language and country-wise distribution of papers;
5. Authorship pattern and subject-wise distribution of papers; and

6. The extent of applicability of Bradford's Law of Scattering to the pattern of journal use by Indian scientists in the field of Biological Sciences.

III. METHODOLOGY

The present study is based on the analysis of citations drawn from the articles published in the journal *OCLC Systems and Services* for the period of 2006-2010.

IV. ANALYSIS

4.1 Major Sources of Literature

From table 1 it is clear that the major channel of communication in the field of Library and Information Science comprises mostly by journal articles (515) accounting for 40.65% of the total citations. Websites (253) and books (189) contribute 19.95% and 14.95% respectively. While thesis and dissertations have negligible contributions with 8.9% and 8.55% respectively. Thus the library and information scientists depend more on journal articles.

Table 1
Major Sources of literature

Sl.No.	Form of Documents	No. of citations	Cum. Citations	% of Citations	Cum. %
1	Journals	515	515	40.65	40.65
2	Website	253	768	19.95	60.60
3	Books	189	957	14.95	75.55
4	Conference proceedings	113	1070	08.90	84.45
5	Thesis & dissertations	109	1179	08.55	93.00
6	Others	89	1268	07.00	100.00
		1268		100.00	

4.2 Language, Subject and Country of Origin of Information Sources

Further, the citations were analyzed according to their language, country and subject. The language-wise scattering of cited documents showed that English was the predominant language and use of other foreign language materials was substantially lower. It is clear from the Table 2 that nearly 98.85% of journal articles were published in English followed by Portuguese language documents with only 0.58% of citations.

Table 2
Language-wise Distribution of Cited Library and Information Science journals

Sl.No.	Language	No. Of Journals	No. of Citations	Cum. Citation	Percentage	Cum. %
01	English	214	509	509	98.85	98.85
02	Portuguese	03	03	512	00.58	99.43
03	French	01	01	513	00.19	99.62
04	German	01	01	514	00.19	99.81
05	Spanish	01	01	515	00.19	100.00
		220	515		100	

4.3 Country-wise Distribution of Cited Library and Information Science Journals

The cited documents were analysed according to their country of origin. Table 3 indicates that 64.56% of the cited documents were from USA and rest were from UK (23.65%) and remaining less than 13% were from other 13 countries. From this it can be inferred that the researchers in Library and Information Science depend much on literature emanating from USA and UK.

Table 3

Country-wise Distribution of Cited Library and Information Science Journals

Sl.No.	Country of origin	No. of Journals	Cumulative on of journals	%	Cum. %
1	USA	142	142	64.56	64.56
2	UK	52	194	23.65	88.21
3	Netherland	04	198	01.81	90.02
4	Canada	03	201	01.37	91.39
5	Spain	03	204	01.37	92.76
6	Brazil	03	207	01.37	94.13

7	Germany	03	210	01.37	95.50
8	Sweden	02	212	00.90	96.40
9	China	02	214	00.90	97.30
10	Australia	01	215	00.45	97.75
11	Iran	01	216	00.45	98.20
12	India	01	217	00.45	98.65
13	Austria	01	218	00.45	99.10
14	Japan	01	219	00.45	99.55
15	Maryland	01	220	00.45	100.00
		220		100.00	

4.4 Subject classification of cited journals

It is evident from the table 4 that total 515 citations are spread in 220 subject journals. Nearly 16.31% of cited documents were from the field of information technology and 13.03% were from the field of digital library. The journal articles devoted to other subjects like Library services, Library & Information Science, Academic Libraries, Computer science, Microbiology etc. accounted for nearly 70% of the total cited literature. This has an important implication for the provision of information services to the Library and Information scientists.

Table 4

Subject classification of cited journals 2005-2010

Sl.No	Subject Categorization of cited journals	No. of Journals	%	No. of Citations	%	Cum. %
1	Information Technology	22	10.00	84	16.31	16.31
2	Digital library	12	5.48	67	13.03	29.34
3	Library services	8	0.66	38	7.37	36.71
4	Library & Information Science	15	6.84	33	6.43	43.14
5	Academic Libraries	16	7.29	29	5.63	48.77
6	Computer Science	12	5.47	23	4.49	53.26
7	Microbiology	9	4.11	16	3.13	56.39
8	Higher Education	7	3.20	14	2.74	59.13
9	Library management	6	2.72	11	2.13	61.26
10	Communication	5	2.27	9	1.76	63.02
11	Scientometrics	1	0.45	7	1.37	64.39
12	Web libraries	5	2.27	5	0.97	65.36
13	Library Documentation	2	0.90	5	0.97	66.33
14	Medicine	3	1.36	4	0.77	67.10
15	Library administration	3	1.36	4	0.77	67.87

16	Research methods	4	1.81	4	0.77	68.64
17	Physics	4	1.81	4	0.77	69.41
18	Geographic Information Science	2	0.90	3	0.58	69.99
19	Library philosophy	1	0.45	2	0.38	70.37
20	Economics	2	0.90	2	0.38	70.75
21	Public Library	2	0.90	2	0.38	71.13
22	Genetics	2	0.90	2	0.38	71.51
23	Social Science	1	0.45	2	0.38	71.89
24	Health Care Management	1	0.45	1	0.19	72.08
25	Water Science & Technology	1	0.45	1	0.19	72.27
26	Nuclear	1	0.45	1	0.19	72.46
27	Mathematics	1	0.45	1	0.19	72.65
28	Law	1	0.45	1	0.19	72.84
29	Molecular	1	0.45	1	0.19	73.03
30	Neurology	1	0.45	1	0.19	73.22
31	Bacteriology	1	0.45	1	0.19	73.41
32	Library Collection	1	0.45	1	0.19	79.60
33	Phytopathology	1	0.45	1	0.19	73.79
34	Miscellaneous	66	30.00	135	26.21	100.00
		220	100.00	515	100.00	

4.5 Distribution of Citations According to their Authorship

It is observed from the table 5 that most of the citations have single authors (60.19%) and the remaining citations are contributed by two authors (21.35%), three authors (9.33%), four authors (5.25%) and five or more than five authors (3.88%). The publications are in the descending order of single, double, three, four and five and more than five authors.

Table-5
Distribution of Citations According to their Authorship

Sl.No.	Authorship	No. of Citations	Percentage	Cumulative percentages
1	Single	310	60.19	60.19
2	Two	110	21.35	81.54
3	Three	48	09.33	90.87
4	Four	27	05.25	96.12
5	Five and more the five	20	03.88	100.00
		515	100.00	

The data reveals that single authored papers accounted for 310 (60.19%) while 195 (39.81%) citations were multi-authored. The low incidence of multiple authorship is characteristic of social sciences rather than the physical and life sciences where the percentages of multi-authored papers is reported to be in the range from 67 to 83.²

4.6 Ranked list of cited periodicals

Table 7 presents ranked list of journals preferred by the Library and Information scientists for publications. Contributions of Library and Information scientists were scattered in as many as 220 journals. The first six journals in the rank list covered ¼ of the contributions (26.23%) while 50% and 75% respectively were covered by 28 and 93 journals. Among the cited journals D-Lib Magazine occupies the first rank, accounting for 53 (10.40%) of the total number of citations followed by OCLC Systems and Services (4.56%) and Ariadne (3.40%). The selection of periodicals for subscription may be based on the rank list for optimum utilization.

Table 7
Ranking of Periodicals

Sl.No.	Rank	Name of the Journal	Country	Language	No. of Citations	Cum. Citations	%	Cum. %
1	1	D-Lib Magazine	USA	English	53	53	10.40	10.40
2	2	OCLC Systems & Services	UK	English	23	76	4.56	14.96
3	3	Ariadne	UK	English	17	93	3.40	18.36
4	4	Library Journal	USA	English	15	108	2.96	21.32

5	5	Library Hi Tech	UK	English	14	122	2.76	24.08
6	6	Information Technology & Libraries	USA	English	12	134	2.43	26.51
7	7	Library Trends	USA	English	9	143	1.84	28.35
8	8	First Monday	USA	English	8	151	1.65	30.00
9	9	Scientometrics	Netherlands	English	7	158	1.40	31.40
10	9	Journal of the American Society for Information Science and Technology	USA	English	7	165	1.40	32.80
11	10	Serials Review	USA	English	6	171	1.18	33.98
12	10	New Review of Information Networking	USA	English	6	177	1.18	35.16
13	10	Learned Publishing	UK	English	6	183	1.18	36.34
14	10	Chronicle of Higher Education	USA	English	6	189	1.18	37.52
15	10	Annual review of information science and technology	USA	English	6	195	1.18	38.70
16	10	American Libraries	USA	English	6	201	1.18	39.88
17	11	Vishwasharat@TDIL	China	English	5	206	0.97	40.85
18	11	Reference Services Review	UK	English	5	211	0.97	41.82
19	11	Online	UK	English	5	216	0.97	42.79
20	11	Nature	UK	English	5	221	0.97	43.76
21	11	Library resources and technical services	USA	English	5	226	0.97	44.73
22	11	Journal of Web Librarianship	USA	English	5	231	0.97	45.70
23	11	Computers in Libraries	USA	English	5	236	0.97	46.67
24	11	Applied and Environmental Microbiology	USA	English	5	241	0.97	47.64
25	12	SPARC open access newsletter	USA	English	4	245	0.78	48.42
26	12	Program	UK	English	4	249	0.78	49.20
27	12	Portal: Libraries and the Academy	USA	English	4	253	0.78	49.98
28	12	Online Information Review	UK	English	4	257	0.78	50.76
29	12	New Library World	UK	English	4	261	0.78	51.54
30	12	Journal of Information Science	USA	English	4	265	0.78	52.32
31	12	Journal of Academic Librarianship	UK	English	4	269	0.78	53.10
32	12	Information Processing & Management	USA	English	4	273	0.78	53.88
33	12	E-Content	USA	English	4	277	0.78	54.66
34	12	College & Research Libraries	USA	English	4	281	0.78	55.44
35	13	ProQuest	UK	English	3	284	0.58	56.02
36	13	Journal of the American Society for Information Science	USA	English	3	287	0.58	56.60
37	13	Journal of the American Association for Information Science and Technology	USA	English	3	290	0.58	57.18
38	13	Journal of Documentation	UK	English	3	293	0.58	57.76
39	13	Information today	USA	English	3	296	0.58	58.34
40	13	FEMS Microbiology Ecology	USA	English	3	299	0.58	58.92
41	13	Communications of the ACM	USA	English	3	302	0.58	59.50
42	13	College & Research Libraries News	USA	English	3	305	0.58	60.08
43	13	Cataloging & Classification Quarterly	UK	English	3	308	0.58	60.66
44	13	Canadian Journal of Communication	Canada	English	3	311	0.58	61.24
45	14	VINE	UK	English	2	313	0.38	61.62
46	14	Transactions in GIS	UK	English	2	315	0.38	62.00
47	14	The Serials Librarian	UK	English	2	317	0.38	62.38
48	14	The Journal of Academic Librarianship	USA	English	2	319	0.38	62.76
49	14	The Chronicle of Higher Education	USA	English	2	321	0.38	63.14
50	14	Searcher	USA	English	2	323	0.38	63.52
51	14	Nihon Iji Shimpo	USA	English	2	325	0.38	63.90
52	14	Library Technology Reports	USA	English	2	327	0.38	64.28
53	14	Library Philosophy and Practice	Iran	English	2	329	0.38	64.66
54	14	Journal of Usability Studies	Canada	English	2	331	0.38	65.04
55	14	Journal of the Royal Society of Medicine	UK	English	2	333	0.38	65.42
56	14	Journal of Library Administration	USA	English	2	335	0.38	65.80

57	14	Journal of Electronic Publishing	USA	English	2	337	0.38	66.18
58	14	International Journal of Digital Curation	UK	English	2	339	0.38	66.56
59	14	Information Research	Sweden	English	2	341	0.38	66.94
60	14	IEEE Data Engineering Bulletin	USA	English	2	343	0.38	67.32
61	14	Educause Review	USA	English	2	345	0.38	67.70
62	14	DttP: Documents to the People	USA	English	2	347	0.38	68.08
63	14	Current Contents	USA	English	2	349	0.38	68.46
64	14	Computers, Environment and Urban Systems	USA	English	2	351	0.38	68.84
65	14	Computer	USA	English	2	353	0.38	69.22
66	14	CalTech Library	USA	English	2	355	0.38	69.60
67	14	California Digital Library	USA	English	2	357	0.38	69.98
68	14	Australian Academic and Research Libraries	Australia	English	2	359	0.38	70.36
69	14	Archival Issues	USA	English	2	361	0.38	70.74
70	14	ARL bimonthly report	USA	English	2	363	0.38	71.12
71	14	Antimicrobial Agents and Chemotherapy	USA	English	2	365	0.38	71.50
72	14	American Archivist	USA	English	2	367	0.38	71.88
73	15	Technical services quarterly	USA	English	1	368	0.19	72.07
74	15	Information management journal	USA	English	1	369	0.19	72.26
75	15	Information services and use	USA	English	1	370	0.19	72.45
76	15	Proceedings of the American society for information science & technology	USA	English	1	371	0.19	72.64
77	15	Wired	USA	English	1	372	0.19	72.83
78	15	Water Science and Technology	UK	English	1	373	0.19	73.02
79	15	Washington center for improving the quality of undergraduate education newsletter	USA	English	1	374	0.19	73.21
80	15	Transinformaçã	Brazil	Portugues e	1	375	0.19	73.40
81	15	Time	USA	English	1	376	0.19	73.59
82	15	The open nuclear and particle journal	USA	English	1	377	0.19	73.78
83	15	The huffington post	USA	English	1	378	0.19	73.97
84	15	The Economic Journal	UK	English	1	379	0.19	74.16
85	15	The Computer Journal	UK	English	1	380	0.19	74.35
86	15	The Charleston Advisor	USA	English	1	381	0.19	74.54
87	15	The book paper group annual	USA	English	1	382	0.19	74.73
88	15	The Atlantic	USA	English	1	383	0.19	74.92
89	15	Tennessee libraries	USA	English	1	384	0.19	75.11
90	15	Technical Communication Quarterly	UK	English	1	385	0.19	75.30
91	15	Teacher Librarian	USA	English	1	386	0.19	75.49
92	15	Taxonomy	Marylan d	English	1	387	0.19	75.68
93	15	Systems Research and Behavioral Science	UK	English	1	388	0.19	75.87
94	15	Studies in Higher Education	UK	English	1	389	0.19	76.06
95	15	Speculations in Science and Technology	USA	English	1	390	0.19	76.25
96	15	Sociological Inquiry	USA	English	1	391	0.19	76.44
97	15	ScieCom Info	USA	English	1	392	0.19	76.63
98	15	School Library Journal	USA	English	1	393	0.19	76.82
99	15	Saturday Review of Literature	USA	English	1	394	0.19	77.01
100	15	Revue Française d'Allergologie et d'Immunologie Clinique	USA	French	1	395	0.19	77.20
101	15	Revista de Pesquisa e Pós-Graduação, Erechim	Brazil	Portugues e	1	396	0.19	77.39
102	15	Review of the Royal Spanish Academy of Sciences, Series A, Mathematics I	Spain	English	1	397	0.19	77.58

103	15	Public Library of Science Biology	UK	English	1	398	0.19	77.77
104	15	Public libraries	USA	English	1	399	0.19	77.96
105	15	Progressive Librarian	USA	English	1	400	0.19	78.15
106	15	Program: Electronic Library & Information Systems	UK	English	1	401	0.19	78.34
107	15	Profession	USA	English	1	402	0.19	78.53
108	15	PC World	USA	English	1	403	0.19	78.72
109	15	Papers from Portico	USA	English	1	404	0.19	78.91
110	15	Otolaryngology – Head and Neck Surgery	USA	English	1	405	0.19	79.10
111	15	Organizational Research Methods	USA	English	1	406	0.19	79.29
112	15	Online & CD-ROM Review	UK	English	1	407	0.19	78.48
113	15	On the Horizon	UK	English	1	408	0.19	79.67
114	15	North Carolina Libraries	USA	English	1	409	0.19	79.86
115	15	Nippon Ganka Gakkai Zasshi	Japan	English	1	410	0.19	80.05
116	15	New journal of physics	USA	English	1	411	0.19	80.24
117	15	Nature Reviews Genetics	UK	English	1	412	0.19	80.43
118	15	Mycotaxon	USA	English	1	413	0.19	80.62
119	15	Mississippi Libraries	USA	English	1	414	0.19	80.81
120	15	Microform & Imaging Review	USA	English	1	415	0.19	81.00
121	15	Microbial Drug Resistance: Mechanisms, Epidemiology and Disease	USA	English	1	416	0.19	81.19
122	15	Long range planning	Austria	English	1	417	0.19	81.38
123	15	Libri	USA	English	1	418	0.19	81.57
124	15	Library Serials	USA	English	1	419	0.19	81.76
125	15	Library Review	UK	English	1	420	0.19	81.95
126	15	Library quarterly	USA	English	1	421	0.19	82.14
127	15	Library of Congress, Washington, DC	USA	English	1	422	0.19	82.33
128	15	Library of Congress Information Bulletin	USA	English	1	423	0.19	82.52
129	15	Library Management	UK	English	1	424	0.19	82.71
130	15	Library Journal Net Connect	USA	English	1	425	0.19	82.90
131	15	Libraries & Culture	USA	English	1	426	0.19	83.09
132	15	Lecture notes in computer science	UK	English	1	427	0.19	83.28
133	15	Law & Social Inquiry	USA	English	1	428	0.19	83.47
134	15	Knowledge Quest	USA	English	1	429	0.19	83.66
135	15	Journal of digital information	USA	English	1	430	0.19	83.85
136	15	Journal of Zhejjan University Science	China	English	1	431	0.19	84.04
137	15	Journal of Women in Culture and Society	USA	English	1	432	0.19	84.23
138	15	Journal of Theoretical Biology	USA	English	1	433	0.19	84.42
139	15	Journal of the American Planning Association	USA	English	1	434	0.19	84.61
140	15	Journal of the American Medical Association	USA	English	1	435	0.19	84.80
141	15	Journal of Molecular Evolution	Germany	English	1	436	0.19	84.99
142	15	Journal of management information systems	USA	English	1	437	0.19	85.18
143	15	Journal of High Energy Physics	USA	English	1	438	0.19	85.37
144	15	Journal of Education for Library and Information Science	USA	English	1	439	0.19	85.56
145	15	Journal of Digital Libraries	UK	English	1	440	0.19	85.75
146	15	Journal of Computer-Mediated Communication	USA	English	1	441	0.19	85.94
147	15	Journal of Child Neurology	UK	English	1	442	0.19	86.13
148	15	Journal of business and finance librarianship	USA	English	1	443	0.19	86.32
149	15	Journal of Bacteriology	USA	English	1	444	0.19	86.51
150	15	Journal of Archival Organization	USA	English	1	445	0.19	86.70
151	15	IT Professional	UK	English	1	446	0.19	86.89

152	15	IT business Edge	USA	English	1	447	0.19	87.08
153	15	Issues in science and technology librarianship	USA	English	1	448	0.19	87.27
154	15	IRS interoperable repository statistics	UK	English	1	449	0.19	87.46
155	15	Inter-research ethics in science and environmental politics	Germany	English	1	450	0.19	87.65
156	15	Internet Reference Services Quarterly,	USA	English	1	451	0.19	87.84
157	15	International Journal on Digital Libraries	Netherland	English	1	452	0.19	88.03
158	15	International Journal of Geographic Information Science	UK	English	1	453	0.19	88.22
159	15	International Economic Papers	UK	English	1	454	0.19	88.41
160	15	International Digital Library Perspectives	UK	English	1	455	0.19	88.60
161	15	Interest research	USA	English	1	456	0.19	88.79
162	15	Interactions	USA	English	1	457	0.19	88.98
163	15	INSPEL	Germany	German	1	458	0.19	89.17
164	15	Innovations in Education and Teaching International	UK	English	1	459	0.19	89.36
165	15	Information Searcher	USA	English	1	460	0.19	89.55
166	15	Information review	UK	English	1	461	0.19	89.74
167	15	Information Retrieval and Library Automation	USA	English	1	462	0.19	89.93
168	15	Information research: An International Electronic journal	Sweden	English	1	463	0.19	90.12
169	15	Information Communication & Society	USA	English	1	464	0.19	90.31
170	15	Infection and Immunity	USA	English	1	465	0.19	90.50
171	15	Illinois Libraries	USA	English	1	466	0.19	90.69
172	15	IFLS Journal	Netherland	English	1	467	0.19	90.88
173	15	ICPSR Bulletin	USA	English	1	468	0.19	91.07
174	15	IBM Journal of Research and Development	USA	English	1	469	0.19	91.26
175	15	IASSIST Quarterly	UK	English	1	470	0.19	91.45
176	15	High Energy Physics Libraries Webzine	USA	English	1	471	0.19	91.64
177	15	Health Information and Libraries Journal	USA	English	1	472	0.19	91.83
178	15	Health Care Management Review	USA	English	1	473	0.19	92.02
179	15	GSLIS Alumni newsletter	USA	English	1	474	0.19	92.21
180	15	Government Information quarterly	USA	English	1	475	0.19	92.40
181	15	Expert Systems	USA	English	1	476	0.19	92.59
182	15	ETD-educacao tematica digital	Brazil	Portuguese	1	477	0.19	92.78
183	15	EMedia Professional	USA	English	1	478	0.19	92.97
184	15	Electronic Journal of Academic and Special Librarianship	Canada	English	1	479	0.19	93.16
185	15	Educause Quarterly	USA	English	1	480	0.19	93.35
186	15	Digital web magazine	USA	English	1	481	0.19	93.54
187	15	Current Opinion in Genetics & Development	USA	English	1	482	0.19	93.73
188	15	Computers in Physics	USA	English	1	483	0.19	93.92
189	15	Computers and Education	UK	English	1	484	0.19	94.11
190	15	Colorado Libraries	USA	English	1	485	0.19	94.30
191	15	Collection Building	UK	English	1	486	0.19	94.49
192	15	CNET news	Spain	English	1	487	0.19	94.68
193	15	CLIR report	USA	English	1	488	0.19	94.87
194	15	Campus-Wide Information Systems	UK	English	1	489	0.19	95.06
195	15	Business Week	USA	English	1	490	0.19	95.25
196	15	Bulletin of the Medical Library	USA	English	1	491	0.19	95.44

		Association						
197	15	British Journal of Educational Technology	USA	English	1	492	0.19	95.63
198	15	Boston Globe	USA	English	1	493	0.19	95.82
199	15	BMC Evolutionary Biology	UK	English	1	494	0.19	96.01
200	15	Black enterprise	USA	English	1	495	0.19	96.20
201	15	Biological Journal of the Linnean Society	USA	English	1	496	0.19	96.39
202	15	Belo Horizonte	India	English	1	497	0.19	96.58
203	15	Behavioral & Social Sciences Librarian	UK	English	1	498	0.19	96.77
204	15	Aslib	UK	English	1	499	0.19	96.96
205	15	Artificial Intelligence Review	Netherland	English	1	500	0.19	97.15
206	15	Archivos de Bronconeumologia	Spain	Spain	1	501	0.19	97.34
207	15	Archival science	UK	English	1	502	0.19	97.53
208	15	Annual Review of Phytopathology	USA	English	1	503	0.19	97.72
209	15	Annual Review of Microbiology	USA	English	1	504	0.19	97.91
210	15	American Journal of Botany	USA	English	1	505	0.19	98.10
211	15	American Antiquity	USA	English	1	506	0.19	98.29
212	15	ALISS Quarterly	UK	English	1	507	0.19	98.48
213	15	Against the Grain	UK	English	1	508	0.19	98.67
214	15	Acta Anaesthesiologica Scandinavica	USA	English	1	509	0.19	98.86
215	15	Acquisitions and technical services	USA	English	1	510	0.19	99.05
216	15	ACM Transactions on Computer Systems	USA	English	1	511	0.19	99.24
217	15	ACM SIGSOFT software engineering notes	USA	English	1	512	0.19	99.43
218	15	Abbey newsletter	USA	English	1	513	0.19	99.62
219	15	ACM SIGOPS Operating Systems Review	USA	English	1	514	0.19	99.81
220	15	ACM Computing Surveys	USA	English	1	515	0.19	100.00
						515		100.00

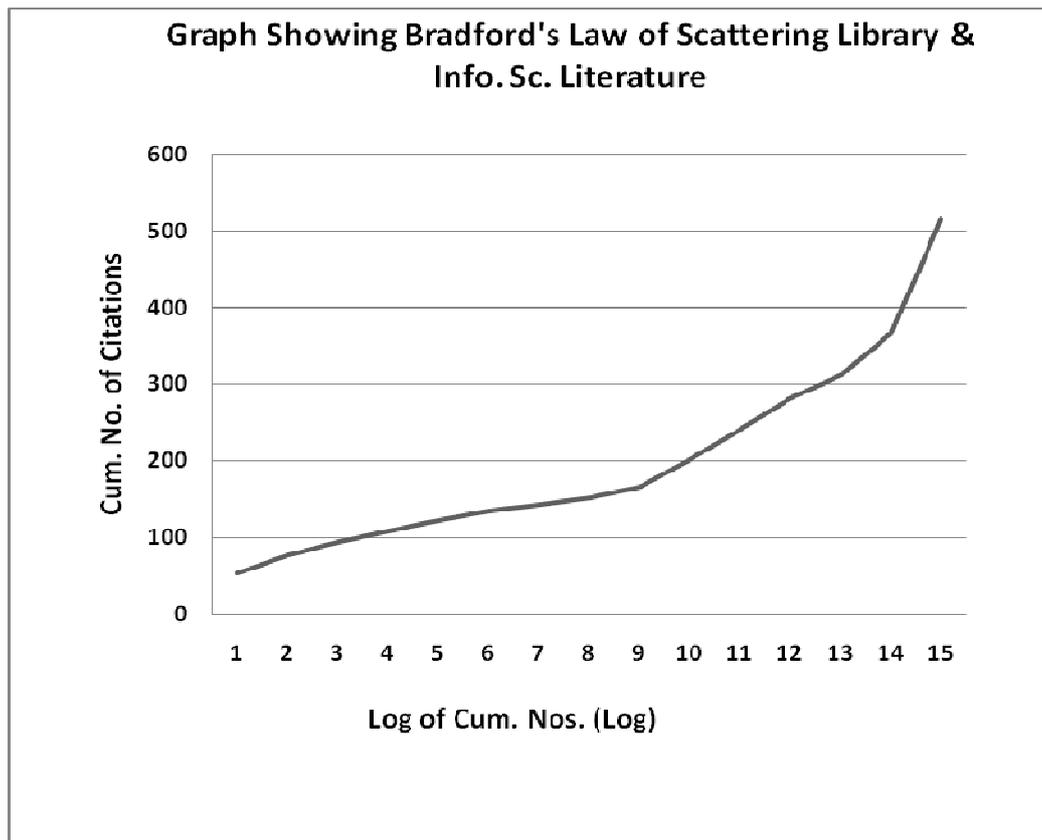
4.7 Bradford's Law of Scattering and pattern of Journal use by Library and Information Scientists

The graphical and verbal interpretation of Bradford's Law of Scattering is being applied to the literature of the journal *OCLC Systems and Services*. Table 8 shows journals arranged in decreasing frequency of citations. To testify the applicability of Bradford's Law of Scattering, a graph is plotted by taking the cumulative number of citations R(n) on the ordinate against the logarithm of cumulative journals log(n) on the abscissa. (Fig.1). It is observed that the resulting bibliography, initially starts with the rising as an exponential nature and then follows into a linear curve indicating the observance of Bradford's Law of Scattering.

Table 8
Distribution of Cited Journals by Decreasing Frequency of Citation OCLC Systems and Services

Cum. No. of Journals	Log of Cum. No.s log(n)	No. of Citations	Total No. of Citations	Cum. No. of Citations R(n)	% of Cum. No. of Citations	% of Cum. Journals
1	0	53	53	53	10.29	0.40
2	0.30	23	23	76	14.76	0.80
3	0.48	17	17	93	18.06	1.20
4	0.60	15	15	108	20.97	1.59
5	0.70	14	14	122	23.69	1.99
6	0.78	12	12	134	26.02	2.39
7	0.85	9	9	143	27.77	2.79
8	0.90	8	8	151	29.32	3.19
9	0.95	14	14	165	32.04	3.59
11	1.04	36	36	201	39.03	4.38

17	1.23	40	40	241	46.80	6.77
25	1.40	40	40	281	54.56	9.96
35	1.54	30	30	311	60.39	13.94
45	1.65	56	56	367	71.26	17.93
73	1.86	148	148	515	100.00	29.08
251	2.40	515	515			100.00



V. CONCLUSION

Following are some of the important findings of the study:

- a) Periodical articles are the major sources of information;
- b) The publications in English language are used maximum;
- c) Maximum number of citations are the publications from USA(64.56%).
- d) Among cited journals the journal D-Lib Magazine occupies the first rank; and
- e) Sole research is favored than that of collaborative research in the field of Library and Information Science.

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Use of information Resources and Services in City Central Library, Mysore and Branch Libraries

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Abstract- A Study on use of information resources and services of City Central Library and its branch libraries, Mysore , Karnataka State, India shows that majority of users were men between the age group of 16 – 25 years and they included unemployed graduates and students who visit the library daily. Most of the users are also member of the library. They got acquainted with the libraries through their friends and through mobile library services. They opine that the location of library and working hours are convenient to them. They visit the library for educational purpose. Most of the users spend 2 hours per day in the library. Short stories, adventure story books, biographies, sports literature and general books were the most frequently read information sources of interest to the users. Concludes that since majority of the users are students and unemployed youth, public libraries need to enrich their information resource collection, provide access to Internet and offer community-based services, including literary programs. Public libraries need to take proactive approach in motivating users to use these resources and services to enhance their competence level.

Index Terms- City Central Library, Branch Libraries, Use, Collection, Services, Karnataka, Mysore

I. INTRODUCTION

The public libraries are the potential social institution to mould the human resource and help to make it more productive and valuable by their information educational, cultural and recreational services. Unesco Public Library Manifesto (1994)⁽⁰³⁾ has made it clear that the public library is a local gateway to the world of knowledge, information and culture. It is a democratic social institution, which provides equal access to all the citizens. Further, it states that it should provide special services to those who are unable to make use of the regular services for whatever the reason.

“Public library is people’s university”. Public library is get open one and all irrespective of its access, cost, community, educated states, socio-economic background etc. It is support are community at large Karnataka Public Library Act-1965 provides for City Central Library in each city having more than 1 lakh population Mysore City Central Library starter early 19th century as a municipal library come empirical Karnataka Public Library System shone after the amalgamate the KPL Act in 1965. Seen in sauce this library in considers to be need from people in Mysore city after the permission new Act. Its activity is nearly main branch at open with in irrespective to serve larger population

people observed background visit this public library with different approaches there unemployed youth, educated class, business class, house wife, children all visit this library to see information of the requirement this study of information needs. Heterogeneaces group of user proved let main change to develop library collection improves library services incest new activity. Therefore present study popular to new the information need of different class of City Central Library.⁽⁰²⁾

City Central Library, Mysore

The City Central Library is a 92-year-old treasure house which has served as a ‘Bodhi’ tree for hundreds of knowledge seekers. The Library situated on Sayyaji Rao road houses a collection of over 55,000 rare books. It keeps adding new books every year with the Octroi funds of Rs 3,43,000 which it gets from the State Government and 6 per cent Library Cess from Mysore City Cooperation, which is about Rs. 80 to 85 lakhs. Established in 1915 during the reign of Nalvadi Krishnaraja Wadiyar, it was handed over to the Government during 1965, when the Public Library Act was passed. Presently, the library has 8 Branches, 11 Service Stations, 3 Reading Rooms and a Mobile Library. In total, it has over 8,88,896 books and 41,852 members. A Competitive Examination Centre was added to the library in 2009-10. One can become a member at the City Central Library by paying Rs 25, Rs 30, Rs 40 to borrow 1, 2 and 3 books respectively.⁽⁰¹⁾ The same card holds good to borrow books from the branches, service stations and mobile library.

Review of Literature

B. Yicmaz⁽⁰⁶⁾ reports results of a sociological and demographic study of public library users in Ankara, Turkey, in order to determine the level of public use and to isolate the factors affecting this usage. He conducted thorough survey of the history and statistics of Turkish public libraries. It is followed by the results of the user survey, employing the society survey method, involving 1800 users (aged 6 years and over) in 3 socioeconomic strata’s. The study took usage of the library as the dependent variable and demographic and socioeconomic properties (age, sex, marital status, educational level, occupation, income level and geographic past) as the independent variables. Other socioeconomic factors (social status and social role) were also considered.

L. Tabgen⁽⁰⁵⁾ reports on a survey of public library use in Trondheim, Sweden by immigrants published in 1995, in order to provide a foundation for introducing relevant initiatives to improve services. He also discusses the nature of the survey and how it was carried out and then outlines its findings in the areas

of level of use of the library, ways in which it is used, and user satisfaction.

Willard and Teece⁽⁰⁴⁾ have conducted a random sample survey of actual users of public library to determine the purpose of user's visit to the local public library. They found 50% of people visit the library to choose material by means of browsing while less than 20% to obtain a specific item or answer an information need.

II. OBJECTIVES OF THE STUDY

1. To know the personal background of users in City Central Library,
2. To understand the frequency of users visit to the public libraries.
3. To assess weather users are satisfied with the location of the libraries.
4. To know the popular magazines, competitive magazines, comics, news papers that the users are interested most and whether they are available in the public libraries.
5. To study weather the users in public libraries have adequate, natural and artificial light, ventilation, power supply, drinking water, sanitary facilities etc.
6. To find out weather the users in public libraries have adequate space to house books and facilitate reading,
7. To know weather-working hours of city central libraries and their branch libraries are convenient to the users.
8. To identify the subject areas of the book collection in city central libraries and branch libraries
9. To assess the opinion of libraries about the users library collection in city central libraries and branch libraries.
10. To study the extension services provided by city central libraries and branch libraries for users.
11. To study whether public libraries provide user orientation and extend assistance to public library users.

Need and Importance

However no effort is made to study the information use patterns of users of public library facilities in Mysore city. Therefore this study attempts to understand what type of information is needed by users of Mysore City Library. The study aims to understand the socio-economic, educational and occupational background of public library users. It studies users and the types of information, the purpose for which they look for information in the library.

Scope and Limitations

The scope of the study is limited to CCL and its branch libraries in Mysore city. The study covers all type of users irrespective of age, sex, education attainment, socio-economic status etc.

Methodology

It is a survey. A questionnaire was specifically designed to elicit the opinions of the users of public libraries in Mysore city and distributed to 1200 users of City Central Library and Branch Libraries on random basis. Out of 1200 questionnaires distributed, 835 filled questionnaires were received, individual response is 69.58%. The questionnaire contains questions related

to background information about the user, user information requirement, approaches to various types of information, opinion about the availability of required information in the public library, other means adopted for fulfilling required information etc

Distribution of Respondents by Age

Different age groups will have different interests in information they want and the approach of children, adults are also different; as they have varied interest in information they seek. The 835 respondents are categorized into 5 age groups as shown in Table 1.

Table 1
Age Group of Respondents

Sl. No	Age Group in Years	Number of Respondents	% Of total responses (n=835)
1	16-25	409	48.98
2	26-35	141	16.88
3	36-45	115	13.77
4	46-55	101	12.09
5	56(Above)	069	08.28
Total		835	100.00

The above table shows that among 835, the 409 (48.98%) respondents are between the age group of 16-25 years, 141 (16.88%) are between the age group of 26-35 years, 115 (13.77%) respondents are aged between 35-45 years, 101 (12.09%) respondents are 46-55 years of age and 69(08.28%) respondents are above 55years of age. So that, the majority of the users 409(48.98%) belonging to the age group of 16 to 25 years.

Educational qualification

Educational level of library user is another important criterion to determine user need. Hence information needs of low-level educated person is different to person with higher educational qualification, therefore data regarding educational qualification is presented in table 2.

Table 2
Educational Qualification of Respondents

Sl. No.	Qualification of Education	Number of Respondent	% Of total responses (n=835)
1	S.S.L.C.	124	14.99
2	Pre-University	189	22.83
3	Under-Graduates	339	40.79
4	Post-Graduates	183	21.39
Total		835	100.00

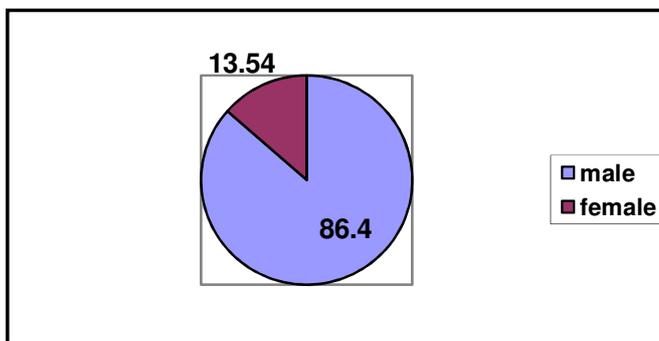
The above table shows that the different levels of education among the respondents. Among 835 respondents, those who have S.S.L.C are 124 representing 14.99%, 189 respondents are having Pre-University education and they represent 22.83%, 339 respondents have completed their under graduation and they represent 40.79% and 183 are Post-graduates representing 21.39%. The table shows that 40% of total respondents are Graduates.

	Department		
6	Agriculturists	37	04.43
7	Industrialists	33	03.96
8	Businessmen	33	03.96
Total		835	100.00

Gender Distribution

Gender of the library users is also considered as other criteria as there could be a difference in the reading interests between males and females. Therefore the information regarding gender of the users was obtained and is presented in the figure below.

Figure 2
The Gender wise division of the respondent



The above figure demonstrates that there are 722 male users, against 113 female users. They represent 86.46% and 13.54% respectively, thus it is observed that male users one more than female users.

Occupations of Users

The individual's occupation greatly influences not only information need but also information use. The employed person may use the library less where as an unemployed person use the library all the time. The interest of unemployed youth may be different from the employed person and from the information need. Therefore information relating to employed users and unemployed users and other types of users who usually use the public libraries is analyzed and presented in the table-3.

Table-3
Occupation of Respondents

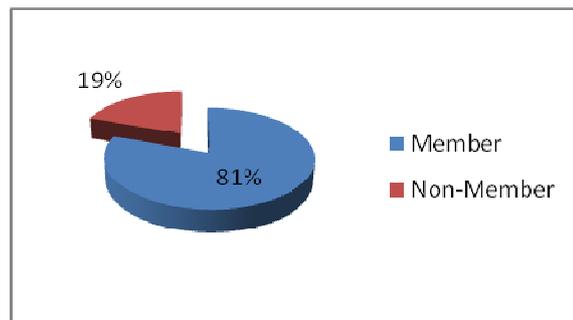
Sl.No.	Occupation	Number of Respondents	% Of total responses (n=835)
1	Students	324	38.80
2	Unemployed	175	20.95
3	Employment private section	83	09.94
4	House wives	82	09.82
5	Employed in Government	68	08.14

The above table shows that among 835 respondents, 324 are students, 175 are unemployed, 83 are private employees, 82 are housewives and 68 are employed in government departments. They represent, 38.8%, 20.95%, 09.94%, 09.82%, and 08.14% respectively. From the remaining 103 respondents, 37 are agriculturists, 33 are industrialists and 33 are businessmen. They represent 04.43%, 03.96%, and 03.96% respectively. The table also demonstrates the status of users who are coming from different occupation. The users are distributed in all categories. The number of unemployed is almost 21% of the total library users.

Membership to Public Library

As all the users of the public libraries may not be the member of the library, the respondents were asked to state whether they are the members of the public library or not. The same data is presented in the figure 3.

Figure 3
Membership of Public Library



The Figure shows that out of 835, 673 users are member of public library as against 162 are nonmembers. They represent 80.59% and 19.41% respectively.

Acquaintance with Library

Users come to know about the library through different sources. With this background data is obtained from the respondents the library about their source of acquaintance about the library. The table 4 presents data relating to this.

Table 4
Acquaintance with City Central & Branch Libraries.

Sl.No	Mode of Acquaintance	Number of Respondents	% Of total responses (n=835)
1	Through Friends	342	40.95
2	Mobile libraries moving around city	117	14.01

3	Radio & TV announcements	92	11.01
4	Through parents	80	09.58
5	Paper advertisement	62	07.42
6	Library news in local news papers	56	06.70
7	Through other sources	86	10.33
Total		835	100.00

It may be observed from the above table about 40.95% respondents could acquaint with libraries through introduction by their friends and nearly 14.01% users got acquaintance through Mobile Library service. There are about 11.01% of users that were inspired to acquaint with the library through Radio and TV announcements. About 9.58% of respondents could acquaint with libraries through the introduction by their parents. About 7.42% respondents became aware of the public library services through paper advertisements. While 54 respondents were influenced by library news in local news papers they representing 6.7%. There are 10.33% users who got acquaint with other sources.

Frequency of visit to the library

The frequency of library visit by the users may differ from one another depending upon the purpose they visit and distance of the library. The respondents were asked to provide information about the frequency of their visit to library. The responses received and analyzed and are presented in table-5.

Table 5
Frequency of visit to library by the users

Sl.No	Frequency Visit	Number of respondents	% Of total responses (n=835)
01	Daily	342	40.95
02	Twice in week	164	19.64
03	Thrice in week	103	12.33
04	Once in week	092	11.01
05	Once in fort night	083	09.90
06	Once in a month	027	03.24
07	Occasionally	024	02.89
Total		835	100.00

The Table 5 exhibits that 342 (40.95%) users visit library daily, 164 (19.64%) users visit library twice a week, 103 (12.33%) users visit library thrice in week, 92 (11.01%) users visit library once in week, 83 (9.94%) users visit library once in a fort night, 27 (3.24%) users visit library once in a month, 24 (2.89%) users visit library occasionally.

Infrastructural Facilities

The public libraries must have basic infrastructural facilities to attract its users. So the data is gathered about the

location, working hours, area of library building etc and the same is presented in the Table 6.

Table 6
User Opinion about Infrastructural Facilities of the Libraries

Sl.No	Infrastructural Facilities	User opinion	Number of Respondents (n=835)	% Of total responses
1.	Location of the Library	Centrally Located	539	64.55
		Not Centrally Located	224	26.83
		Not Responded	072	08.62
2	Working Hours	Convenient	689	82.51
		Not Convenient	146	17.49
3	Area of Library Building	Adequate	369	44.19
		Partially adequate	263	31.49
		Not adequate	203	24.32
4	Furniture and equipments	Adequate	314	37.60
		Partially Adequate	278	33.29
		Not Adequate	243	29.11

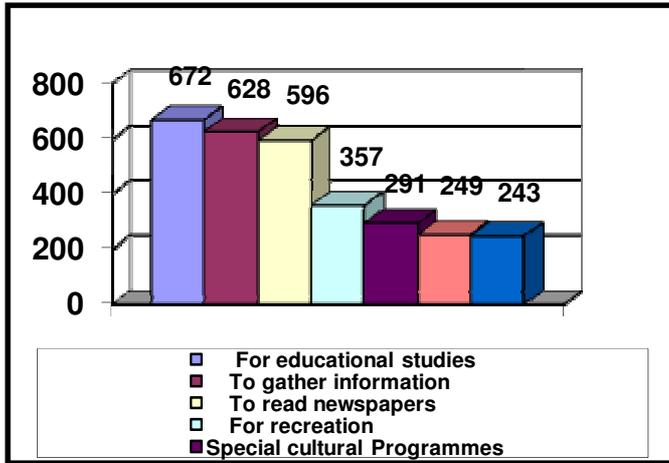
5	Browsing space for users	Adequate	452	54.13	<p>72(8.62%) respondents disagree to the view that the libraries they use are centrally located.</p> <p>The table also shows that there is 689 users representing 82.51% find the working hours convenient as against 146 users representing 17.49% who find it is not convenient. The working hours of city central libraries and branch libraries seem to be convenient to larger public.</p> <p>The table shows that about 44.19% of respondents contended that the space provided in the library for different purposes is adequate and about 31.49% respondents contend that the space is partially adequate, whereas about 24.32% respondents opinion that the space is inadequate.</p> <p>The table shows that 835 respondents have expressed their opinion about the adequacy of furniture. Out of total of 835 who have responded to the specific question 314 (37.60%) contend that the furniture's in their libraries are adequate, whereas 243 (29.11%) of the total feel that the furniture's are insufficient and adequate in their libraries. There are 278 respondents representing 33.29 % of the total who have expressed that the furniture's in their library are partially adequate. Thus 243 users' libraries have not equipped with adequate furniture.</p> <p>The table shows that about 54.13% respondents contended that the browsing space for users is adequate as against 30.89% who feel that the space is not adequate. There are nearly 14.97% respondents who have not indicated their opinion.</p> <p>Table 6 exhibits that for 474 respondents, out of 835, representing 56.76% of the total expressed that the libraries they use have adequate natural light and ventilation against 152 (18.22%) respondents who have responded negatively. There are 209 (25.02%) respondents who contended that the natural light and ventilation in their libraries is partially adequate.</p> <p>The table shows that around 41% users are of the opinion that the electric fans facility provided in the library is adequate against 34.62% of respondents who contended that this facility is inadequate. Of the remaining 24.79% respondents feel that the facility is partially adequate.</p> <p>The table shows that around 28% of users opined that the water facility in libraries is adequate against 46.36% respondents who say that there is no water supply facility and 25.26% contended that the water supply is partially adequate. Thus, the water supply facility in libraries seems to be very poor.</p> <p>The Table shows that about 33.17% respondents express that there is a provision of adequate vehicle parking space against 49.35% respondents who say that there is inadequate space for parking vehicles. About the 17.48% users have expressed that the parking space exists but not adequate.</p>
		Not Adequate	258	30.89	
		Not Responded	125	14.97	
6	Natural Light and Ventilation	Adequate	474	56.76	
		Partially adequate	209	25.02	
		Not adequate	152	18.22	
7	Electric Fans	Adequate	339	40.59	
		Partially adequate	207	24.79	
		Inadequate	289	34.62	
8	Drinking Water Facility	Adequate	237	28.38	
		Partially adequate	211	25.26	
		Not adequate	387	46.36	
9	Parking space for Vehicles	Exists & adequate	277	33.17	
		Exists but not adequate	146	17.48	
		Does not exist	412	49.35	

The table exhibits that out of 835 total respondents 539 (64.55%) contend that the libraries they use are centrally located whereas 224 (26.83%) respondents partially agree that the libraries they use are housed in central place. However

Purpose of Visit to the Library

Users visit libraries for different purposes. The data so obtained is analyzed and presented in figure 4.

Figure 4
Purpose of Library Visit by the Users



The Figure 4 shows that large number of users that they visit libraries for educational studies. They account for 80.47% (672 respondents) of the total. The second important purpose for which most of the users visit libraries is to obtain information on various aspects of their interest. They are 628 in number accounting for 75.20% of the total. There are 71.37% users who visit libraries for reading newspapers and about 42.75% users visit libraries for recreation purposes. Those who visit libraries for attending special cultural programmes are 291 (34.85%), they are 249 users representing 29.82% of the total visiting the library to meet total visiting the library to meet their friends. 243 users around 29.10% visit library for borrowing books. Majority (80.47%) of the users visit the library for educational studies regarding current events.

Hours of Spending in the Library

The serious users normally stay in library for longer hours. To trace the time period spent in library during every visit by the users the data is sought. The responses received are analyzed and presented in table-7.

Table 7
Duration of Time Spent in the Library by the Respondents

Sl. No.	Duration Per Day	Number of Respondents	% Of total responses (n=835)
1	Two hours	195	23.35
2	Three hours	179	21.43
3	Four hours	166	19.88
4	One hour	132	15.80
5	Five hours	98	11.73
6	More then five hours	65	07.81
Total		835	100.00

The table 23 shows that most of users spend on an average two hour per day in libraries. They account for 23.35% of total respondents. There are about 21.43% users who spent three hours per day in libraries. Another 19.88% respondents spend in the library four hours per day. There are 15.80% respondents spend one hour per day. There are 11.73% users who use library for five hours per day, remaining 7.81% respondents spend in the library more then five hours per day.

Reading Interests Among Users

To know the type of documents that the users are interested in reading, the researcher has identified 18 varieties of documents and asked the users to indicate their priorities. The data obtained from respondents is tabulated and presented in table 8 where in the type of documents are arranged in the descending order of preference by users using public libraries.

Table 8
Reading Interest among User

Sl. No	Variety of books of interest	Number of respondents	% Of total responses (n=835)
01	Short stories	588	70.41
02	Adventure stories	572	68.50
03	Biography	519	62.15
04	Sports literature	483	57.84
05	General books	477	57.12
06	Poetry	384	45.98
07	Sacred stories	357	42.75
08	Tours & travels	305	36.05
09	Text books	284	34.01
10	Detective	279	33.41
11	Fiction	187	22.39
12	Riddles	163	19.52
13	Historical document	159	19.04
14	Social literature	148	17.72
15	Philosophy	137	16.40
16	Folk literature	129	15.44
17	Religious books	113	13.53
18	Mythological documents	97	11.61
19	Others	69	08.26

The table 8 exhibits that as many as 70.41% respondents are interested in reading short stories. This is followed by adventure stories where in 68.50% users respectively are interested. Biographies occupy third place and they are followed by sports literature and general books. The number of users interested in these documents account for 62.15%, 57.84% and 57.12% respectively. There are about 45.98% and 42.75% respondents interested in poetry and users interested in sacred stories and 42.52% user are interested in tours and travels books. Those users who are interested in text books, detective books, fiction, riddles, historical documents and social literature account for 34.01%, 33.41%, 22.39%, 19.52%, 19.04% and 17.72% respectively. There are 137 (16.40%) and 129 (15.44%) users who are interested in philosophy and folk literature. Those who are interested in religious books and mythological documents account for 13.53% and 11.61% respectively. There are 69 users representing 8.26% of the total respondents who are interested in drawing, painting art and sculpture books.

Availability of Books, Newspapers and Magazines of Interest

Books, news papers and popular magazines are important sources of information for users. Today’s users read books, news papers and magazines regularly to update their knowledge and to keep themselves up to date with the day-to-day happenings. To know the opinion of the users about availability of books of their interest, newspapers and magazines in their libraries the information is sought and is presented in the table 9.

Table 9

Availability of Books, Newspapers and Popular Magazines of their Interest in the library

	User Opinion	Number of respondents	% Of total responses (n=835)
Books	Available	372	44.55
	Partially available	270	32.36
	Not available	192	22.99
Newspapers & Magazines	Partially Available	326	39.04
	Available	233	27.90
	Not Available	276	33.06

The Table 9 shows that there are about 44.55% users who express that the books of their interest are available in the library against 32.36% of user who positively express the partially availability their interested books. There are 22.99% users who expressed negatively about the not availability of books. Thus it may be inferred that in majority of libraries, the books of interest and useful to the users are available. The table also exhibits that there are 39.04% users who opinion that the newspapers and magazines required by the partially available in public libraries, as against 33.06% users who express that the required

newspapers and magazines are not available in the public libraries. There are 27.9% users who expressed that required news papers/magazines are available in public libraries.

Availability of Non-Book Materials and Other Facilities

Users enjoy using different forms of information sources and therefore, libraries need to possess information available in different forms. It is to know the opinion of users about the forms of documents other than books and other facilities that are available or not available and the desirability of having different forms of information sources in different public libraries, information is sought and the same is presented in table 10 the availability of non-book materials in city central libraries and branch libraries as opinion by users respondents.

Table 10
Availability of Non-Book Materials

Sl. No.	Documents/ Materials	Number of respondents	% Of total responses (n=835)
1	Pictures/Maps	288	34.49
2	Photos/Portraits	222	26.59
3	T.V	213	25.50
4	CD-ROM	120	14.37
5	Video	102	12.22
6	Computers	99	11.86
7	Discs	93	11.14
8	Micro film	90	10.78
9	Microfiche	76	09.10

Among different forms of the non-book materials, picture/maps and photos/portraits seems to be available in moderate number in some libraries. The number of users responded positively about the availability of these non-book materials accounts for 34.49% and 26.59% respectively. There are about 25.50% users who opinion positively about the availability of TV. Those users who express positively about the availability of CD-ROM, Video, Computers, Discs, Microfilm and Microfiche account 14.37%, 12.22%, 11.86%, 11.14%, 10.78% and 9.10% respectively.

User Opinion about users interests in using Popular Magazines and Newspapers in Public Libraries

The libraries are supposed to procure documents in accordance with the needs of users. Not only the libraries need to procure books but also procure popular magazines and newspapers to the users easily and timely for their use. To find out the users interests in using magazines and newspapers investigator obtained the opinion of user’s interest in using in the libraries. The table 11 presents data relating to the opinion of users about their use of popular magazines and newspapers in respective public library that they use.

Table 11
User Opinion about Use of Popular Magazines and Newspapers in Public Libraries

Sl.No	Magazines	Number of respondents	% Of total responses (n=835)	Sl. No	Newspapers	Number of respondents	% Of total responses (n=835)
01	Taranga	558	66.82	01	Prajavani	680	81.43
02	Sudha	496	59.40	02	Vijayakarnataka	543	65.02
03	Vara Patrike	312	37.36	03	Kannada Prabha	512	61.31
04	Lankesh Patrike	236	28.26	04	Samyakta Karnataka	497	59.52
05	Mangala	236	28.26	05	Indian express	436	52.21
06	The Week	228	27.30	06	Deccan Herald	397	47.54
07	India Today	204	24.43	07	The times of India	383	45.86
08	Prapancha	196	23.47	08	The Hindu	367	43.95
09	The Sport Star	194	23.23	09	Udayavani	332	39.76
10	Filmfare	189	22.63	10	Andolana	313	37.48
11	Prajamatha	173	20.71	11	Star of Mysore	297	35.56
12	Mallige	173	20.71	12	Munjane	263	31.49
13	Deepavali special	164	19.64	13	Sanjevani	211	25.26
14	Frontline	159	19.04	14	Others	184	22.03
15	Blitz	113	13.53				
16	Kasturi	70	8.38				
17	Sangathi	58	6.94				
18	Others	42	5.02				

Sanjevani is poor, they account for 37.48%, 35.56%, 31.49% and 25.26% respectively.

The table 9 shows that Taranga is listed at the top in which more than 66.82% users are interested. This is followed by Sudha, Varapatrike, Lankesh Patrike and Mangala in which 59.40%, 39.37% 28.26% and 28.26% users are interest. There are 27.30% users who are interested in The Week and 24.43% users who are interested in India Today. Those users who are interested in reading Prapancha, Sport, Filmfare, Prajamatha and Mallige account for 23.47%, 23.23%, 22.63%, 20.71% and 20.71% respectively. While Deepavali Special is preferred by 19.64% users Frontline and Blitz are read by 19.04% and 13.53% users respectively. The magazines Kasturi, Sangathi and others is preferred by least number of users as they account for 08.38%, 6.94% and 5.02% users respectively.

The table also reveals that the Prajavani, Vijayakarnataka, kannada Prabha, Samyukta Karnataka, Indian express and Deccan Herald are used by majority of users. The number of users who responded positively about the use of these dailies account for 81.43%, 65.02%, 61.31%, 59.52%, 52.21% and 47.54% respectively. The other dailies such as The Times of India, The Hindu, and Udayavani are being used by 45.86%, 43.95%, and 39.76% respectively. The response of public regarding the availability of Andolana, Star of Mysore, Munjane,

Availability of Public's Most Interested Books in Libraries

The opinion of public about the availability of their interested books in the public libraries is sought and presented in table 12.

Table-12
Availability of Most interested titles of Books in libraries

Sl.No	Availability	Number of respondents	% Of total responses (n=835)
01	To great extent	392	46.94
02	To some extent	384	45.98
03	Not available	59	07.08
Total		835	100.00

The Table 10 shows that 46.94% of the public respondents are of opinion that books that are interested most are available to great extent whereas 45.98% of public opinioned that the books that the books that they most interested are available in public

libraries to some extent. There are 7.08% respondents who contend that their interested books are not available in the libraries.

Interest in Reading Latest Publications

Users normally will have the urge to read, see new books. It is to know the opinion of the users whether they are interested in reading latest publications, information has been sought and the same is presented in table 13.

Table 13
Users Interest in Reading Latest Publication

Sl.No	Opinion about new publications	Number of respondents	% Of total responses (n=835)
1	Have Interest	741	88.74
2	Do Not have interest	94	11.26
Total		835	100.00

The Table exhibits that nearly 88.74% users are of the opinion that they are interested in reading latest publications. Only about 11.26% users seem to have no interest in reading latest books. Those users who expressed negatively are very small in number and therefore, it may be inferred that large majority of users are interested in reading latest publications.

Addition of New Books to Libraries

Libraries need to have live collections and the collection be developed continuously. The library that does not add user new books from time, majority of user are interested in latest publications. If the public libraries add new and relevant publication continuously, do serve as real centers of libraries, add new users books to their collection from time to time, information is sought and the same is presented in table 14.

Table 14
Addition of New Books of Libraries

Sl.No	User Opinion	Number of respondents	% Of total responses (n=835)
01	New books are added	334	40.00
02	New books are not added	304	36.40
03	Partially New books are added	177	23.60
Total		835	100.00

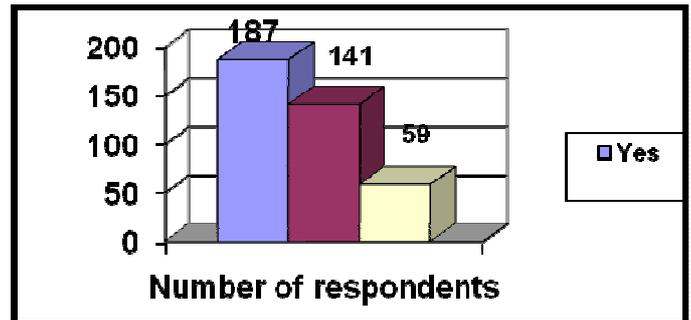
The Table exhibits that only about 40.00% users are of the opinion that the libraries do add to new users books to their collection. Against this almost equal number (36.40%) expressed negatively and nearly about 23.60% users expressed that the

libraries add new books partially, that means some libraries do acquire and add publications but with reasonable gap of time.

Consideration of Requests of Users for Addition of Books to Library

The Figure 5 presents weather or not the suggestions made by users for the addition of books are considered.

Figure 5
Consideration of requests of users for addition of books to Library



It may be observed from the Figure that out 387 users who requested for addition of their books of interests to the libraries, 187 (48.32%) users that their requests have been considered by the libraries. Against this, 141 (36.43%) users state that their requests were considered by libraries in procuring required books. There are another 59 (15.25%) users who have expressed that their suggestions for procuring books were considered by their libraries partially.

Means of Getting Needed Books

Other than the library, there are different sources that the users can obtain needed books for reading purposes. Information is therefore sought from users as to where from the users obtain needed books for reading purposes. The information so sought is presented in table 15.

Table 15
Means of Getting Needed Books

Sl.No	Source	Number of respondents	% Of total responses (n=835)
1	Borrow from other private libraries	476	57.01
2	Borrow from friends	285	34.13
3	Buying for yourself	74	08.86
Total		835	100.00

The table shows that while 57.01% users borrow from private libraries, 34.13% users borrow from friends and 08.86% users buy books for themselves. Thus users not only depend upon the public library to meet their requirement of books but

also get required books from private libraries, their friends and self purchase.

Subject/Items Published in Newspapers/Magazines that are of Great Interest to the Users

It is to know the subjects of great interest to the users in news papers and magazines, their opinion is sought and presented in table 16.

Table 16
Subjects/Items in Newspapers/Magazines that are of Great Interest to Users

Sl.No	Subject/Items	Number of respondents	% Of total responses (n=835)
1	Politics	653	78.20
2	Films	516	61.80
3	Entertainment	477	57.13
4	Sport news	417	49.94
5	Comedy	390	46.70
6	Regional/National/International news	363	43.47
7	Specials news	357	42.25
8	Crimes	339	40.60
9	Employment news	336	40.24
10	Children's column	297	35.57
11	Advertisement	294	35.20
12	Cr Crossword competition	270	32.34
13	S Science & Technology	249	29.82
14	Biogeography	237	28.38
15	Astrology	236	28.26
16	Agriculture	213	25.51
17	Women's section	210	25.15
18	Sunday special	180	21.56
19	Poems	180	21.56
20	Center page articles	174	20.84
21	Short stories	144	17.25
22	Book review	129	15.45
23	Editorial	126	15.09
24	Religious subject	120	14.01
25	Serials	117	14.01
26	Weather report	90	10.78
27	Tourism	87	10.42
28	Readers forum	57	06.83

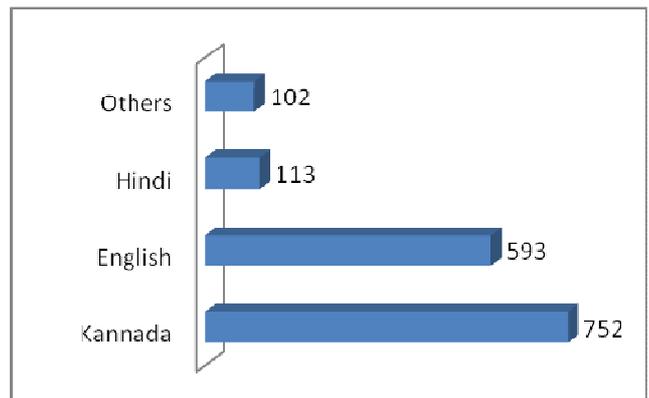
The table 16 shows those who are greatly interested in politics are 78.2% as against 61.80% who are greatly interested in films. Those who are greatly interested in entertainment, sport news, comedy, regional/national/international news, specials news and crimes account for 57.13%, 49.94%, 46.70%, 43.47%,

42.25% and 40.60% respectively. There are 40.24% users who are interested in employment news. Those who are interested in children's column, advertisement, crossword competition, science & technology, biography, astrology, agriculture and women's section account for 35.57%, 35.20%, 32.34%, 29.82%, 28.38%, 28.26%, 25.51% and 25.15% respectively. There are 21.56% users who are greatly interested in Sunday special and poems. Those who are interested in center page articles, short stories, book review, editorial, religious subject, serials and weather report account for 20.84%, 17.25%, 15.45%, 15.09%, 14.37%, 14.01% and 10.78% respectively. There are 10.42% and 06.83% interested in tourism and readers forum respectively.

Language-wise Preference of Reading Materials by Users

Since the investigator covers users in cities/towns as well as taluk places spread over different regions of Karnataka State, he found it appropriate to know users with different language-wise preference of reading materials. The opinion of user is presented in figure 6.

Figure 6
Language-wise Preference of Books/reading Materials by Users



The figure shows that out of 835 users, 752 representing 90.06% prefer to read Kannada reading materials. There are 71.02% users who prefer documents published in English language. Those who prefer documents in Hindi language account for 13.53% respectively. There are about 12.22% users who prefer documents in other languages, such as Tamil, Telugu, Urdu and Others.

Easy identification or location of Books

It is to know weather the users can easily identify and locate the books of choice in the library. Their opinions have been sought and the same is presented in table 17.

Table 17
Opinion of Users About Easy Identification of Books

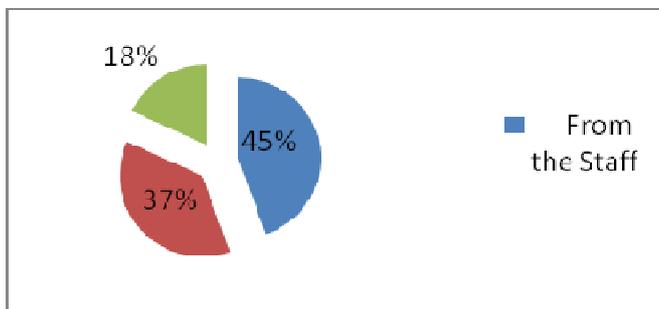
Sl.No	Opinion	Number of respondents	% Of total responses n=(835)
1	Books can be easily located	417	49.94
2	Partially books can be easily located	276	33.05
3	Books are not easily located	142	17.01
Total		835	100.00

The table 21 reveals that there are 49.94% users who identify books in the library easily, whereas 33.05% users could partially identify required books and 17.01% users could not identify required books easily.

Guidance in Consulting the Library Resources

More often, the staff within the library plays a major role in providing guidance to its users. It is to know the sources of help received by users from the librarians and library staff and others in searching the library resources, information was sought from the users' respondents and the same is presented in figure 7.

Figure 7
Guidance in consulting the library resources



The figure exhibits that the librarians and library staff are the major source of guidance to users within the library to located and use different sources of information over 44.55% users opine that they received guidance from the library staff. There are 37.37% users who opine that friends guided them in consulting books within the library. Users are normally accompanied by their parents/guardians while visiting library. About 18.08% of users express that their parents/guardians have been providing guidance and assistance to them in consulting resources in the libraries.

Organization of Reference Sources

Opinion of users was sought about the organization of reference collection and services. The opinion sought are analyzed and presented in the table-18.

Table 18
Organization of reference sources and services

Sl.No	Opinion	Number of Respondents	% Of total responses (n=835)
1	Organized well	592	70.90
2	Not organized well	243	29.10
Total		835	100.00

The table 22 shows that there are 592 respondents representing 70.90% of the total 835 who have express positive opinion about the organization of reference collection. Whereas remaining 243 respondents representing 29.10% have replied negatively.

Orientation to Users

Primary orientation about the library, its sources and services, rules and regulations, do's and don'ts help user to make optimum use of library resources or service should be given to the users. Opinion of users is therefore sought to know weather librarians have provided orientation to the users in the beginning for locating the documents, searching information and knowing about the facts in the library. The opinion so sought it presented in table 19.

Table 19
Opinion of Users About Library Orientation

Sl. No	Opinion	Number of respondents	% Of total responses (n=835)
1	Orientation is given	336	40.24
2	Orientation is Not given	499	57.76
Total		835	100.00

Out of 835 users, 336 users representing 40.24% of the total who have responded positively, against 499 (57.76%) users who have opined negatively about the orientation by the librarians for beginners.

Type of Special Programs that the Users are interested

As Public libraries conduct different special programs the responses about user's interest were collected in this regard. The responses are given in table-20.

Table 20
Interest in special programme by the respondents

Sl.No	Programs	Number of Respondents	% Of total responses (n=835)
1	Debate	472	56.53
2	Book exhibition	431	51.62
3	Special Lectures	423	50.66
4	Talk-exhibition	290	34.73
5	Art Exhibitions	249	29.82
6	Movies	208	24.91
7	Photo Exhibition	103	12.34

Table shows that there are 472 respondents represent 56.53% are interested in debate, 431 (51.62%) are interested in book exhibition, 423 (50.66%) have interest in special lectures, 290 (34.73%) are interested of in talk exhibition about employment. 249 (29.82%) respondents show interest in art exhibitions, 208 (24.91%) respondent are interested in movies, 103 (12.34%) respondent are interested in photo exhibition.

Opinion of users about Library Staff

The user is asked to give the opinion in general about library staff. The opinion given is represented in table 21.

Table 21
Opinion about the Library Staff by the Respondent

Sl.No	Opinion	Number of Respondents	% Of total responses (n=835)
1	Co-operative & helpful	464	55.56
2	Co-operative but not helpful	305	36.52
3	Neither co-operative not helpful	66	07.92
Total		835	100.00

The Table shows that there are 464 respondents who opined (55.56%) that the library staffs are co-operative. And helpful 305 (36.52%) content that the co-operative but not helpful, remaining 66 (07.92%) say they are neither co-operative not helpful.

III. CONCLUSION

Majority of users of CCL and its branch libraries in Mysore are within age group of 11-25 years and visit library daily. Majority of them are students, and unemployed youth. They spend two per day in the library. Since majority of the users are students and unemployed youth public libraries needs to enrich their information resource collection. Public libraries need to take proactive approach in motivating users to use their resources and service to enhance their competence.

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Power consumed in Delta Connection

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Abstract- The power consumed in delta connected load is considered as $\sqrt{3}/V_L \cdot I_L$ with power factor as unity. The power measured by the watt meter also confirms this value. But analysis indicate that the power consumed by a load in delta connection is 18.75% more than what is normally believed. This unaccounted power may be getting unknowingly booked to reduce efficiencies of loads and systems.

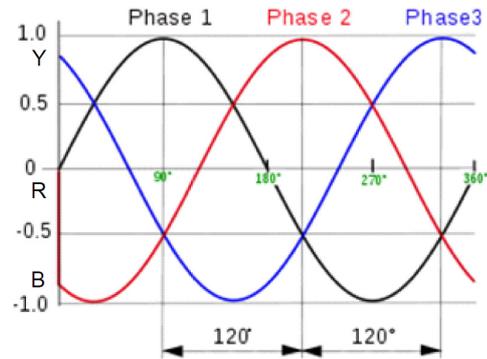
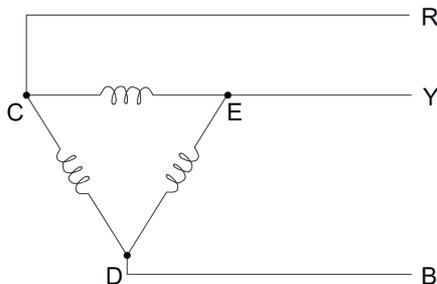
Index Terms- Delta connection, rms current, heat generation.

I. INTRODUCTION

In addition, the published research work also provides a big weight-age to get admissions in reputed varsity. Now, here we enlist the proven steps to publish the research paper in a journal. The three phase system can be considered as consisting of branches carrying positive and a negative currents. As per the Kirchoff's law, the sum of all the currents in a circuit should be always zero. It means that the positive and the negative currents will be always equal. When one line is conducting a positive current, second line alone or along with third line will carry return current to the generating station. From the following analysis, it will be seen that current carried by a phase of a load is $\frac{\sqrt{3}}{2} I$ for 0 to $\frac{2\pi}{3}$ and zero from $\frac{2\pi}{3}$ to π . This gives higher heat generation than the normally assumed.

The current in delta connection is assumed to be $\frac{1}{\sqrt{3}}$ of line current. The power consumed by delta connected load is worked out accordingly and is considered as $\sqrt{3} / V_L \cdot I_L \cos \phi$ where V_L, I_L & $\cos \phi$ have their usual meaning but the following analysis gives a different result.

In the delta system, the phase voltage is same as line voltage and the phase current is $\frac{1}{\sqrt{3}}$ of line current, I



Consider phase R, Y & B connected to a delta load. The flow of current can be understood from the behavior of d.c. When the current in R phase starts flowing from 0, Y is positive and equal to $\frac{\sqrt{3}}{2} I$ or 0.866I and B, ahead of R by 240° , is negative with value equivalent to $-\frac{\sqrt{3}}{2} I$ or -0.866I. The current of R phase will find a return path via phase B up to 60° when Y will be zero and change its sign. From 60° to 120° the current of phase R will be shared by phases Y & B and the current of phase R after 120° will be totally carried by phase Y. The return line current of phase R after 60° will get divided as phase currents in phase Y & B.

As far as phase CD of load is concerned, the current flows as a sine wave from the phase 'R' up to 60° . Thereafter from 60° to 120° will follow Sine wave corresponding to phase B.

II. CURRENT FLOW

1. The rms current flowing through phase CD up to 60° is worked out as under:-

$$\begin{aligned}
 i &= I \sin \theta \\
 I_{rms}^2 &= \frac{I^2}{\pi/3} \int_0^{\pi/3} \sin^2 \theta \cdot d\theta \\
 &= \frac{I^2}{\pi/3} \left[\frac{\theta}{2} - \frac{\sin 2\theta}{4} \right]_{0}^{\pi/3} \\
 &= \frac{I^2}{\pi/3} \left[\frac{\pi/3}{2} - \frac{\sin 2\pi/3}{4} \right] \\
 I_{rms}^2 &= 0.29 I^2 \\
 I_{rms} &= 0.54 I \quad \dots\dots\dots (1)
 \end{aligned}$$

2. RMS current from 60° to 120°

$$= I^2 \int_{\pi/3}^{2\pi/3} \sin^2 (\theta + 240^\circ) d\theta$$

$$= \left[\frac{\theta + \frac{2\pi}{3}}{2} - \frac{\sin 2\theta (\theta + \frac{2\pi}{3})}{4} \right] \frac{2\pi}{3}$$

$$I_{rms}^2 = 0.29I^2$$

$$I_{rms} = 0.54 I \text{ same as in (1) above}$$

3. No current will flow in phase CD from $\frac{2\pi}{3}$ to π
 i. The heat generated in the half cycle, current

flowing for $\frac{2}{3}$ rd of the time.

$$= (0.54)^2 \cdot I^2 \cdot r \times (\frac{2}{3}) / \text{phase}$$

$$= 0.19 I^2 \cdot r \dots \dots 'I' \text{ is the peak current \& 'r'}$$

is resistance per phase.

ii. Conventional heat generation:-

'I' & 'r' have the same meaning as above.

$$I_{rms} = \frac{I}{\sqrt{2}}$$

$$I_{\text{phase}} = \frac{I_{rms}}{\sqrt{3}}$$

$$= \frac{I}{\sqrt{2} \cdot \sqrt{3}} = \frac{I}{\sqrt{6}}$$

$$= 0.4 I$$

$$\text{Heat generated in half cycle} = (0.4)^2 \cdot I^2 \cdot r$$

$$= 0.16 I^2 \cdot r$$

The heat generated is $0.19I^2 \cdot r$ as against $0.16 I^2 \cdot r$ conventionally assumed. The heat generation is thus 18.75% more than normally assumed.

III. MEASUREMENT OF QUANTITIES

For measuring a current or voltage, an instrument peaks up the peak value of the alternating quantity. This value corresponds to the full scale deflection.

The maximum current the phase of load is $\frac{\sqrt{3}}{2}$ of the peak line current which is the value of $\sin 60^\circ$.

The rms value corresponding of this value is $\frac{\sqrt{3}}{2} \times \frac{1}{\sqrt{2}}$

This current flows for $\frac{2}{3}$ rd of the half cycle.

∴ The current recorded will be $\frac{\sqrt{3}}{2} \times \frac{1}{\sqrt{2}} \times \frac{2}{3}$ of IL

$$\frac{1}{\sqrt{3} \cdot \sqrt{2}} \text{ of IL or } 0.4 \text{ IL}$$

The measured current in phase will be $0.4I$ and the actual current will be $0.369 I$.

$0.369 I$ is $\frac{2}{3}$ rd of $0.54I$. The difference being small does not get noticed. But the difference in power consumed and power measured is substantial. The unaccounted power would get accounted as loss as T& D loss or loss in machines. Recognition of this difference will benefit the utility providers, designers and users equally.

IV. CONCLUSION

The relationship of phase current equals to $\frac{1}{\sqrt{3}}$ of line current in delta connection needs a revisit. The power consumed in delta configuration is 18.75% more than what is normally assumed.

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A Field Level Studies on Selected Serum Biochemical Constituents in Cyclic, Non-Cyclic and Endometritic Crossbred Cows

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Abstract- Forty-five Jersey Sahiwal cows selected from nearby villages from tirupati. Jersey Sahiwal were divided into three equal groups i.e. cyclic, non cyclic and endometritic. Blood samples were collected from all the experimental animals, serum was separated and stored at -20°C until assayed for glucose (g/dl), total protein (g/dl), urea (mg/dl) and cholesterol (mg/dl). The results revealed significantly ($P < 0.05$) higher values of glucose (58.08 ± 2.59) and cholesterol (290.72 ± 15.95) in endometritic cows as compared to cyclic (50.72 ± 1.12 , 199.12 ± 9.38) and non-cyclic cows (50.56 ± 1.12 , 202.96 ± 14.84). Total protein level differed significantly ($P < 0.05$) among cows of all the three groups, being highest in endometritic (19.16 ± 1.00), followed by non cyclic (15.23 ± 0.89) and lowest in cyclic (9.19 ± 0.45) cows. However, serum level of urea did not differ in cyclic (30.88 ± 2.42), non cyclic (33.80 ± 3.43) and endometritic (37.12 ± 3.45) animals, although highest value was recorded in endometritic animals.

Index Terms- Blood, biochemical constituents, cows, cyclic, non cyclic, endometritic.

I. INTRODUCTION

The breeding efficiency of dairy cows is lowered by a number of reproductive disorders like endometritis, an-oestrus and repeat breeding, affecting adversely the productive and reproductive performance of cows, and resulting in great economic losses to dairy farmers (Dutta et al., 1988). The basic causes of the reproductive problems in a herd are multiple and include managerial, nutritional and pathological factors. The findings of many authors (El-Azab et al., 1993; Balakrishnan and Balagopal, 1994; Qureshi, 1998) suggest that normal blood levels of various biochemical constituent are indispensable for normal function of various systems of body including reproductive system. Changes in various biochemical constituents have been blamed for reproductive failures. Thus, serum biochemical profile might be a potential aid in characterizing these problems. Blood glucose appears to be one of the key nutrients affecting cyclicality in farm animals and a minimum level of 60-40mg/ml is required to maintain the physiological processes of the body (Duke, 1970). According to Dowine and Gelman (1976), low blood glucose may be

associated with infertility. Nadiu and Rao (1982) and Dutta et al. (1988) reported significantly lower serum glucose level in an-oestrus than normally cycling animals. El-Azab et al. (1993) reported significantly higher serum protein in cyclic cows than the non cycling one's. However, Tegegne et al. (1993) found inconsistent trend. Qureshi (1998) reported higher blood urea level in an-oestrus animals than those resuming cyclicality within 45 days postpartum. Burle et al. (1995) reported lowest serum concentration of cholesterol in an-oestrus than in cycling cows. Greatly variable reports were available on the level of these biochemical constituents, hence the present study was planned to assess the levels of selected biochemical constituents in cyclic, non-cyclic and endometritic crossbred cows.

II. MATERIALS AND METHODS

The study was conducted at field level. Fifteen animals each for three groups i.e., cyclic, non-cyclic and endometritic were selected. The animals with a corpus luteum (CL) on one of the ovaries were considered as cyclic animals, while cows having no functional CL were included in non cyclic group. The animals having thick uterus and containing pus in the oestrus mucus were placed in endometritic group. Blood samples were collected by jugular veinipuncture; serum was separated and stored at -20°C until analyzed. Serum glucose, urea, cholesterol and total proteins were determined spectrophotometrically according to the methods described by Brahm and Trinder, (1972), Merck (1974), Allain et al. (1974) and Doumas et al. (1981), respectively.

III. STATICAL ANALYSIS

The data were analyzed statistically using one way analysis of variance technique (Steel and Torrie, 1980). Significant means were compared by Duncan's Multiple Range Test (Duncan, 1955).

IV. RESULTS AND DISCUSSION

Serum biochemical constituents (mean \pm SE) in cyclic, non cyclic and endometritic crossbred cows are given in Table 1. Mean concentrations of serum glucose in cyclic, non-cyclic and

endometritic cows were 50.72 ± 1.12 , 50.56 ± 1.13 and 58.08 ± 2.59 g/dL, respectively. The results clearly indicate that serum glucose level of endometritic cows was significantly ($P < 0.01$) higher than cyclic and non-cyclic animals. Majeed et al. (1990) recorded higher serum glucose level in endometritic animals than healthy ones. Increased blood glucose level in endometritic animals may result from either an imbalance between hepatic output and peripheral uptake of the sugar or disturbances in the endocrine regulatory mechanisms which influence these processes. Abnormal functioning of hormone producing organs may influence glucose levels (Coles, 1986). Increased activity of the anterior pituitary, adrenal cortex and thyroid may result in increased blood glucose level. Mechanism by which hyperpituitarism resulted is incompletely understood; however it may be related to increased production of adrenocorticotrophic hormones (Coles, 1986). Total protein level was significantly higher ($P < 0.05$) in endometritic (19.16 ± 1.00 g/dL) cows as compared to cyclic (9.19 ± 0.45 g/dL) and non-cyclic (15.23 ± 0.89 g/dL) cows. The level in non cyclic cows was significantly ($P < 0.05$) higher than that of cyclic animals. Majeed et al. (1990) and Lyubetsky (1997) reported higher values of total serum protein in endometritic buffaloes and cows compared to cyclic buffaloes and cows, respectively. However, Burle et al. (1995) reported significantly higher value of total serum protein in cyclic cows. The variation could be due to differences in breeds, environment and level of nutrition. In agreement to the findings of the present study,

higher level of total serum protein was associated with low fertility, as reported by Hewett (1974). Excessive intake of protein in the feed can reduce fertility and increase the number of service per conception. Fertility is impaired more by feeding excessive protein to older cows. The mechanism by which high level of protein adversely affects reproduction in dairy cows is unknown (Randel, 1990). No significant difference in concentration of urea in cyclic (30.88 ± 2.42 mg/dL), non-cyclic (33.80 ± 3.45 mg/dL) and endometritic (37.12 ± 3.45 mg/dL) cows was observed in the present study. The values observed in endometritic cows were apparently higher but not significantly different. Zaman et al. (1985) and Majeed et al. (1990) also observed non significant ($P < 0.05$) difference in blood urea among cyclic, non cyclic and endometritic animals. Serum cholesterol level was found to be significantly ($P < 0.05$) higher in endometritic (290.72 ± 15.95 mg/dL) as compared to cyclic (199.12 ± 9.38 mg/dL) and non-cyclic (202.96 ± 14.84 mg/dL) cows. However, the difference between cyclic and non cyclic animals was non significant. Similarly, Zaman et al. (1985) reported a non significant difference in levels of plasma cholesterol of cyclic and non-cyclic buffaloes. Majeed et al. (1990) found a non significant difference in serum cholesterol level between endometritic and healthy buffaloes.

Identify the constructs of a Journal – Essentially a journal consists of five major sections. The number of pages may vary depending upon the topic of research work but generally comprises up to 5 to 7 pages.

Table1: Serum biochemical constituents (mean \pm SE) in cyclic, non-cyclic and endometritic crossbred cows

Parameters	Cyclic cows	Non-cyclic cows
Glucose (g/dL)	50.72 ± 1.12^b	50.56 ± 1.13^b
Total protein (g/dL)	9.19 ± 0.45^c	15.23 ± 0.89^b
Urea (mg/dL)	30.88 ± 2.42^a	33.80 ± 3.45^a
Cholesterol (mg/dL)	199.12 ± 9.38^b	202.96 ± 14.84^b

Values with different superscripts in a row differ significantly ($P < 0.05$).

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Multi-Layered Cryptographic Processor for Network Security

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Abstract- This paper presents a multi-layered architecture for the security of network and data using a layered structure of cryptographic algorithms. This architecture gives benefit of low area and high speed requirement. This paper mainly concern for security so architecture is designed in layers to avoid the possibilities of invasion from outsiders. This paper implements a combination of Private-Public-Private key algorithm for encryption-decryption in two layers and a Public key for key generation. Simulation of codes is carried out on ModelSim 6.3f and design optimization is shown using Xilinx-Project Navigator ISE 13 suite. This paper proposes multi-layered architecture of integrated cryptographic processor which can be used for any byte length. This architecture decreases the use of any one cryptographic algorithm designed for any one specific purposes.

Index Terms- Network Security, cryptography, Multi-layered architecture

one key for encryption of a message and a different key for the decryption of same message. Private Key algorithm due to having high throughput is suitable for data communication, and public key algorithm with much lower throughput are suitable for key exchange. Advanced Encryption Standard (AES), a Federal Information Processing Standard (FIPS), is an approved cryptographic algorithm that can be used as private key algorithm. Data Encryption Standard (DES), selected by the National Bureau of Standard as an official Federal Information Processing Standard (FIPS) for United States in 1976, is also a widespread use candidate for private key algorithm. Rivest-Shamir-Adi (RSA) is a public key algorithm key algorithm invented in 1977 by Ron Rivest, Adi Shamir and Leonard Adleman (RSA).

This paper shows the architecture of implementation of a multi-layered structure of cryptographic algorithm (Private-Public-private key algorithm). Elliptic Curve Cryptography (ECC) is most suitable for key exchange for all the available algorithms.

I. INTRODUCTION

IN this digital world, with the increment of Internet in human life every step like Banking, payment, financial transaction etc. The importance of network security is also increasing. Security forms the backbone of today's digital world.

II. CRYPTOGRAPHIC ALGORITHMS

In this section, introduction and a brief detail of all the three algorithms (Private-Public-private key algorithm) for encryption and decryption of message are provided. This section also explains the key exchange protocol using Elliptic Curve Cryptography (ECC).

A. Advanced Encryption Standard (AES)

The Advanced Encryption Standard (AES) algorithm operates on blocks of 128,192 or 256 bits, by using cipher keys of length 128,192 or 256 bits respectively. The block diagram for Advanced Encryption Standard (AES) is as shown in figure2.

Inputs and Outputs

AES-128 uses 128b key and need 10 rounds. Similarly, AES-192 uses 192b key with 12 rounds and AES-256 uses 256b key with 14 rounds of data processing.

The basic unit for processing in the Advanced Encryption Standard (AES) algorithms is a byte (a sequence of eight bits). The first step in Advanced Encryption Standard (AES) encryption is conversion of input bit sequence into byte sequence, which is arranged in a two dimensional array of bytes (called as States). Each byte in state matrix is an element of a Galois field, $GF(2^8)$. The AES-128 consists of 10 rounds with four main operations in each round, namely, "ByteSub", "Shift Row", "MixColumn", and "AddRoundKey". States undergoes

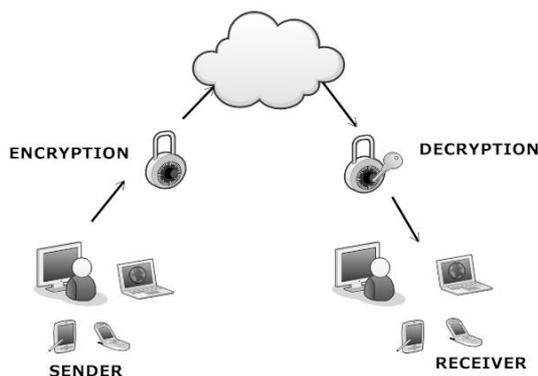


Fig. 1: Cryptographic process

There are mainly two types of cryptographic systems used for security purpose. One is Symmetric key algorithm (also known as Private Key algorithm) and other is Asymmetric key algorithm (also known as Public key algorithm). The symmetric key algorithm uses same key for encryption and decryption of a message (like Advanced Encryption Standard (AES), Data Encryption Standard (DES)). The asymmetric key algorithm use

to AddRoundKey initially before the round-1. There is no MixColumn in lastround. The key scheduler block is used for generating 128b key for each round. Key Scheduler block consists of two main operations, firstly, key expansion, which expands the input key bits required by the algorithm, and lastly, the key selection, which selects the required number of bits from the expanded key. The implementation of Advanced Encryption Standard (AES) mainly needs LUT (for ByteSub), MixColumn need GF (2⁸), circularshifter (for ShiftRow), logicalXOR for AddRoundKey.

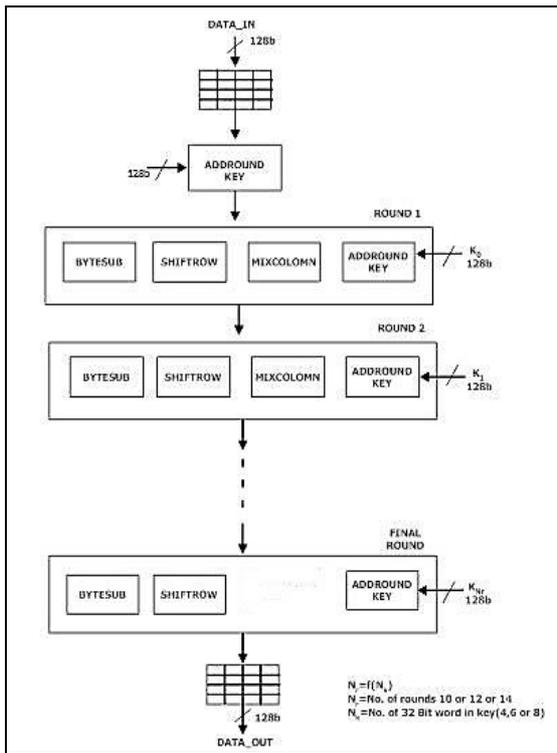


Fig. 2: AES block diagram

B. Data Encryption Standard (DES)

Data Encryption Standard (DES) is the block cipher architecture type of algorithm that takes a fixed length string of plaintext bits and transforms it through a series of complicated operations into another ciphertext bit string of the same length. The block size is of 64-bits; however, only 56-bits of these are actually used by the algorithm, as rest 8 bits are kept for checking parity purpose only and hence discarded. Every 8th bit of the selected key (i.e., 64b) is discarded, that is, positions 8, 16, 24, 32, 40, 48, 56, 64. Data Encryption Standard (DES) consists of 16-rounds. The figure 3 shows the single stage structure of Data Encryption Standard (DES). Data block first go through Initial permutation (IP), then to 16 rounds of complex key-dependent permutation, and finally, to another permutation which is the inverse of the IP called as IP⁻¹ as shown in figure2. The Fiestelfunction, f () operates on half of 64b block i.e., 32b at a time and consists of four stages namely, Expansion, Keymixing, Substitution (also known as S-Box) and Permutation (also known as P-Box).

The implementation of Data Encryption Standard (DES) needs XOR, Shift, LUT and Permutation. 3DES is more secure than Data Encryption Standard (DES) considered by National Institute of Standards and Technology (NIST). 3DES (or TDES) can also be implemented in place of Data Encryption Standard (DES).

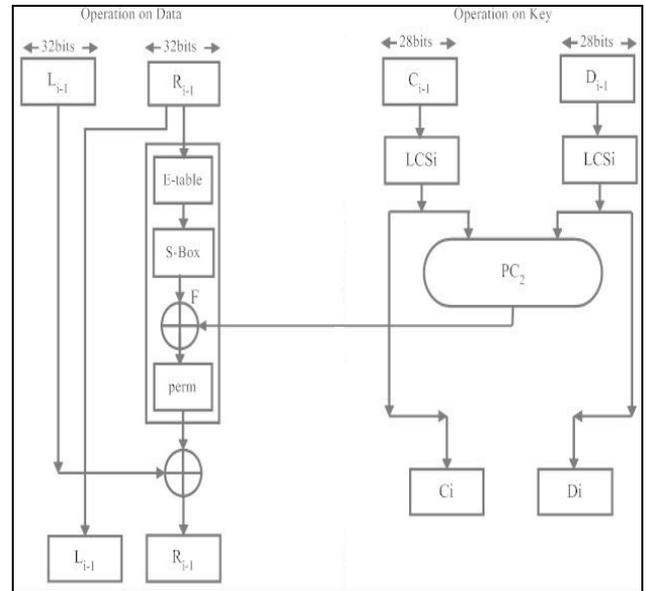


Fig. 3: Single stage operation of DES

C. Rivest-Shamir-Adi (RSA)

Rivest-Shamir-Adi (RSA) algorithm can be classified as three algorithms; the key generation algorithm, encryption algorithm, decryption algorithm. Firstly, Rivest-Shamir-Adi (RSA) key generation algorithm can be described as follows.

- 1) Generate two large random and distinct primes P and Q, P ≠ Q.
- 2) Calculate N=P.Q and φ= (P-1)(Q-1). Here, N is used as the modulus for both the public and private keys.
- 3) Choose a random integer, E, 1<E<φ, and find greatest common divisor such that gcd(E,φ)=1. Where, φ is Euler's totient function.
- 4) Compute the inverse integer D, 1<D<φ, such that ED=1(mod φ), i.e., E and φ are coprime.
- 5) Public key is (N, E) and private key is (N, D).

Secondly, Rivest-Shamir-Adi (RSA) encryption algorithm can be described as follows, C=M^E mod N

Finally, Rivest-Shamir-Adi (RSA) decryption algorithm can be described as follows, M=C^D mod N

Where, C is the ciphertext and M is the message.

D. Elliptic Curve Cryptosystem (ECC)

An elliptical curve is defined by an equation in Z variables with coefficients. The cubic equation for elliptical curve takes the form y² +axy+by= x³+cx²+dx+e

Where, a,b,c,d,e are coefficients, and x & y are variables

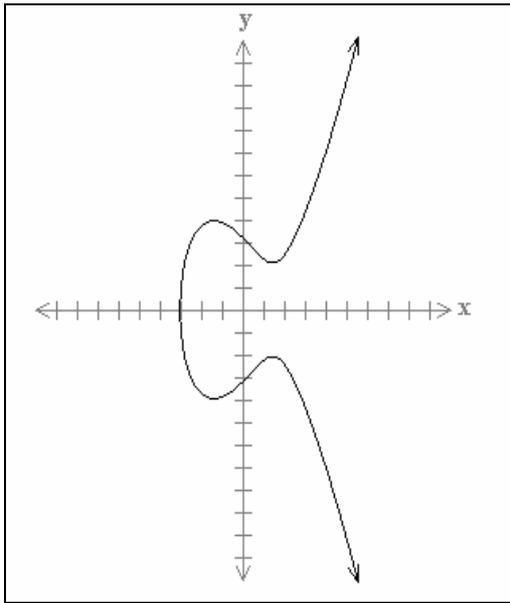


Fig. 4: ECC curve

Elliptic Curve Cryptosystem (ECC) operates over a group of points on an elliptical curve defined over a finite field. Its main cryptography operation is scalar multiplication, which computes $Q=kP$, i.e., a point P multiplied by an integer k resulting in another point Q on the curve.

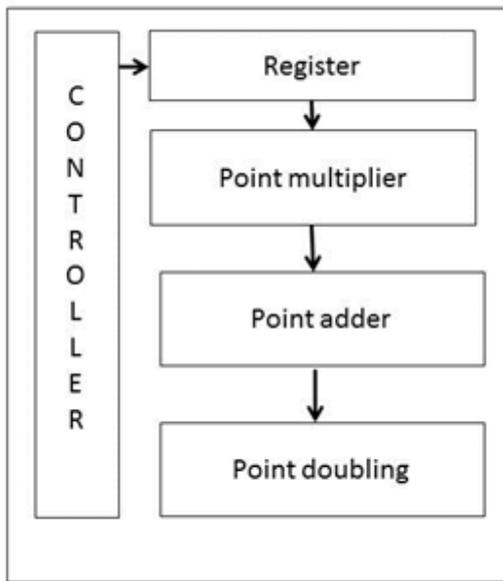


Fig. 5: ECC block diagram

III. ARCHITECTURAL DESCRIPTION

The overall architecture of cryptographic processor for network security is shown in figure5.

A. Key Generation

A public key cryptographic algorithm is implemented for the generation of a secure key for the data encryption and decryption. The host CPU controls the overall processes. The key exchange protocol of Elliptic Curve Cryptosystem (ECC) implements key for data processing algorithms.

B. Microprocessor

The microprocessor is used to select the cryptographic algorithm among the three according to the type of message/data bits being transmitted. The message goes to the various algorithm processes of respective algorithm resulting in an encrypted message. The decryption is almost similar but in reverse direction by the help of control unit and microprocessor.

C. Processor block

The processor block performs the encryption of data. This block consists of functional blocks of Advanced Encryption Standard (AES), Data Encryption Standard (DES) and Rivest-Shamir-Adi (RSA).

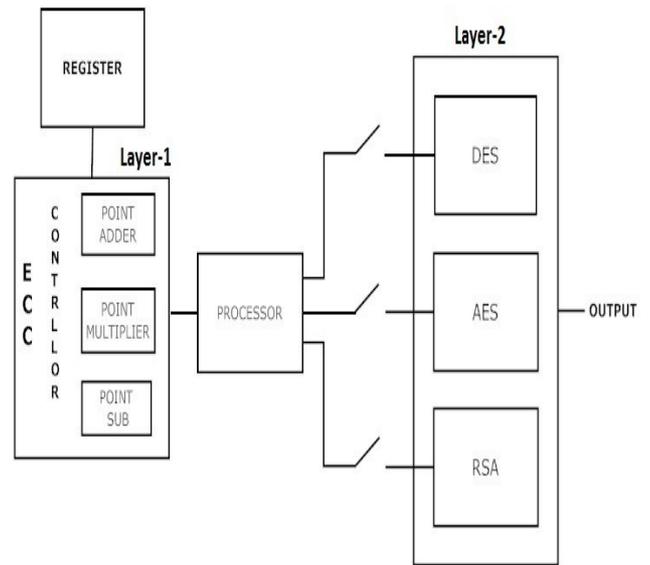


Fig. 6.: Architecture of cryptographic processor for network security

IV. IMPLEMENTATION

The blocks used for Advanced Encryption Standard (AES) [5] [6] and Data Encryption Standard (DES) [7] [8] are commonly selected blocks and area requirement decreases and speed for execution increases. The AddRoundKey and InvAddRoundKey is implemented using simple XOR operation followed by shift and XOR for MixColoumn and InvMixColoumn. The four basic operations of the Data Encryption Standard (DES) are completed by XOR, shift, LUT and permutation blocks.

The architecture is divided into two layer of cryptographic algorithm namely ECC, for generation of key and second layer consists of all the three algorithms structure, which performs according to the size of data being used. The multi-layered

architecture helps in increasing the throughput as shown in comparison table 1.

The architecture of multi-layered cryptographic processor is shown in figure6.

V. RESULT

A. Advance Encryption Standard (AES)

Simulation is done for 128-bits input of data which is plain text and the roundkey are placed in register. The decryption followed by encryption consists of encrypted data of 128-bits which is the ciphertext and key given for both encryption and decryption is of 128-bits. As key generated and plain text is given, the encrypted output following each blocks includes s-box generation in round 1 to round 10 and MixColoumn generation in round 1 to round 9 as there is no MixColoumn in last round of execution.

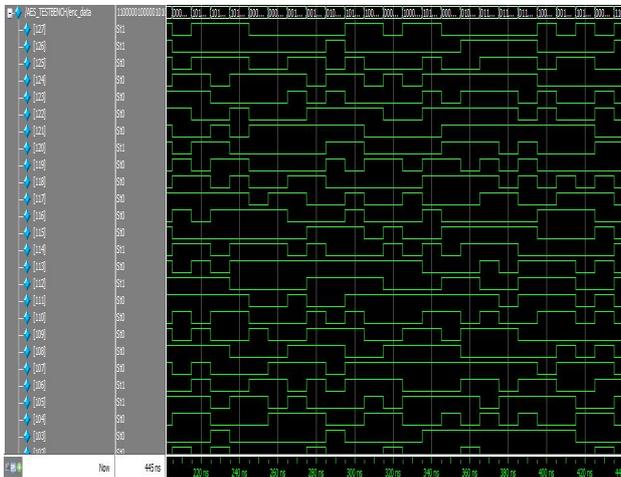


Fig. 7: AES Simulation Result (encrypted_data)

As shown in figure7, the encrypted data is decrypted with same blocks but now in reverse order, letting last block R10 as first block now and similarly R1 as last block. The completion of encryption and decryption can be easily obtained by completion signal i.e. encrypt_complete for encryption completion and decrypt_complete for decryption completion.

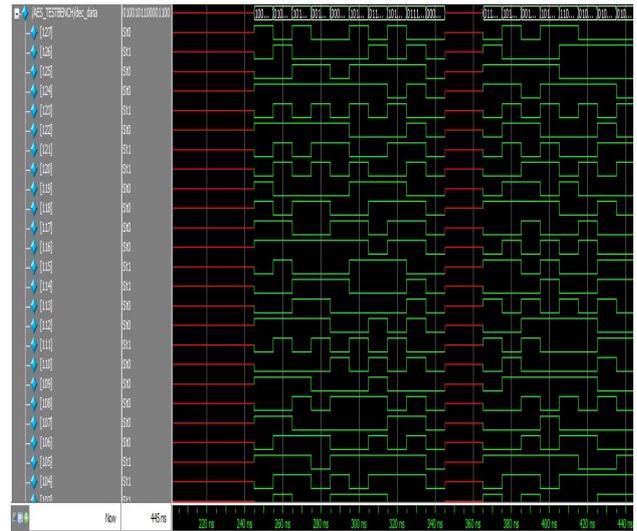


Fig. 8: AES Simulation Result (decrypted_data)

The final simulation is shown in figure 9. The summary generated using Xilinx ISE is shown in figure 10.

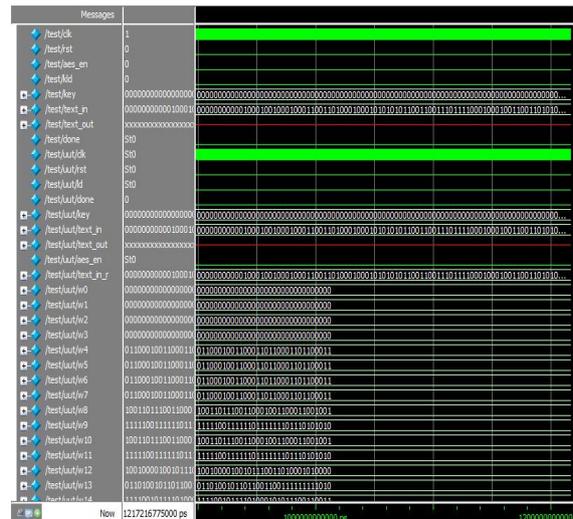


Fig. 9: AES Simulation Result (complete)

The summary for AES shows that there are no errors present in the AES design and the device utilization is according to the specifications showing optimum utilization of all resources available.

Project File:	aes128.xise	Parser Errors:	No Errors
Module Name:	DEVICELEVEL	Implementation State:	Placed and Routed
Target Device:	xc3s400-4pq208	Errors:	No Errors
Product Version:	ISE 13.2	Warnings:	No Warnings
Design Goal:	Balanced	Routing Results:	All Signals Completely Routed
Design Strategy:	Xilinx Default (unlocked)	Timing Constraints:	All Constraints Met
Environment:	System Settings	Final Timing Score:	0 (Timing Report)

Device Utilization Summary				
Logic Utilization	Used	Available	Utilization	Note(s)
Number of Slice Flip Flops	474	7,168	6%	
Number of 4-input LUTs	4,290	7,168	59%	
Number of occupied Slices	2,371	3,584	66%	
Number of Slices containing only related logic	2,371	2,371	100%	
Number of Slices containing unrelated logic	0	2,371	0%	
Total Number of 4-input LUTs	4,246	7,168	60%	
Number used as logic	4,290			
Number used as a route-thru	56			
Number of bonded I/Os	23	141	16%	
Number of BUFPGMUs	2	8	25%	

Fig. 10: AES Simulation Summary

B. Data Encryption Standard (DES)

Simulation is done for 64-bit input of data which is plain text and the roundkey are placed in register. The decryption followed by encryption consists of encrypted data of 64-bits which is the ciphertext and key given for both encryption and decryption is of 56-bits. At first the text_in is divided into two half known as left and right blocks. The key generation for round 1-8 is shown in figure 13.

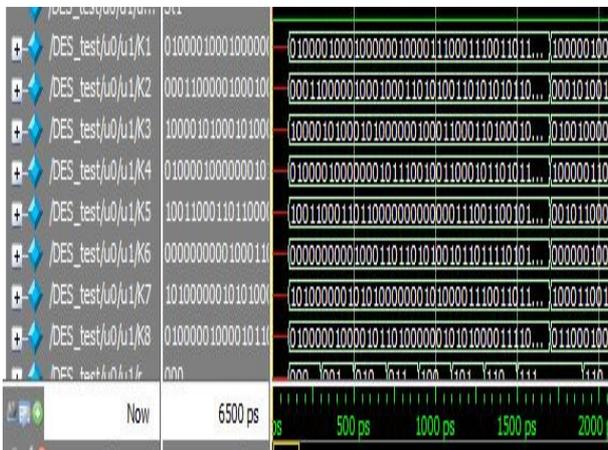


Fig. 11: DES Simulation Result (key- round1-8)

The top_module shown in figure12 shows complete simulation result of DES. In this complete encryption and decryption of data is shown.

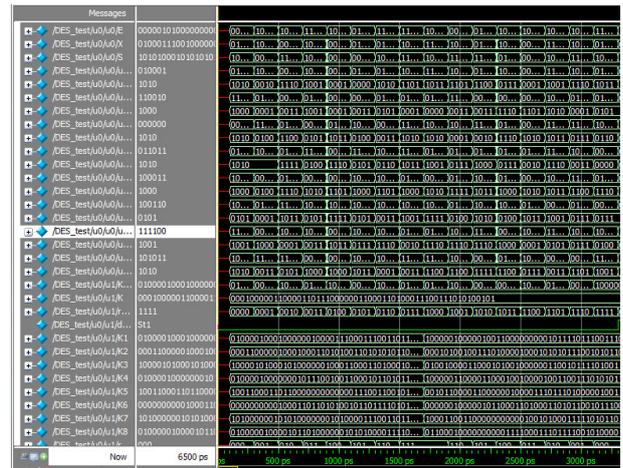


Fig.12: DES Simulation Result (top_module)

Finally figure13 shows summary of DES execution using Xilinx ISE showing no error in the design and optimum utilization of all devices.

des Project Status			
Project File:	DES.xise	Parser Errors:	No Errors
Module Name:	des	Implementation State:	Programming File Generated
Target Device:	xc3s500e-5f1256	Errors:	No Errors
Product Version:	ISE 13.2	Warnings:	No Warnings
Design Goal:	Balanced	Routing Results:	All Signals Completely Routed
Design Strategy:	Xilinx Default (unlocked)	Timing Constraints:	All Constraints Met
Environment:	System Settings	Final Timing Score:	0 (Timing Report)

Device Utilization Summary				
Logic Utilization	Used	Available	Utilization	Note(s)
Number of Slice Flip Flops	64	9,312	1%	
Number of 4-input LUTs	852	9,312	9%	
Number of occupied Slices	449	4,656	9%	
Number of Slices containing only related logic	449	449	100%	
Number of Slices containing unrelated logic	0	449	0%	
Total Number of 4-input LUTs	852	9,312	9%	
Number of bonded I/Os	190	190	100%	
Number of BUFPGMUs	1	24	4%	
Average Fanout of Non-Clock Nets	3.99			

Fig. 13: DES Simulation Summary (using Xilinx)

C. RON, ADI SHAMIR, RIVEST ADI (RSA)

Simulation is done for 512-bit input of data which is plain text and the roundkey are placed in register. The decryption followed by encryption consists of encrypted data of 512-bits which is the ciphertext.

Simulation results

The Random number generator, GCD, Encryption and decryption are written in Verilog Code and simulated in ModelSim 6.3f and results are mentioned below.

1) Random number generator

The 16-bit random number generator implemented using the 16-bit LFSR is shown in Figure14.



Fig. 14:RSA Simulation Result (random number generator)

Figure 14 shows the waveform of the random odd number generator which has generated few odd numbers .

2) gcd

The 16-bit GCD (Extended Euclidean algorithm) implemented is shown in Figure 15.

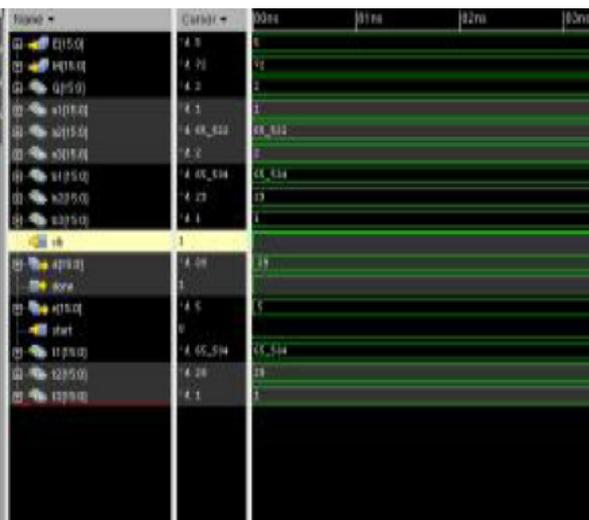


Fig.15:RSA Simulation Result (gcd generator)

Figure15 also shows the waveform for extended Euclidean algorithm with two inputs and the resulted output is the public key e and the private key d.

Encryption and Decryption

The 16-bit Modular Multiplication [12] simulated using ModelSim is shown in Figure16.



Fig. 16: RSA Simulation Result (modular multiplication)

Figure16 shows the waveform for modular multiplication module in which the input value is A, B and N, the resulted output is M. The 16-bit Encryption module simulation is shown in Figure17.

The waveform for encryption module consists of input values is e, n and plain text p, the resulted output is the encrypted cipher text m. The 16-bit decryption module simulation is shown in Figure18.



Fig. 18: RSA Simulation Result (decryption)

Figure18 shows the waveform for decryption module in which the input value is d, n and cipher text p, the resulted output is the encrypted plain text m.

3) Top Module (RSA)

Figure19 shows the waveform of the Top module of entire RSA. Here the random prime numbers generated are P and Q. After getting P and Q, n and $\phi(n)$ are calculated. And public key e is selected by random prime number. GCD checks whether e and $\phi(n)$ are relatively prime or not by getting the GCD as 1, and using Extended Euclidean algorithm d is calculated. Now the plain text M is given, and by using e and n, after encryption we get the cipher text C. Now by using d, n and the cipher text, after decryption we got back the plain text same as the expected result.

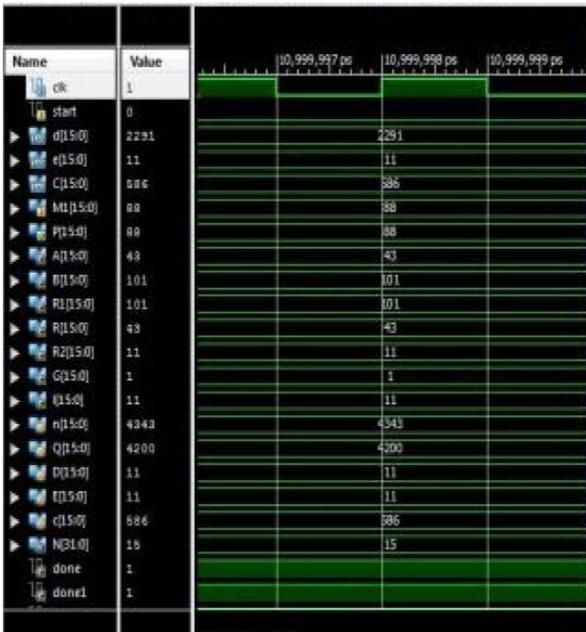


Fig. 19: RSA Simulation Result (top_module)

D. ELLIPTICAL CURVE CRYPTOGRAPHY (ECC)

The point multiplication operation and the point verification operations are implemented by ECC architecture [18]. The shared memory stores the operands, k, Px, Py before the start of the multiplication operation. The results are placed back into the shared memory after operation executed. The result of ECC follows following steps as shown from figure 20 to 23.

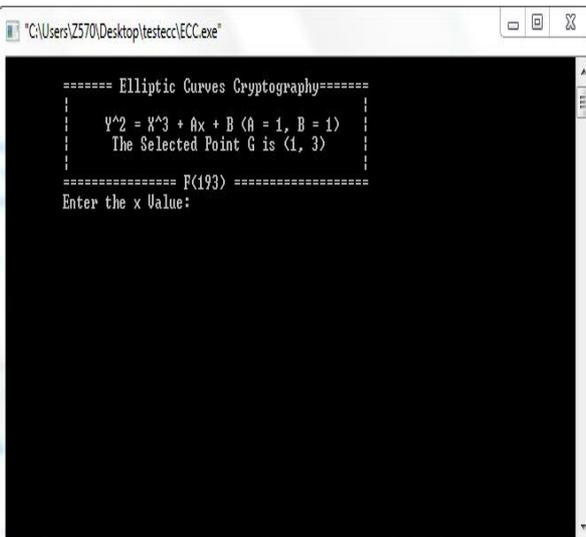


Fig. 20: Console output for ECC (1st step)

complete, the results are placed back into the shared memory. The curve parameters a/b/m as well as the width of memory is fixed for the particular version of the core. As figure20 shows the console showing output window for ECC, asking for input from the user but it can be automated to save time and energy of the user.

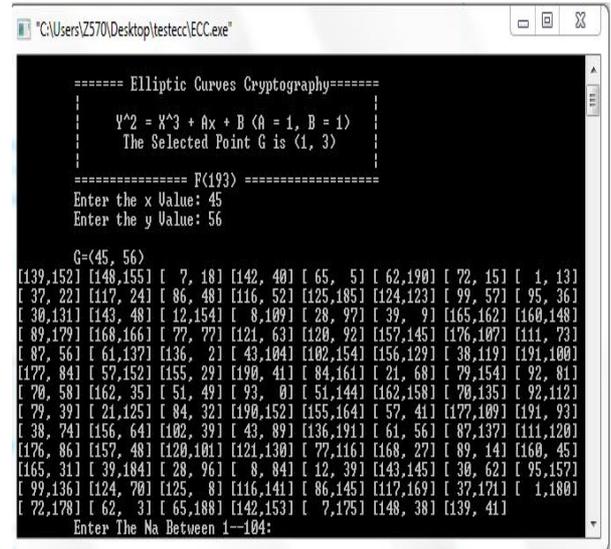


Fig. 21: Console output for ECC (2nd step)

The input for each parameter is taken by the user and the elliptical curve point is generated as shown in figure 21.

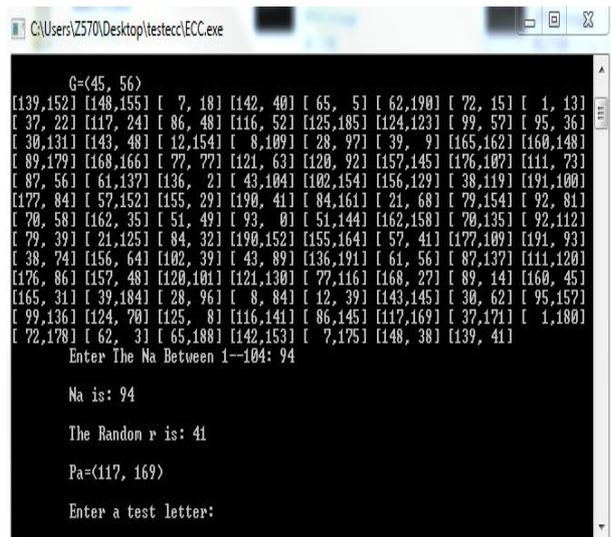


Fig. 22: Console output for ECC (3rd step)

After determining the curve point, one random r is chosen and the console is now ready for taking the data to be encrypted as shown in figure22.

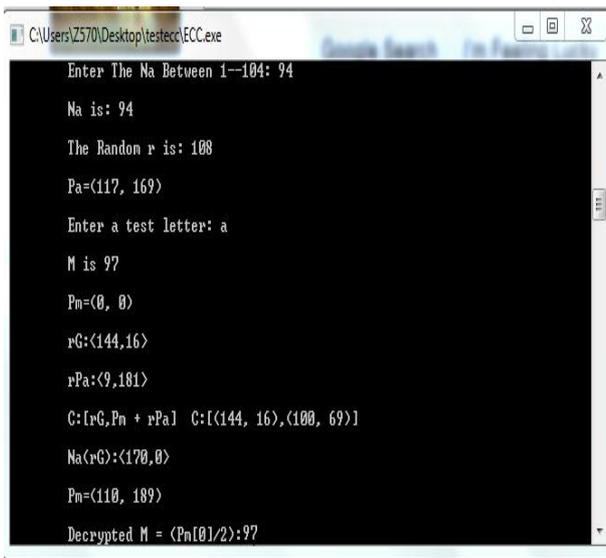


Fig. 23: Console output for ECC (final step)

The message to be encrypted is shown by M by converting the alphabets into integer to suite the processor functioning. Here encrypted message is shown by C. The decrypted message is shown by decrypted m.

Design of ECC allows sharing the arbitrated memory to store the arguments and results of operations. This both helps to save the resource in the extremely compact implementations and simplify the data transfer. The time required for memory loading is smaller than 7-8% Dedicated memory can be also be used.

VI. PERFORMANCE COMPARISON

The performance of individual cryptographic algorithms and the multi-layered cryptography algorithm can be done on the basis of encryption execution timing, memory required, output byte and finally throughput. The comparison is shown in Table 1.

Table 1: Performance Comparison

	Encryption Time (Sec)	Memory (KB)	Output Byte (KB)	Throughput (Mb/sec)
Advanced Encryption Standard (AES)	4.4	18,765	132,072	24.60
Data Encryption Standard (DES)	5.1	20,256	130,032	19.80
Rivest Shamir Adleman (RSA)	16.2	25,239	70,656	20.10
Layered Cryptography Processor	2.4	16,465	63,356	145.50

Encryption execution timing is the total time taken for encryption to the throughput and it should be as low as possible. Memory requirement is the use of memory space while performing the encryption or decryption which should be low for

better performance. Output byte shows the length of encrypted text as it should be higher to avoid any hindrances to data. Finally a high throughput shows high speed and low power consumption by the system.

VII. CONCLUSION

The design of cryptographic processor presents a secure key generation internally in the architecture without knowledge of the user also.

This paper also implements a combinational architecture of Private-Public-Private key algorithm. This universal architecture has no bound of data size, so reduces the requirement of different cryptographic processor for different data size and other specifications. This paper can also be implemented with other private or public key algorithms to increase the efficiency even more. ECC usages can decrease the storage requirements for the execution of the protocols and so use of ECC for the future developments with regard to the network security is beneficial.

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Tidal Power: An Option for Alternative Sustainable Power Generation in Bangladesh

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Abstract- In an energy-hungry world people is seeking for energy to meet up for the future crisis. But oil, gas, coal and other recourses will be finished within 40 years. So, renewable energy is the only solution in order to meet up the future crisis. Solar, wind, wave, tidal, fuel cell, geothermal etc are the renewable energy sources. Among them tidal energy is an old but efficient method. If there is one thing we can safely predict and be sure of on this planet, it is the coming and going of the tide. This gives this form of renewable energy a distinct advantage over other sources that are not as predictable and reliable, such as wind or solar. Rise and fall of tides is more cyclic than random weather patterns. Using this free source we can produce a large amount of power which is very reliable and continuous. The main objective of this paper is show that tidal power may be an alternative solution to meet up recent power crisis.

Index Terms- Tidal power, Fuel, One way tidal power generation, two way tidal power generations, Power crisis.

I. INTRODUCTION

Now a day's tidal power is knocking the future for electricity production. The use of tidal power originated in around 900 AD when early civilizations constructed tide mills. These mills used the force of the tide to turn a waterwheel, which in turn was used to grind grain into flour [1, 2]. Britain and France are using the tidal power concept since 11th century for milling grains [3,4]. The first study of large scale tidal power plants was initiated by the US Federal Power Commission in 1924 which would have been located if built in the northern border area of the US state of Maine and the south eastern border area of the Canadian province of New Brunswick, with various dams, powerhouses and ship locks enclosing the Bay of Fundy and Passamaquoddy Bay. Nothing came of the study and it is unknown whether Canada had been approached about the study by the US Federal Power Commission. The world's first large-scale tidal power plant (the Rance Tidal Power Station) became operational in 1966 [5, 6]. The facility is located on the estuary of the Rance River, in Brittany. With a peak rating of 240 Megawatts, generated by its 24 turbines, it supplies 0.012% of the power demand of France [7]. The second tidal barrage was put in service at Annapolis Royale Nova Scotia, Canada in 1982 in order to demonstrate the functioning STRAFLO turbine, invented by Escher-Wyss of Switzerland and manufactured by GE in Canada. This 16 MW turbine has some difficulties with clogging seals necessitating two forced outages, but has been functioning without interruption since its early days. There are

approximately 10 small barrages scattered throughout the world, but they are not intended for commercial power generation. For example there is a 200KW tidal barrage on the river Tawe in Swansea Bay. China has several tidal barrages of 400KW and less in size [8]. Bangladesh has a long coastal zone, most of which is covered by embankments and sluice gates [9-11]. In most cases, the coastal area of Bangladesh is remote from population centers and has no electricity [10, 12]. But this coastal environment is very resourceful in terms of agricultural production, shrimp aquaculture and other business and commercial activities [13, 14]. At present this area has expanded shrimp aquaculture haphazardly, which is unsustainable [15]. This expansion has not been integrated with electricity supply [16,17] Some recent studies have suggested that coastal area of Bangladesh is ideal for harnessing tidal electricity from the existing embankments and sluice gates by utilizing small scale tidal energy technology [18, 19]. Lack of electricity is the main barrier to coastal development in Bangladesh [20]. Bangladesh can take tidal power generation opportunity as a challenge and can easily overcome at least some portion of the national power crisis.

II. FUEL CRISIS FOR ELECTRICITY GENERATION

Power crisis in Bangladesh is increasing day by day. The generated electricity is far less than the actual demand in our country. Fuel crisis or lack of fuel management is making the current situation worse. In order to generate electricity Bangladesh largely depends on one or two kinds of fuel. As a result, it is getting difficult to supply the amount of fuel needed for power generation. According to government planning, supply and demand of fuel should be adjusted by the end of 2012. But no action is yet taken to fulfill this plan. Power sector is seriously affected by this. Brief explanations of different types of fuel on current situation are given below:-

A. Oil

In our country 30% of liquid fuel is imported to meet up the need of commercial fuel. According to experts, this dependency on fuel is very dangerous for Bangladesh. In last 3-4 year many rental, quick rental and picking power plant based on oil has been established. This has made the situation worse, because the supply of oil is not always possible. Moreover, price of oil have increased. As a result, most of the oil based power plants are need to keep shut down.

B. Gas

The main fuel for electricity generation in our country is Natural Gas. But the production of Natural Gas is not meeting demand for power generation. As of year 2012 70%-80% power plants are run by natural gas in our country. According to Petrobangla, recently government has improved the gas production by 350 million Cubic feet. But the problem is demand have increased by 500 million cubic feet. Because, for special purpose gas connection is provided such as CNG station, but normally gas connection is not provided to anyone. Also, government has taken decision to provide gas connection to industries gradually.

No large gas field is discovered after the discovery of Bibiana gas field at 1996. Foreign companies along with national company Buppex are trying to increase gas production as well as searching for new gas field under PSC act. But this not possible to add up to national grid before 2015. In order to increase gas production recently government is trying to make a contact with Russia's national company Gasprom. According to the contact, 10 new cavities were supposed to be dug. But the contract is not done yet. This 26th April, 2012 delegates of Gasprom supposed to come in Bangladesh. Even if the contact is done this time, it won't help the fuel condition in near future.

C. LNG

In order to improve the gas crisis government has taken new step by importing Liquid Natural Gas (LNG). The amount of LNG imported is equivalent to 500 million cubic feet of natural gas. This will be distributed in Chittagong division. For this Maheshkhal terminal was supposed to be build within June-July of the year 2012. But it won't start within this year.

D. LPG

In last few years, LPG (Liquid Petroleum Gas) has become the new source of fuel. But its supply is about one-fourth of demand. There is plan of making adjustment between the supply and demand of LPG. In last June, 2011 finance minister has provided a plan about it. But yet no step is taken about it.

D. Coal

Bangladesh has a good amount of reserved coal; which is a good source of fuel. But our government doesn't have any plan of using this coal but to keep it for future generation. Currently coal is being imported to meet up the demand. Government is planning to import a large amount of coal. But our country does not have necessary infrastructure to import and use this large amount of coal.

E. Biogas

Biogas is made up of the waste of domestic animals. The use of Biogas is increasing in the rural area. But it's limited to few rural families. Only those who have their own domestic animal are getting the help of government to use biogas. Biogas is still at its earliest period, so its use hasn't been spread out yet.

The above discussion gives us a picture that Bangladesh is mainly dependent on Natural gas and imported oil. But the gas reserve of our country will diminish at a time. And importing oil to run power stations is too costly. Since we don't have any good back up plan the consequence may be severe. Also, we are not able to provide sufficient amount of fuel to meet our demand. Day by Day the demand for electricity will increase. If we don't find a new way to backup our existing system, our generating capacity won't increase. This will have a bad effect on our country's overall development.

III. REASON BEHIND POWER CRISIS

There are no particular reason that why our country is drowned in power crisis. Though, our government claims that in last three year electricity situation has been improved. But as soon as summer comes our everyday life is submerged into darkness as load shedding intensifies even though our industries are shut down for 12 hours a day.

At the start of this government's period electricity situation was far worse than now. In order to come out of this problem, one quick solution was to use Rental power plants. This was temporary and quick and also thought out to be advantageous for the government. But after starting these plants it was evident that this has been a harmful step for the whole power generation system. It will take a long time to come out of this situation. But instead of coming out of this mess, government kept pushing the rental power plants. Government decided what would be the buying price of the current and in what price they will supply oil to the plant. There is a big difference between subscriber's fee and government spending. To run these quick rentals government is giving a large amount of subsidy. It is estimated that government will have to give 40 Billion USD worth of subsidy in this finance year. This subsidy is one-third of total revenue. Government is trying to give some amount of money from coming budget. But this may hamper our economical situation.

According to Bangladesh Power Development Board (BPDB), in the year 1990-91 established generating power was 2398 MW. In 2005-06, it became 5275 MW. In this 15 year our established generating power is increased by 5.8% every year. At the same time production power at the time of pick hour is increased from 1672 MW to 3812 MW. That is, the actual producing power is increased by 6.1% every year. But there was no increase in generating power at 2006-07 and 2007-08, though maximum generation was increased by 8%. Even if the generating power is increased, there is no guarantee that the generation will also increase.

If we further analyze BPDB's data we will see that, in 1990-91 to 1995-96 established generating power was increased by 4.4%. Till 2000-01 it was increased to 6.6%. But in next 5 year i.e. till 2005-06 it decreased to 5.7%. At first 38 month of this government's period generating power jumped to 11.4%. Actually most of it increased at year 2010-11, when a huge number of rental power plant was running. Question may arise that this large amount of rental power plants why failed to increase power generation. The reasons behind this are-

- The productivity of old power plants (Government) is decreasing day by day.
- Power plants cannot go in full production due to shortage of fuels.
- Generation of rental power plants is less than what is actually said.

According to BPDB the production of electricity in 30th April 2010 was suppose to be 2055 MW. But in 29th February 2012 the production rate decreased at a rate 41% and now the actual production is 1506 MW. So it is clear that due to the shortage of fuel the production of electricity is decreased.

IV. TIDAL ENERGY

Tidal energy is produced through the use of tidal energy generators. The large underwater turbines are placed in areas with high tidal movements and designed to capture the kinetic motion of the ebbing and surging of ocean tides in order to produce electricity. Tidal power has great potential for future power generation because of the massive size of the oceans and if there is one thing we can safely predict and be sure of on this planet, it is the coming and going of the tide. This is the distinct advantage over other sources that are not as predictable and reliable, such as wind and solar. Tides come and go for the gravitational force of the Moon and Sun and also the rotation of the Earth. The rotational period of the moon is about 4weeks, while the earth takes 24hours for one rotation which occurs a tidal cycle of around 12.5hours. Moreover, once the construction of the barrage is complete, the maintenance & running costs are very small and the life time of the turbines are generally very high for instance, around 30years. The above discussion suggests that tidal energy will be a preferred option over the other choices to meet the sky rocketing demand of electricity. There are two types of generation methodologies that are available to generate power. They are (1) one way generation & (2) two way generation system.

A. One Way Tidal Power Generation System

This section of the paper provides a brief overview of the one way tidal power generation system with the view of graphical representation. In one way tidal power generation system one way turbine is used. In order to generate tidal power both sea water level and the river basin water level is considerable. From Figure-1 it is seen that sea water level is varying approximately sinusoidal. During high tide basin water level will follow sea water level very closely because sluice gates are open. When the sea and basin water levels are equal at point P_1 , both sluice gates and turbines are closed. It will be closed until a sufficient head H_1 built up. When the heads built up sluice gates at point Q will be open and the basin water level will fall with duration of T. At point P_1' there is not sufficient head H_1' is present to produce electricity. As a result both turbine and sluice gates will be closed until the two levels are equal. The moment these two levels are equal again then next cycle will start. Hence total power generation duration will be T. The advantage of this kind of plant is only one turbine is required for the plant and the cost of the

turbine, operation and maintenance are low. Turbine model required for this kind of plant is also industrially available. However, the disadvantage of this plant is the amount of power produced is less. Apart from its demerits this kind of power plant is widely used.

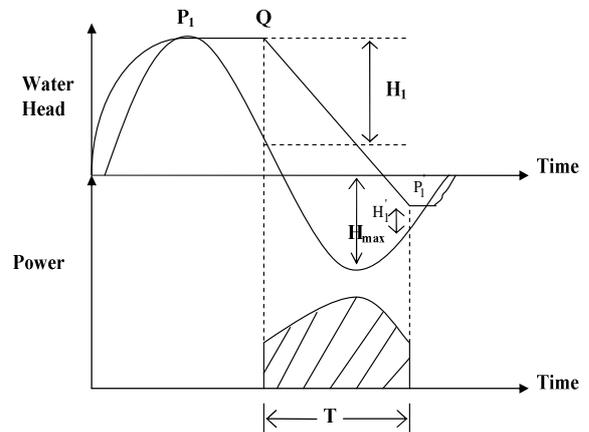


Figure 1: One way tidal power generation system.

B. Two Way Tidal Power Generation System

This part of the paper provides a summary of the two way tidal power generation system with the help of graph, indicating the water flow and position of the turbines, basin water level & sluice gates. This section has also enlightened the benefits and hazards of this system and further modification idea for a better output. During high tide water will go through the turbine and therefore there should be a difference between the points L_1 and L_2 . Water is passing into the basin from sea eventually basin water level will up. It will be rising until it reaches at point P_2 and a sufficient head build up. At point P_2 sluice gates will be open but turbines are closed until the basin and sea water levels are equal at point M_1 . At point M_2 a sufficient head will build up for power generation and then at point M_2 , turbines will open in opposite direction and basin water level will fall. The dive will last until it reaches at point P_2' . While there is not enough sufficient head to produce electricity (up to H_2'), turbines will be closed but sluice gates are open still at point Q_1 . The moment they are equal and will be equal at point Q_1' sluice gates will be closed. After building the next head H_2' sluice gate opens and new cycle begins. From the power output curve it is seen that power duration will be T_1 , T_2 and T_3 . This obviously illustrates power generation will be higher compared to previous power generation regime. However, the problem is associated with the no load period (NLP). During the no load period the system does not produce any power. This is the foremost problem of two way tidal power Generation system. When no load period occurs there is load shedding for some time. This creates a problem in large tidal power plants. In case for the massive generation using two way tidal power generation system the no load period gets higher. Because of this problem two way tidal power generation

system is normally not preferred and most preferable is one way tidal power generation system. However, two way tidal power generation system has the capability to produce larger amount of electricity which actually attracted the researcher to invent a regime to curtail the portion of no load period and eventually treat this method as a viable option to ensure the energy security.

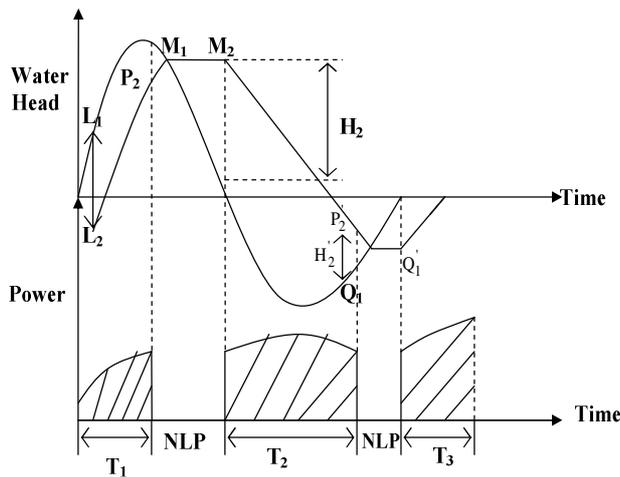


Figure 2: Two way tidal power generation system.

V. TIDAL POWER MAY BE AN ALTERNATIVE SOLUTION

We have discussed about Fossil fuels for power generation. There are also renewable energy sources such as Solar, Wind, Tidal, Hydropower, Nuclear etc. The renewable energy sources are more advantageous than Fossil fuel. They are more environments friendly and cost effective than fossil fuel. Also, fossil fuel will diminish in future. In fact, they have started to extinct. Sun, wind, water are the sources of renewable energy. There is no possibility of extinction of these sources in billion years. Besides, the life time of renewable energy based power stations are longer than fossil fuels. In case of Bangladesh the best form of renewable energy are Hydropower and Tidal Energy. Because Bangladesh is surrounded by a lot river and canals and this gives practically zero fuel cost. There is long coastline in Bangladesh along the Bay of Bengal. In the coastlines and also in the big rivers of Bangladesh the tidal heights are suitable for power generation. If we compare tidal energy with hydropower and other fossil fuels then we will see that tidal energy is more beneficial than other sources. As it has negligible environmental impact. Also, the maintenance cost is very low compared to others. Though hydropower is renewable source, but it has negative environmental effect on its surroundings. In rainy season hydropower can provide good amount of electricity but in dry season it doesn't have sufficient water to provide electricity. So, it is used as picking power plant. But tide is always constant whether it is in river or sea. So, it can provide constant power all year long. In case of fossil fuels, tidal power's cost per unit energy is significantly lower. Currently, Cost of energy per unit for diesel station is 15.687 Tk, for gas station 18.803 Tk, For Steam turbine (oil faired) is 10.924 Tk,

Steam turbine (coal faired) is 2.009 Tk and hydropower is 0.87 Tk.; Whereas according to our research tidal power would be 1.89 Tk .So, cost of tidal power is very low compared to most other power plants. Bangladesh government is not yet able to take benefits from tidal power plant. Day by day the cost of oil, coal will increase. Also, the maintenance costs for fossil fuel based power plants are very high. In case of tidal power maintenance cost is very low since it has only few numbers of turbine and generator. So, we see that tidal energy have a lot of advantages over other forms of fuel sources and very negligible negative impact. Bangladesh has great potential for tidal power in future because of its large number of rivers and also because of the Bay of Bengal.

VI. CONCLUSION

Tides play a very important role in the formation of global climate as well as the ecosystems for ocean habitants. At the same time, tides are a potential source of clean renewable energy for future human generations. Tidal Energy has the potential and prospect to find a place in the power industry. But with the conventional power plant technology being well established and continued to be in the main stream, tidal power plants are yet to gain commercial acceptance. In the near future with its attractive and lucrative features it may pose a competition with the conventional technologies. The conventional energy sources for many countries are almost at their peaks. Depletion of primary power sources will inevitably force people to replace most of the traditional energy sources with renewable energy in the future. Tidal energy is one of the best candidates for this approaching revolution. For Bangladesh, more detailed studies are needed to be carried out. Development of new, efficient, low-cost and environmentally friendly hydraulic energy converters suited to free-Sow waters, such as triple helix turbines, can make tidal energy available worldwide. Moreover, this type of machine can be used not only for multi-megawatt tidal power farms but also for mini-power stations with turbines generating a few kilowatts. Such power stations can provide clean energy to small communities or even individual households located near continental shorelines, straits or on remote islands with strong tidal currents.

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A New Image Segmentation Algorithm for Grid Computing

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Abstract- A new method for image segmentation using watershed transform algorithm is presented in this paper. It takes advantage of the fact that the proposed algorithm produced good results even if the same parameters are used for the standard segmentation algorithm. The proposed segmentation algorithm will be very effective for grid computing as it seems to possess specific tasks of image information and detection in order to obtain a detailed and accurate image analysis.

Index Terms- Grid computing, Image segmentation, Watershed algorithm.

I. INTRODUCTION

Image segmentation [1-2] is an essential process for computer vision and for image analysis tasks. The general segmentation problem involves the partitioning a given image into a number of homogeneous segments, such that the union of any two neighboring segments yields a heterogeneous segment. Various methods are there for dealing with segmentation and feature extraction like, histogram based techniques, edge-based techniques, region based techniques, Markov random field based techniques, and so on. However, because of the variety and complexity of images, the segmentation is a challenging task.

Image segmentation analysis computationally requires large amounts of processing power for sharing any algorithm and there solutions. One way of obtaining this processing power is to make use of grid computing [3-4]. With grid computing we have the ability to distribute jobs to many smaller server components. The main advantage of grid computing is instead of having one heavily burdened server the load can be distributed across many computers, where the distributed nature of grid computing is transparent to the user. When a user submits a job they don't have to think about which machine their job is going to get executed on. The "grid software" will perform the necessary calculations and decide where to send the job based on policies.

Among the various image segmentation techniques, a well-known image segmentation technique is watershed transform using distance transform [5-6], which is based on mathematical morphology. In contrast to classical area based segmentation, the watershed transform is executed on the gradient image. A good number of works has already been carried out on watershed segmentation and these are available in the published or online literature [7-15]. In this paper we propose a new reliable algorithm for image segmentation using watershed using distance transform with image contrast enhancement concept which will found to be very useful for the grid computing environment.

This paper is organized as the following. The section 2 is a brief description of Grid technology. The section 3 introduces the morphological watershed method in image segmentation. Section 4 describes the proposed algorithm. The implementation results and discussions are described in section 5 and finally conclusions are discussed in section 6. Experimental results presented in this paper are obtained by using MATLAB.

II. THE GRID TECHNOLOGY

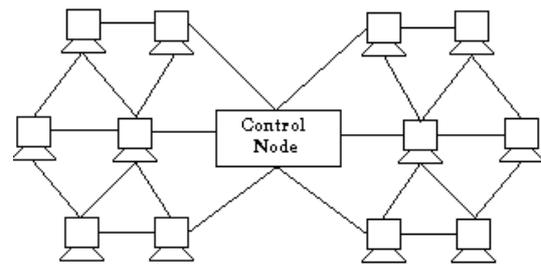


Figure 1: A basic grid computing system, every computer can access the resources of every other computer belonging to the network.

Sharing any algorithms and there solutions is a vast challenge. A grid is a network of computers. Grid technology is based upon so-called nodes that are linked together and share certain communication rules in using open standards. Grid computing framework allows a platform independent access to remote computing services. Web services allow end-users to fully interact with data, information requests as well as applications with a low level of user interaction. It is an Internet embedded network with variety of connected nodes which correspond to servers. Grids are the platform of communication standards, and users can freely concentrate on their desired tasks. Grid also provides network computing of the user's tasks, which is distributed computing. Grid provides a verity of services like, computational services, data services, application services, information services, knowledge services, etc.

III. THE WATERSHED

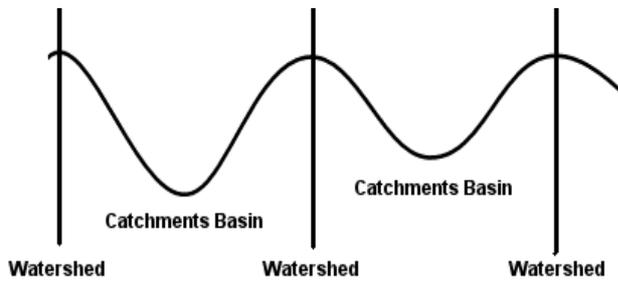


Figure 2: Watershed segmentation-local minima yield catchment basins; local maxima define the watershed lines.

The Watershed method or the watershed transform is an image segmentation technique based on gray-scale mathematical morphology. It can be classified as a region-based segmentation approach where the main idea behind this method comes from geography. If a landscape or topographic relief which is flooded by water, the divide lines of the domains of attraction of rain falling over the region forms watersheds. An alternative approach is to imagine the landscape being immersed in a lake, with holes pierced in local minima also called catchment basins (CB), will fill up with water starting at these local minima, and, at points where water coming from different basins would meet, dams are built. When the water level has reached the highest peak in the landscape, the process is stopped. As a result, the landscape is partitioned into regions or basins separated by dams, called watershed lines or simply watersheds.

A. THE MATHEMATICAL FORMULATION RELATED TO WATERSHED

Let $f \in C(D)$ have minima $\{m_i\}_{i \in I}$, for some index set I . The catchment basin $CB(m_i)$ of a minimum m_i is defined as the set of points $x \in D$ which are topographically closer to m_i than to any other regional minimum m_j :

$$CB(m_i) = \{x \in D | \forall j \in I, j \neq i: f(m_i) + T_f(x, m_i) < f(m_j) + T_f(x, m_j)\}$$

The watershed of f is the set of points which do not belong to any catchment basin:

$$Watershed(f) = D \cap \left(\bigcup_{i \in I} CB(m_i) \right)^c$$

Let W be some label, $W \in I$. The watershed transform of f is a mapping $\lambda: D \rightarrow I \cup \{W\}$, such that

$$\lambda(p) = i \text{ if } p \in CB(m_i),$$

and $\lambda(p) = W$ if $p \in Watershed(f)$.

So the watershed transform of f assigns labels to the points of D , such that (i) different catchment basins are uniquely labeled, and (ii) a special label W is assigned to all points of the watershed of f .

B. WATERSHED WITH DISTANCE TRANSFORM

For digital image segmentation, the distance transform method is commonly used in conjunction with the watershed transform. The distance transform is the distance from every pixel to the nearest pixel of a binary image. In distance transform method every 1-valued pixel has a distance transform value of 0 because its closest nonzero pixel is itself. In below, figure 4(a) shows a binary image matrix, and in figure 4(b) shows the corresponding distance transform.

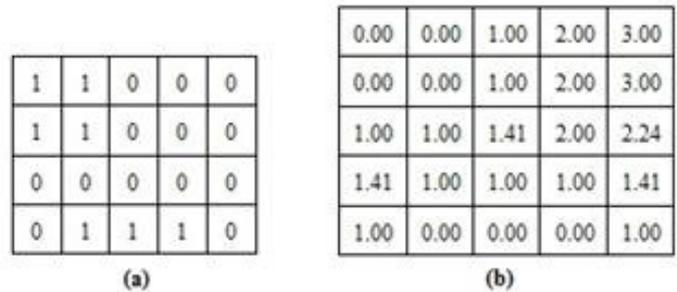
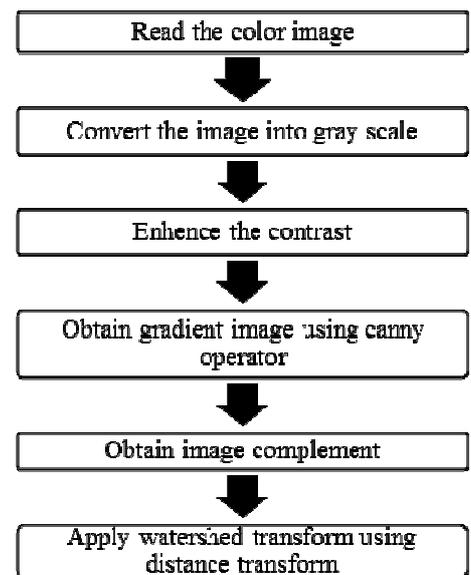


Figure 3: (a) shows a binary image matrix, and (b) shows the corresponding distance transform

IV. PROPOSED SEGMENTATION APPROACH

In proposed approach one color image is chosen and converted in to gray scale. The next steps are to enhance the contrast of the grayscale image and obtaining the gradient image using canny operator. In fourth step the complement image has been obtained from the gradient image and finally the segmented image has been acquired by applying watershed algorithm using distance transform. The flowchart of the proposed algorithm is shown below.



V. RESULTS AND DISCUSSIONS

In the present study two color images has been chosen. The first image is the most popular image in the recent literature, the 512 by 512 lina image and the second one is the image of Fruits having 299 by 215 dimensions which have been shown in figure 4(a), 5(a) respectively. The segmented images obtained by the standard watershed algorithm using distance transform are shown in figure 4(b) and 5(b) respectively. And again the segmented images obtained by applying proposed have been sown in figure 4(c) and 5(c) respectively.

It has been observed that the watershed lines in segmented images obtained by proposed algorithm are very sharp, thin and prominent. These segmented images are expected to create much more response clarity and sharpness of the edges and counters. The entropy and PSNR of the final segmented images applying standard watershed algorithm using distance transform and by applying proposed algorithm have been calculated and the values have been shown in the table 1.

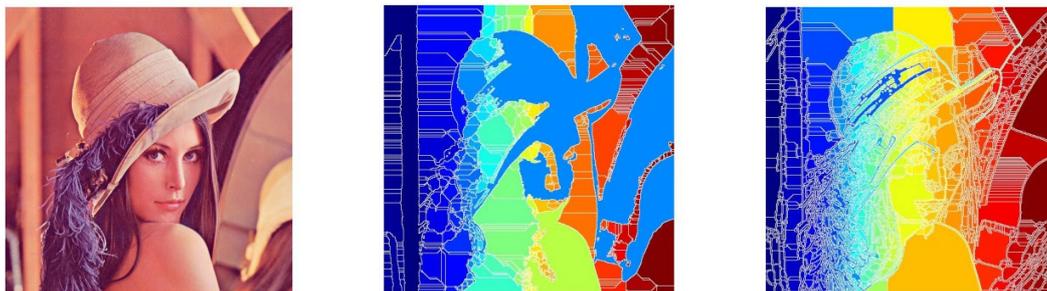


Figure 4: (a) Original image of Lena, (b) segmented image of Lina by applying watershed algorithm using distance transform, (c) segmented image of Lena by applying proposed algorithm.

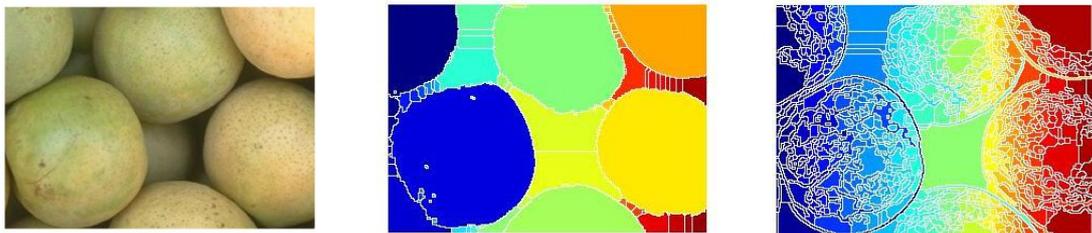


Figure 5: (a) Original image of Fruits, (b) segmented image of Fruits by applying watershed algorithm using distance transform, (c) segmented image of Fruits by applying proposed algorithm.

Table I- statistical measurement

Image	Techniques	Entropy	PSNR
Lena	watershed algorithm using distance transform	4.7330	8.7199
Lena	Proposed algorithm	5.0482	8.0373
Fruits	watershed algorithm using distance transform	3.4212	7.9364
Fruits	Proposed algorithm	4.0951	8.2148

VI. CONCLUSION

In this paper a new method for image segmentation had

been presented. This method makes use of the observation that image segmentation results using watershed algorithm with distance transform with the concept of image contrast enhancement is a good form of segmentation technique. The

statistical measurement analysis assures the effectiveness of the proposed algorithm. This algorithm will be very effective in a grid computing environment where the load will be on remote machines rather than clients with minimum processing power and better performance for image segmentation as grid computing is cooperation of different computers, for a specific job.

ACKNOWLEDGMENT

The authors acknowledge the constant inspiration and encouragement from Professor P. K. Bose, Director, National Institute of Technology, Agartala.

DEDICATION

One of the others (Dibyendu Ghoshal) dedicates the entire study to the loveliest and loving memory of his only one and younger sister Kumari Sumita Ghoshal who herself was a gem of the scholars, a symbol of wisdom and art, peerless beauty and simplicity, unfathomable knowledge and generosity.

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Efficient Message Passing in VANET Using Message Handling Algorithm and LTA, MNA Agents

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Abstract- The agent based architecture proposed in this paper, is a multi-hop broad cast scheme which is called as Link-Based Distributed Multi-hop Broadcast (LDMB). The existing scheme is a backtracking scheme while the proposed scheme is a forwarding approach which broadcasts emergency messages efficiently in vehicular ad hoc network. The forwarding scheme in LDMB is completely distributed, where each vehicle who receives the emergency message estimates its link status firstly and then computes the waiting time before forwarding this message. LDMB does not need any handshakes and there may be several candidates to forward the message which provides the reliability of the multi-hop broadcast. This paper uses the advantages of LDMB in an agent based environment thereby improving performance of message passing and overcoming the problem of fixed packet size as proposed in the earlier systems.

Index Terms- Link-based Distributed Multi-hop Broadcast (LDMB); Vehicular Ad Hoc Network (VANET); emergency messages; forwarding scheme

I. INTRODUCTION

VANET which is a promising solution to Intelligent Transportation System (ITS) are experiencing a rapid development under the urgent demand of road safety in recent years. With the continuous increasing number of vehicles on roads, the safety applications of VANET are extremely important to thousands of people's lives. The VANET which supports complete mobility and applications in dynamic, random, and multi-hop topology is one of the branches of MANET (Mobile Ad Hoc Network) in a special situation. In VANET, the change of the topology is rapid but predictable; fragmentation of the network occurs frequently; the mobility of the nodes is regular and they do not have the problem of energy limitation, there is rich information from outside equipments such as GPS (Global Positioning System) and GIS (Geographic Information System). To cope up with this rapid changing topology in VANET it is a high time need to go for an alternate approach for packet forwarding and this paper discusses on agent based approach using LDMB [12].

II. EXISTING PROTOCOL

The Existing VANET geocast routing protocols cannot fully support the requirements essential for efficient communication. Moreover the vehicles in the dangerous region are not properly intimated with warning notifications. As such, this results in link connectivity problem or frequent temporary network fragmentation problem. With frequent temporal network fragmentation problem in mobicast messages may not be successfully received.

III. CONCEPT OF LOCATION TRACKING AGENT (LTA)

The location tracking agent keeps track of the location of each agent and their current state. This agent may reside on one or more hosts on the network. The registry implementation may utilize a central registry, a fully replicated registry or a distributed registry. The LTA agent is equipped with a special registry to maintain location information. The registry keeps track of three tables: the transient table, the user agent location table, and the system agent location table. The transient table has two attributes: Agent name and target address. The location table for user agents has five attributes: Agent name, network address, MNA agent, MEA agent name, and agent mobility state. The MEA and the MNA attributes provide the ability to load-balance the message forwarding and events management services. In the simplest environments, a single MEA agent and a single MNA agent carry these services. The location table for system agents has four attributes: Agent name, network address, agent running state, and utilization load.

IV. THE MESSENGER AGENT (MNA)

The messenger agent is responsible for storing asynchronous messages. The MNA agent buffers messages for agents in transient and is equipped with a special registry to maintain message information. The registry keeps track of one table that has five attributes: Agent name, message ID, message envelope, message contents and timestamp buffering a message is triggered by an event that is posted by the middleware of the agent in transient. At arrival the middleware may instruct the MNA agent to deliver its messages or it may retrieve the messages itself. The MNA reassembles the message from the message envelope and the message content fields and routes the message to the recipient. The MNA agent also serves as a messaging board that stores asynchronous messages.

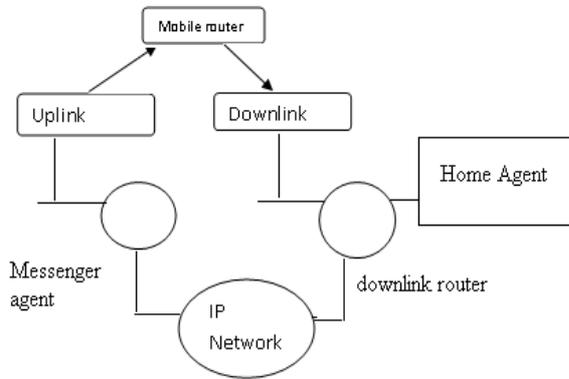


Fig 1: Messenger agent Architecture

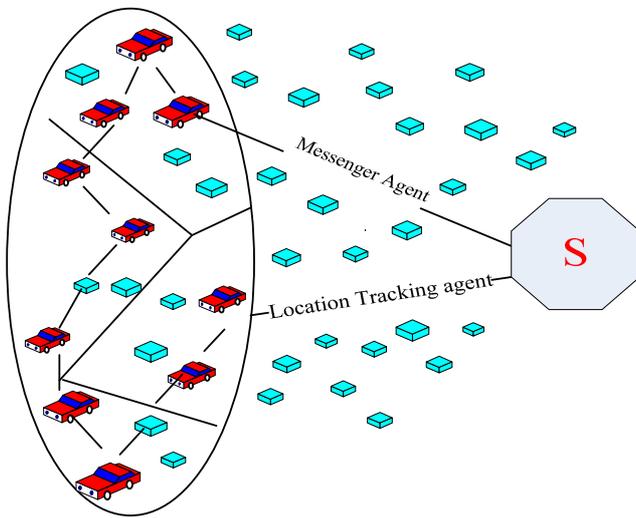


Fig 2: Proposed Architecture

In order to avoid the congestion the source node tracks the nearest location and send a message to the nearest neighbor node. Whenever the node want to transfer the information from the node to sink node. It broadcast the message to Agents. It gathers the neighboring nodes information and make sure the message reaches sink node with more surely.

V. LINK-BASED DISTRIBUTED MULTI-HOPBROADCAST PROTOCOL

The scenario we consider in the paper is a straight expressway without any intersections, where the behaviors of vehicles are relatively regular, and which will also have a profound influence on the performance of the network. The speed of the vehicles, density, vehicle flow, and headway are some basic measurements to describe the condition of some road section in traffic theory. The speed of vehicles running on expressway is limited from

80km/h to 120km/h in China, and density maybe different as the time or location changes. Headway is another important factor not only in traffic theory but in our simulation scenario. One of the most popular distribution models of time headway is Erlang distribution [1], and the density distribution is as follows,

$$f(t) = \lambda \exp(-\lambda t) \frac{(\lambda t)^{k-1}}{(k-1)!} \quad (1)$$

$$\hat{\lambda} = \frac{\mu}{\sigma^2}, \quad \hat{k} = \frac{\mu^2}{\sigma^2} \quad (2)$$

Where μ is the mean of the observed headways and σ is the standard deviation of the observed headways.

VI. ALGORITHM DESCRIPTION

We propose that the forwarding scheme is based on the link status of each vehicle which is measured by the probability of packet reception. The analytical estimation of probability of packet reception is shown as [7],

$$P(x, \delta, r, f) = e^{-3(x/r)^2} \left(1 + \sum_{i=1}^4 h_i(\xi, r) \left(\frac{x}{r} \right)^i \right) \quad (3)$$

where
$$h_i(\xi, r) = \sum_{i,k \geq 0} h_i^{(i,k)} \xi^i r^k \quad (4)$$

$$i=1, \dots, 4, \quad \text{with } \xi = \delta \cdot r \cdot f$$

and x is the distance between sender and receiver in meters (m); δ is the traffic density in vehicles per kilometer (veh/km); r is the transmission range in meters (m) with certain transmission power; f is the message rate; $h(i;k)$ i is the empirical coefficients that is given in [7]. We denote the reception probability of packet from vehicle m to vehicle n as P_{mn} , and distance between vehicle m and n is x_{mn} . For simplicity, the transmission range r of all vehicles is assumed to be the same. This empirical probability may not accurate because it is well know that wireless link is influenced by shadowing and fading losses and the quality of wireless link changes quickly. So the probability of packet reception here is just an estimation value but this will not affect the reliability of the message transmission.

When the source vehicle s has broadcasted the emergency message, vehicles in its transmission range may receive this message. Without loss of generality, emergency messages in this paper is supposed to transmit in the opposite direction of the running vehicle, i.e. backward. Consequently, each vehicle in the forward direction that receives the emergency message will discard it whereas backward vehicles will calculate the possible reception probability of this message. A probability threshold P_{th} is set to screen out high quality links and vehicles with high quality link then calculate the waiting time before forwarding. The waiting time of the location-based forwarding scheme can be obtained from [6]

$$T_w = \left(- \left\lfloor \frac{x}{r} * MaxSlot \right\rfloor + MaxSlot \right) * T_s \quad (5)$$

where $MaxSlot$ is the maximum number of slots a vehicle waits before forwarding and T_s is the length of one slot.

The forwarding scheme in LDMB is link-based, so we modify the formula (5) to

$$T_w = \left\lceil (\alpha^{P_{sj}} \alpha^{P_{th}-\epsilon}) * MaxSlot \right\rceil * T_s \quad (6)$$

where *MaxSlot* and *T_s* is the same as in (5), *P_{th}* is the threshold aforementioned, *P_{sj}* is the packet reception probability of vehicle *j* which may receives the packet from the source vehicle *s*, α and ϵ are adjusting factors of waiting time and their empirical values are shown in table 1. After getting the waiting time vehicles begin their waiting process and the shorter the waiting time of the vehicle is the earlier the vehicle forwards the emergency message. If the vehicle which is supposed to forward the packet firstly forwards the packet successfully, other vehicles that are still in the process of waiting receive the forwarding packet and will stop the waiting process immediately. On the other hand, if the vehicle which is supposed to forward the packet firstly fails to forward because of collision, other vehicles will continue the waiting process until a vehicle forwards the message. The worst situation is that all neighbors in the source vehicle's one-hop range fail to forward the packet or there is no neighbor in the source vehicle's one-hop range, and in this circumstance the source vehicle will rebroadcast the packet after the maximum waiting time, i.e., *MaxSlot***T_s*. This forwarding scheme will be repeated several times which is decided by the transmission range of the vehicles and the demand of the kind of the emergency message. The summary of the forwarding scheme in LDMP is shown as follows.

Step1. On receiving the packet from source vehicle *s*, vehicle *j* in the specified direction estimates the packet reception probability *P_{sj}*. For any $P_{sj} \geq P_{th}$, vehicle *j* is the candidate to forward the packet.

Step2. Vehicle *j* calculates its waiting time *T_w* based on *P_{sj}* and begins the waiting process.

Step3. On hearing the packet for the second time from candidate vehicles, go to Step5.

Step4. Having waited for the time of *T_w*, vehicle *j* forwards the packet.

Step5. Vehicle *j* quit the process of waiting. The procedure exits.

VII. PROPOSED MODEL

First the location tracking agent tracks the location and then messenger agent receives the message and compare the message identifier with vehicle identifier. If the message identifier matches with vehicle identifier then the message is reported to the driver otherwise it gets rejected. The reported message is stored in the memory and it is transmitted periodically to other vehicles. When the message queue is filled with the messages, or the time stamp gets off the configured time period, the messages

are automatically deleted. This scheme is depicted graphically in the figure below.

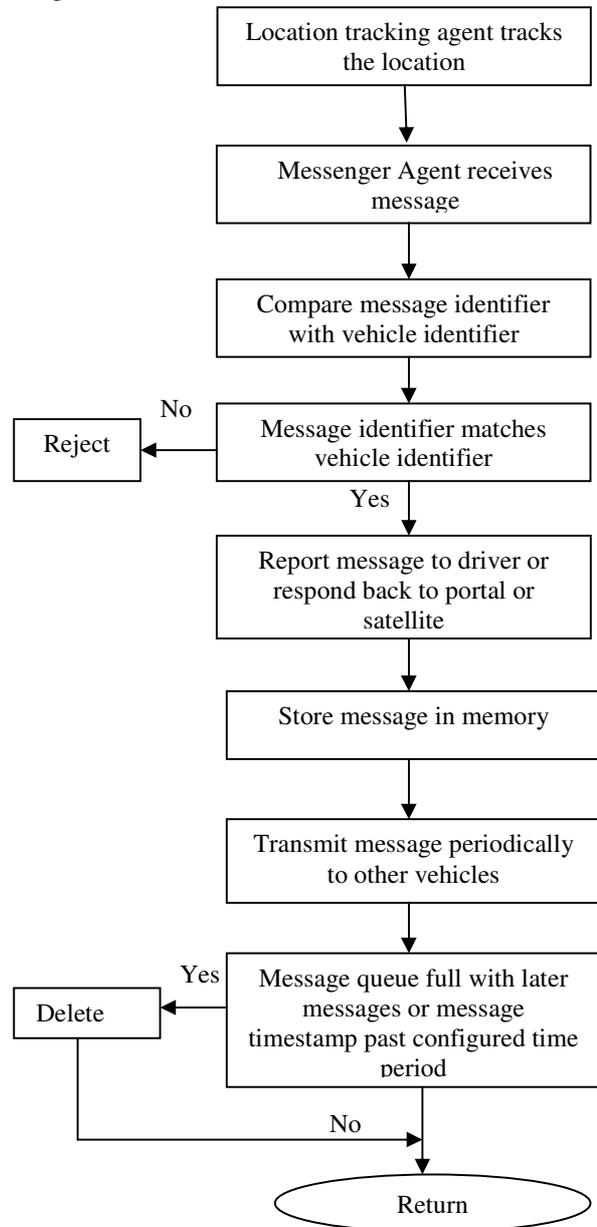


Fig 3. Message Handling model

VIII. MESSAGE HANDLING(MH) ALGORITHM

Step 1: The agent tracks the location.

Step 2: The Messenger Agent receives the message.

Step 3: The Messenger Agent compare the message identifier with vehicle identifier

Step 4: If the message identifier matches with the vehicle identifier. Then the report messages are send to driver or respond backto portal or satellite.

Step 5: Then it stores the message in memory and transmits the message periodically to other vehicle.

Step 6: If the message queue is full with later messages or message timestamp past configured time period then delete it, otherwise return.

IX. RELATED WORK

The LDMB we propose in the paper takes the distance between sender and receiver, transmission power, transmission rate, and vehicular traffic density as the influencing elements to link status. Then, vehicles which receive the emergency message will make the forwarding decision according to their own link status. Once one of the elements aforementioned changes, the link status would change accordingly and the forwarding decision of vehicles might be different. The forwarding scheme in LDMB is completely distributed which does not need any handshakes, and we will describe it in detail in the following section.

It is supposed all vehicles are equipped with GPS receivers and all kinds of sensors, which provide the current vehicle state to the routine messages exchanging between vehicles. However, the traditional GPS receivers on vehicles which are widely used all over the world can provide position information with an accuracy of approximately 10m, which is far from the demand of VANET. In [4], DGPS (Differential Global Positioning System) is used in automated vehicle location systems. Other vehicle state, such as speed, direction and acceleration can be obtained through sensors. We will not consider the topology changes during the message propagation because the transmission, propagation and back off time scales are much smaller compared with the vehicles' position changes. The headways between vehicles follow the Erlang distribution as mentioned above. Vehicles exchange routine messages with their neighbors through one-hop broadcast at certain rate and these messages are stored in every vehicle's neighbor information table. Once something emergent happens, emergency message would send out though multi-hop broadcast as soon as possible. The forwarding scheme during the multi-hop is discussed in the following subsection.

X. CONCLUSION

We proposed a time/location-critical framework using Location Tracking Agent LRA and Messenger Agent MNA for emergency message dissemination in vehicular ad-hoc networks. Although data dissemination in VANET and MANET has been studied extensively in the literature, to the best of our knowledge, it is the first time that multiple deadlines at different locations are taken into account at the same time. This is achieved through our previously proposed LTA and MNA scheme, which allows messages of different importance to be broadcast to different distances simultaneously. We propose a location-based secure and dependable disaster rescue network. By solving the challenging problem of exploiting the stored location information for post as well as pre disaster rescue, and at the same time preserving location privacy in normal network operations, the system offers a functional, secure, and sound

networking solution for disaster rescue, which is likely to gain user acceptance and requires little deployment effort. We plan to carry out simulations for different connectivity scenarios and different parameter settings (e.g., time interval in the temporal redundancy mechanism), by incorporating various locating/positioning techniques, and different methods for dividing geographic areas in redundancy storage, to evaluate the performances of the proposed networking solution applied in Location Tracking Agent LTA and Messenger Agent MNA. This paper uses the advantages of LDMB in an agent based environment thereby improving performance of message passing and overcoming the problem of fixed packet size as proposed in the earlier systems.

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Characterizing the *Drosophila melanogaster* *lethal(2)denticleless* gene in InsP₃R background

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Abstract- Protein containing WD-repeats participate in a wide range of cellular functions, they are generally involved in regulatory mechanisms concerning chromatin assembly, cell cycle control, signal transduction, RNA processing, apoptosis and vesicular trafficking. *lethal(2)denticleless* is a recently identified novel class of Protein containing WD-repeats. Bioinformatic analysis has shown conservation of critical functional motifs among the human L2DTL, mouse L2dtl and *Drosophila* l(2)dtl proteins. The function of l(2)dtl is still under speculation but the studies suggest that L2DTL and PCNA are involved in CDT1 degradation after DNA damage and cell cycle regulation. The gene expression studies have shown that l(2)dtl levels are altered in different condition and even found up-regulated in under galactose challenge conditions in human. l(2)dtl was chosen for its potential regulation by InsP₃R mediated intracellular Ca²⁺ signaling. This study indicates a possible role of l(2)dtl in InsP₃R mediated intracellular Ca²⁺ signaling.

Index Terms- *lethal(2)denticleless* (l(2)dtl), Inositol 1,4,5 trisphosphate receptor (InsP₃R), signal transduction and WD-repeats.

I. INTRODUCTION

lethal(2)denticleless gene was identified while analyzing the cell cycle gene *morula* (*mr*) by complementation analysis of embryonic-lethal mutations and the mutants found lacking ventral denticle belts named l(2)dtl [1]. The human L2DTL, a conserved WD40 domain-containing protein was found to be part of CUL4 ubiquitin E3 ligase complex identified by mass-spectrometry [2]. The proteins containing WD-repeats participate in a wide range of cellular functions, they are generally involved in regulatory mechanisms concerning chromatin assembly, cell cycle control, signal transduction, RNA processing, apoptosis and vesicular trafficking [2]. In *Drosophila* it is expressed at a very high levels in the early embryo and in adults shown as by in-situ hybridization and northern blotting respectively [1]. The reason for high level expression in the early embryo is maternal contribution confirmed by *in situ* hybridization in the female germ line. The human ortholog when down-regulated by RNAi in hepatocellular carcinoma (HCC) leads to reduced cancer cell growth and invasion capability *in vitro* and in which microarray analysis disclosed dysregulation of genes involved in cell cycle regulation, chromosome segregation, and cell division [3]. In mouse the l(2)dtl homolog is known as CTD2. L2DTL knockout mice show embryonic lethality which is also reported in *Drosophila* and morphological studies of early embryos have shown fragmentation of mitotic chromosomes and chromosomal

lagging indicating its involvement in nuclear division [3]. As of now the *Drosophila* l(2)dtl gene had not been annotated as a cell cycle regulator but data from both *Drosophila* and human cells suggests that the L2DTL protein is a targeting subunit of the CUL4/DDB1 ubiquitin ligase complex that targets critical cell cycle regulators for degradation [4]. RNAi targeting in the human ortholog has been shown to cause growth arrest and an increase in both p53 protein and the DNA replication licensing factor CDT1 [5, 6]. Additionally, human l(2)dtl has been shown to oscillate during the cell cycle with peak expression occurring at the G1/S transition, consistent with a role in regulating G1/S transition [7]. Other independent studies have shown that it plays an important role in cell proliferation through regulation of a G2/M checkpoint [8]. Some recent reports also indicate its involvement in differentially regulating histone methylation at K4, K9 and K27 through interaction with CUL4–DDB1 E3 ligase complexes which target CDT1 for proteolysis in response to DNA damage [2]. Very recently l(2)dtl was reported as one of the hits whose function might be linked to blood cell development or function in *Drosophila* and its involvement in transcription through DREF involving *ddb1* [9]. Other reports, report role in regulation of endocycles in *Drosophila* through E2F1 transcription factor [10, 11].

InsP₃R is a calcium channel on ER. InsP₃R functions, differentially in specific tissues or at specific stages of development. This has been shown using EMS generated single point mutations in the *itpr* gene [12]. The phenotypes include defective recovery from olfactory adaptation [13], altered adult wing posture, defective flight and flight physiology and defective nerve branching at neuromuscular junctions in adults [14] and smaller larval body size due to a feeding defect and reduced insulin signaling [15]. Also gene expression study in IP₃R mutant larvae shows altered regulation of transcripts related to carbohydrate and amine metabolism [16]. A microarray study was performed to study the feeding defect leading to developmental arrest of second instar larvae [16]. l(2)dtl genes was found differentially regulated in the microarray and was selected for functional validation.

II. MATERIALS AND METHODS

A. *Drosophila melanogaster* strains

The UAS-RNAi-l(2)dtl was procured from VDRC [17]. *Elav^{C155}GALA* (a stronger pan-neuronal driver) [18]. *itpr^{Ka1091/hg3}* is a heteroallelic combination of single point mutants in the *itpr* gene generated in an ethyl methanesulfonate (EMS) screen. Detailed molecular information on these alleles has been published [12]. The wild-type *Drosophila* strain used in all experiments is *Canton-S* (CS). Fly strains were generated by

standard genetic methods using individual mutant and transgenic fly lines described above. Flies were grown at 25°C in standard cornmeal medium containing agar, corn flour, sucrose and yeast extract along with anti-bacterial and anti-fungal agents.

B. Larval staging and lethality measurements

Staging experiments for obtaining molting profiles of heteroallelic mutant larvae were carried out as described previously with minor modifications [12]. Briefly, flies were allowed to lay eggs for a period of 8 hrs at 25°C. Embryos were allowed to hatch and grow further at this temperature. Larvae of the desired genotype were selected from these cultures at 56–64 h after egg laying (AEL) and transferred into vials of standard cornmeal medium lacking agar (agar less medium). Larvae were grown in agar less medium at 25°C and screened at the indicated time points for number of survivors and their phase of growth and development. For each time interval, a minimum of 75 larvae were screened in batches of 25 larvae each. Computation of means, SEM, and *t*-tests were performed using Origin 7.5 software (Origin Lab, Northampton, MA, USA).

C. RNA isolation

For isolation of total RNA, larvae of the requisite genotypes were selected at 120–124 hr AEL and snap frozen in liquid nitrogen. Total RNA was isolated using TRI Reagent (Sigma, St. Louis, USA). The frozen larvae were crushed with a baked homogenizer after adding 250µl of the TRI Reagent (Sigma, St. Louis, USA). The pestle was washed with another 250µl of TRI Reagent, mixed properly and transferred onto a clean eppendorf. 250µl each of equilibrated RNase free phenol and chloroform were added and vortexed for 60 seconds. The tube was then centrifuged at 14,000 rpm for 5 min at 4°C. The aqueous layer was removed into a fresh tube and re-extracted with the same amount of phenol and chloroform, repeating the above spin. The aqueous layer was again put into a fresh tube and extracted with 500µl of chloroform and spun at 14,000 rpm for 5 min at 4°C. The upper aqueous layer was then precipitated with two volumes of RNase-free 100% ethanol by keeping it at -80°C for at least 30 minutes. The sample was spun at 14,000 rpm for 30 min at 4°C. The supernatant was removed and the pellet washed with 500µl of 70% ethanol. The pellet was air dried and finally dissolved in appropriate amount of DEPC treated water. After quantification, RNA with a ratio of OD₂₆₀/OD₂₈₀ > 1.8 was taken for further experiments. Integrity of the isolated RNA was confirmed by the presence of full length rRNA bands on a 1.2% formaldehyde agarose gel. RNA was isolated from *CS*, female *UAS-RNAi-l(2)dtl/Elav^{C155}GALA*.

D. Reverse Transcription-PCR (RT-PCR)

Total RNA (1µg) was reverse transcribed in a volume of 20µl with 1µl (200U) Moloney murine leukemia virus (M-MLV) reverse transcriptase (Invitrogen Technologies, Carlsbad, CA, USA) using 1µl (200ng) random hexaprimers (MBI Fermentas, Glen Burnie, MD, USA) containing 1mM dithiothreitol (DTT) (Invitrogen Technologies, Carlsbad, CA, USA), 2mM of a dNTP mix (GE HealthCare, Buckinghamshire, UK) and 20U of RNase Inhibitor (Promega, Madison, WI, USA) for 1h at 42°C. The polymerase chain reactions (PCRs) were performed using 1µl of

cDNA as a template in a 25µl reaction volume under appropriate conditions.

E. TOPO TA Cloning

Full length cDNA of *l(2)dtl* was PCR amplified by using *l(2)dtl* specific primers by Taq polymerase and was cloned into pCRII-TOPO vector. The TOPO vector is linearized and has single 3' – thymidine (T) overhangs and topoisomerase I that is covalently bound to it. The ligation reaction takes place with the help of the Topoisomerase I enzyme within 5 minutes. The ligation reaction was carried out using TOPO TA Cloning kit (Invitrogen, California, USA). A 4:1 ratio of PCR product to vector was used. 2µl of the ligation reaction was used for transformation.

F. Transformation

Transformation was performed using One Shot TOP 10 competent *E. coli* cells (Invitrogen, California, USA). 1–2µl of the ligated DNA was added to 100µl of TOP 10 competent cells thawed on ice and mixed gently and allowed to incubate on ice for 30 minutes. A heat shock was given at 42°C water bath for 30 seconds and placed them on ice for 2 minutes. 250 µl of LB medium was added to the solution and incubated at 37°C water bath for one hour. After an hour, 50µl was plated out on an LB agar plate containing 50µg/ml ampicillin and rest was store at 4°C. The plate was incubated at 37°C overnight. The colonies obtained were inoculated in 2–5 ml of liquid LB medium + 50µg/ml ampicillin and cultured overnight. DNA was extracted following standard protocols as described below.

G. Plasmid DNA Extraction (Mini prep)

After overnight incubation, the cultures were transferred to an eppendorf, spun at 8,000 rpm for 3 minutes at 4°C and supernatant discarded. The pellet was re-suspended in 150µl of Solution I (GTE, 50mM glucose, 25mM Tris-Cl, pH 8.0 and 10mM EDTA, pH 8.0) by vortexing. 250µl of Solution II (0.2N NaOH and 1% SDS) was added and mixed by inverting the tube 5–6 times and incubated on ice for 3 minutes 30 seconds. 150µl of Solution III (3M Potassium acetate and 5M glacial acetic acid) was added, mixed by inverting and kept in ice for 10 minutes. The solution was then centrifuged at 14,000 rpm at 4°C for 10 minutes and supernatant transferred into a fresh tube avoiding any cell debris. An equal volume of equilibrated Phenol: Chloroform was added to the supernatant and spun at 14,000 rpm for 15 minutes at room temperature. The upper aqueous phase was removed carefully and 1ml of cold 100% ethanol along with 50µl of Sodium acetate was added, mixed and then spun at 14,000 rpm, 4°C for 10 minutes. The supernatant was discarded and the pellet washed with 500µl of 70% ethanol and spun again at 14,000 rpm, 4°C for 5 minutes. The supernatant was discarded and the pellet was allowed to air dry. The pellet was then re-suspended in 40–50µl of autoclaved double distilled water or TE having RNaseA (10µl of 20mg/ml RNaseA in 1ml double distilled water or TE) and incubated at 37°C for 30 minutes. 1µl of the DNA was then run on a 0.8% agarose gel along with the vector DNA as the control and another 1µl was used on nanodrop for quantification. Plasmid DNA that migrated slower than vector DNA was selected for further analysis.

Restriction endonuclease (RE) digestions were done with specific enzymes at 37°C for 3 hours to confirm the presence of the required fragment.

H. PEG precipitation of plasmid DNA

To the confirmed positive clones from RE digestions, 2.5µl of 4M NaCl and 40 µl of 13% PEG8000 was added to linearised plasmid by BamHI RE and mixed vortexing and incubation on ice for 20 minutes, the solution was centrifuged for 15 minutes at 14,000 rpm at 4°C. The supernatant was removed and the pellet was washed with 70% ethanol and air-dried. The pellet was dissolved in 15-20 µl of PCR quality water and 1µl of the DNA was then run on a 0.8% agarose gel along with the vector DNA as the control and another 1µl was used on nanodrop for quantification. Approximately 200 ng of the PEG precipitated DNA was used for sequencing.

H. Sequencing Analysis

The cloned DNA fragments were sequenced with gene specific and SP6/T7 specific primers using the Big Dye terminator cycle sequencing kit on the 301 Genetic Analyser Sequencer (ABI Prism). The gene sequence obtained was then compared with the published *Drosophila* sequence from flybase and analysed on DNAMAN.

I. Phenol Chloroform Extraction of DNA

In order to clone the positive full length cDNA of *l(2)dtl* into the multiple cloning site of the vector pUAST in 5' -3' orientation, a restriction digest of both the purified PCR fragment and the vector with XbaI and EcoRI was done separately (single digest). To 100 µl of the PCR reaction, 100 µl of phenol:chloroform was added and mixed by vortexing and centrifuged at 14,000 rpm for 5 minutes at RT. The upper aqueous layer was transferred to a fresh eppendorf and an equal volume of chloroform:isoamylalcohol (24:1) added and centrifuged again at 14,000 rpm for 5 minutes. The above step was repeated once again. To the upper aqueous layer that was transferred into a fresh tube, one-tenth volume of 3M sodium acetate (pH 5.0) and 2.5 volumes of double distilled alcohol was added and kept at -80°C for 30 minutes or -20°C for two hours or more. The solution was spun at 14,000 rpm for 15 minutes and supernatant discarded. The pellet was then washed with 70% ethanol and spun for 5 minutes at 14,000 rpm. The pellet was then air dried and dissolved in 20 µl of PCR quality water. 1µl of the DNA was then run on a 0.8% agarose gel along with the vector DNA as the control and another 1µl was used on nanodrop for quantification and was further used for ligation.

J. Gel Extraction

The required full length cDNA of *l(2)dtl* fragment from pCRII-TOPO vector and linearised pUAST vector was digested with EcoRI RE and was gel purified using the Qiagen Gel Extraction Kit (Qiagen, Venlo, Netherlands). The restriction-digested fragment was run on a 0.8% agarose gel. The area of the gel containing the DNA fragment was cut under minimum UV exposure, using a clean and sharp blade and put into an eppendorf. The gel was weighed and 300 µl of QG buffer was added for every 100mg of gel. The tube was incubated at 50°C for 10 min (or until the gel slice has completely dissolved) was

vortexed thoroughly. After the gel slice has dissolved completely, 1 gel volume of isopropanol (agarose gel slice is 100 mg, add 100 µl isopropanol) was added to the sample and mix. The tube was then placed in a QIAquick spin column provided with 2 ml collection tube and centrifuged at 13,000 rpm for 30 seconds and the flow-through was discarded. The QIAquick spin column was then washed with 0.75 ml of Buffer PE and centrifuged at 12,000 rpm for 1 minute and flow-through was discarded. The QIAquick column was centrifuged for an additional 1 min and flow-through was discarded. QIAquick column was placed into a clean 1.5 ml microcentrifuge tube to elute DNA, 30 µl of autoclaved double distilled water was added to the center of the QIAquick membrane and centrifuged for 2 min at maximum speed. 1µl of the DNA was then run on a 0.8% agarose gel and another 1µl was used on nanodrop for quantification and was further used for ligation.

K. Ligation

The ligation reaction was carried out using the Quick Ligase kit (NEB, Ipswich, Massachusetts, USA). A 1:3 ratio of restriction digested gel purified vector and PCR fragment was used along with 1µl of the quick ligase enzyme and 10µl of the buffer. The reaction mixture was kept at room temperature for 15 minutes. For transformation 10µl reaction mix was used into One Shot TOP 10 competent *E. coli* cells (Invitrogen, California, USA).

L. DIG-labeled *l(2)dtl* RNA probe preparation for in situ hybridization

Digoxigenin labeled probes were made by random-primed labeling of DNA fragments (Cat.No.11175025910, Roche Applied Science). Probes for *Drosophila l(2)dtl* were designed to the common region and specific exons. Probes were amplified from gene specific PCR fragment cloned in PCRII-TOPO (#K460001, Invitrogen, California, USA) and sequenced to verify orientation and identity of the fragment. DIG-labeled RNA probes were generated from plasmid DNA using the Roche DIG-RNA Labeling Kit (#11175025910, Indianapolis, Indiana, USA) and the labeling efficiency was determined following the manufacturer's protocol. Sense and antisense probes were generated from the same plasmid, taking advantage of the SP6 and T7 dual promoter flanked PCRII-TOPO cloning site. Probes were diluted to 10ng/µl and stored at -80°C for up to 6 months.

M. Primers used

1. For RT-PCR and for preparation of *l(2)dtl* RNA probes
forward AAGGAGAAGGTGGACTGGCTGA
reverse GGATTGGGAATGGGAGTGCGA
2. For amplification of full length cDNA clone
forward CACCGAATTCACGGTCACACTGCCCAAG
reverse GCTCTAGATGTACAGAGGGCGGGGAG
3. For sequencing of full length cDNA clone
Oligo 1 CGATCACACTGCCAGACTGTGG
Oligo 2 CATCAAATCCTGCCTCAGCCCCG
Oligo 3 CTCCTTCGCCTTCCGCTTGG
T7 TAATACGACTCACTATAGGG
Sp6 ATTTAGGTGACACTATAG

III. RESULTS AND DISCUSSION

A. Bioinformatic analysis of *l(2)dtl* sequence

l(2)dtl gene has a coding sequence of 2274 bp, consisting two exons 8 bp and 2266 bp long which is separated by a 274 bp intron (Figure 1A). The promoter region has three typical heat shock elements (HSE) and three thermal stress responsive elements (TSE, Figure 1A). Bioinformatic analysis revealed conservation of critical functional motifs among the human L2DTL, mouse L2dtl, and *Drosophila l(2)dtl* proteins. Sequence analysis from Clustal-W reveals that the 769 amino acid protein consists of highly conserved region at the C-terminus and a poorly conserved region at the N-terminus (Figure 1B). The protein motif analysis from PROSITE and P-fam shows multiple Protein kinase C and Casein Kinase II phosphorylation sites, multiple N-myristoylation sites, three each

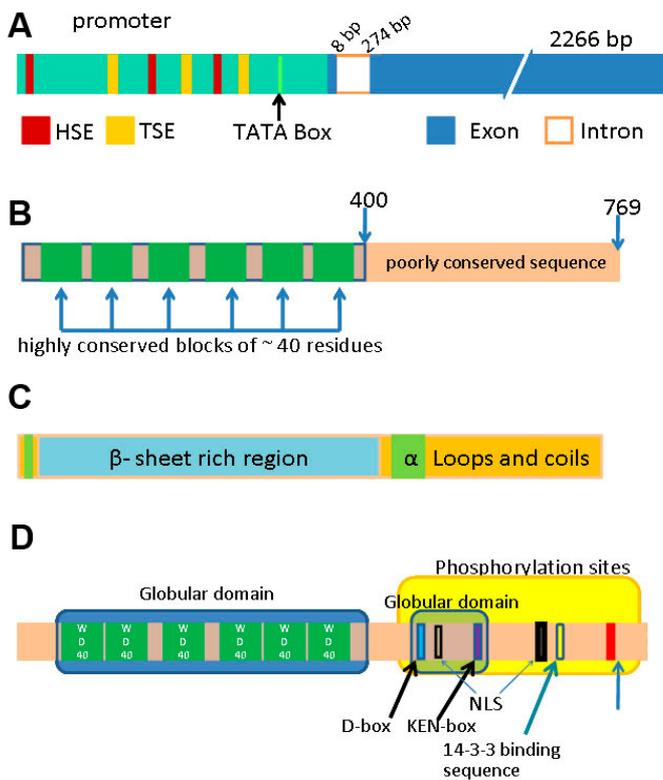


Figure 1: Schematic representations and Bioinformatic analysis of *Drosophila l(2)dtl* (A) *l(2)dtl* gene contains 2 exons (blue boxes) and one intron (white boxes) (B) Clustal-W analysis (C) secondary structure prediction (D) protein architecture search-Elm showing different domains.

of N-glycosylation and cAMP-dependent protein kinase phosphorylation sites, one tyrosine kinase phosphorylation and one DNA methylase site. The protein is 49% and 45 % similar to its human and mouse homolog respectively. Secondary structure prediction shows the presence of 3.51% α-helices, 41.22% β-sheets, and 55.27% loops and coils (Figure 1C).

The protein contains six WD40 repeats, two nuclear localization signal (NLS) at the N-terminus, one potential PEST

sequence, one KEN box signal, and a D-box signal (Figure 1D). WD40 (Tryptophan-Aspartate) repeat proteins are involved in several important biological functions including transmembrane signaling, cytoskeletal dynamics, vesicle fusion, protein trafficking, nuclear export, RNA processing, chromatin modification, and transcriptional mechanisms and cell division [19, 20]. KEN box and D-box are involved in regulation of cell cycle through ubiquitin-mediated protein degradation [21] and PEST-like sequences are required for phosphorylation and ubiquitination [22].

B. Characterization of *l(2)dtl* in *InsP₃R* background (*itpr^{ka1091/ug3}*)

To elucidate the possible role of *l(2)dtl* in mediating calcium release from *InsP₃R*, the flies were analysed with *l(2)dtl* mRNA knocked down by using specific GAL4 driver. A pan-

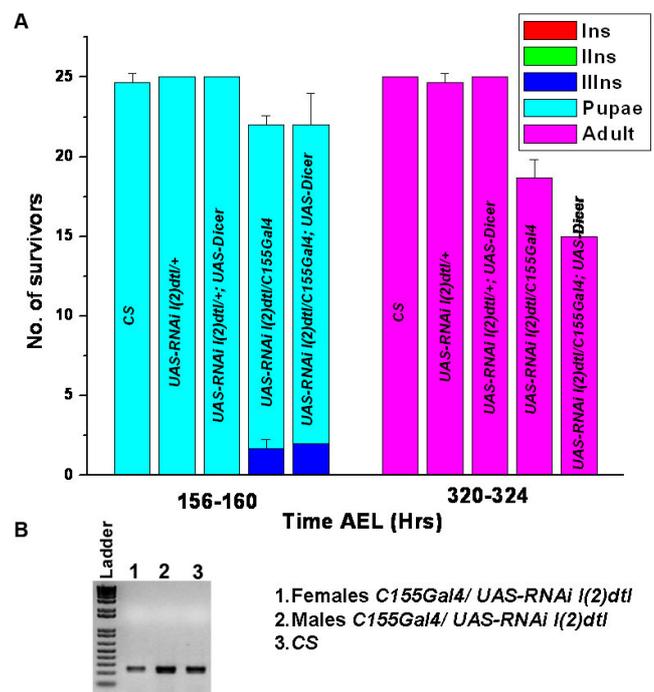


Figure 2: (A) Stage profiling of *UAS-RNAi-l(2)dtl* driven by pan-neuronal GAL4 in the wild type background with and without dicer shows decrease in number of survivors at 320-324 hrs compared to wild type and other controls conditions grown at 25°C AEL (B) RT-PCR showing decrease level of RNA in animals with *UAS-RNAi-l(2)dtl* driven by pan-neuronal GAL4 compared to controls. Since both the GAL4 and the UAS line are on X, only female progeny will show the knockdown.

neuronal GAL4 (*Elav^{C155}GAL4*) was used to drive *UAS-RNAi* against *l(2)dtl*. It was found that *UAS-RNAi-l(2)dtl* by itself or with *UAS-Dicer* does not have a very profound effect at 156-160 hrs after AEL compared to wild type. But it does show an effect at 320-324 hrs AEL (adult stage) by increasing lethality both by itself or with dicer as compared to wild type (Figure 2A). The RNA level was checked to find out the efficiency of RNAi in brains isolated from third instar larvae (120-124 hrs AEL) expressing RNAi against *l(2)dtl*. The level of *l(2)dtl* was found to be low compared to controls (Figure 2B). As it is evident that

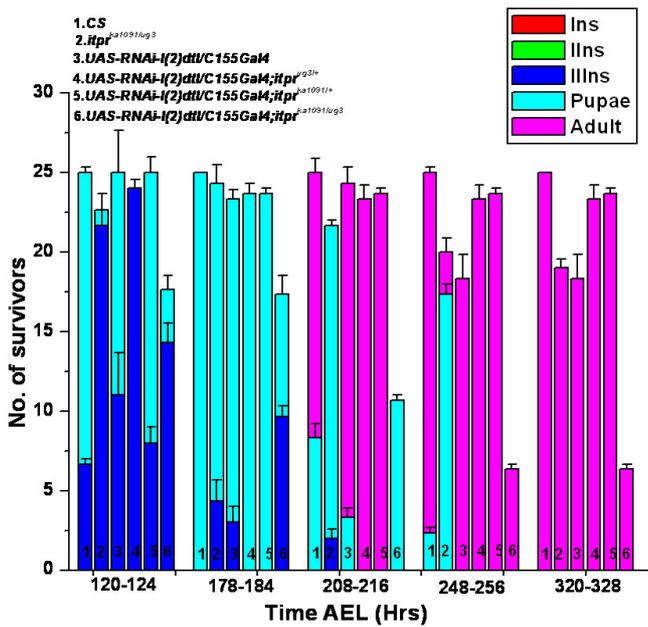


Figure 3: Lethality assessment.

Pan-neuronally driven *UAS-RNAi-l(2)dtl* in the background of *itpr* mutant (*itpr*^{ka1091/ug3}) animals shows a decrease in the number of survivors compared to wild type and other controls conditions including *itpr* mutant (*itpr*^{ka1091/ug3}) grown at 25°C and same conditions at later times AEL.

low level of *l(2)dtl* RNA enhances lethality, the well characterized weaker heteroallelic combination (*itpr*^{ka1091/ug3}) was used to assess its functional effect. As shown in Figure 3, animals expressing RNAi against *l(2)dtl* pan-neuronally in wild type background in terms of number of viable organisms mimics *itpr*^{ka1091/ug3} animals, which are 80% viable at 25°C under normal conditions. The lethality however, is further enhanced significantly when it was expressed in *itpr*^{ka1091/ug3} background. This shows there is some kind of direct or indirect interaction happening at the molecular level between *l(2)dtl* and InsP₃R mediated calcium signaling. There was no other obvious enhancement or suppression of *itpr*^{ka1091/ug3} phenotype observed.

C. Full length cDNA cloning of *l(2)dtl* for making UAS- *l(2)dtl* transgenic flies

The idea behind generation of full length cDNA clone of *l(2)dtl* in an expression vector was to make *UAS-l(2)dtl* transgenic flies and use them to revert back the phenotype of lethality seen by *UAS-RNAi-l(2)dtl* and to address other questions keeping them as positive control. Full length cDNA clone of *l(2)dtl* (LD21681) was obtained in pOT2 vector from BDGP. The expression vector used was pUAST whose intactness and restriction endonuclease (RE) sites were checked (Figure 4A-C). RE sites present in pOT2 with the clone were also checked but because of the incompatibility with pUAST RE sites, the full length cDNA of *l(2)dtl* was PCR amplified by using *l(2)dtl* specific primers by Taq polymerase (4D). Taq polymerase has a tendency to incorporate single point mutations and generate A overhang products. So the full length cDNA was cloned into

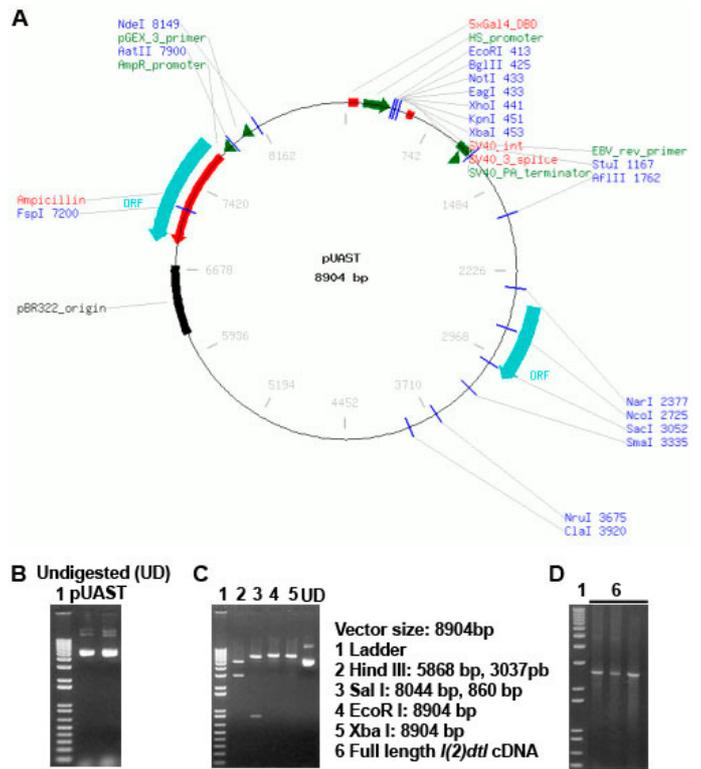


Figure 4: (A) Schematic representations of pUAST expression vector (B) and (C) Integrity analysis of pUAST by restriction endonuclease digest (D) PCR amplification of *l(2)dtl* full length cDNA.

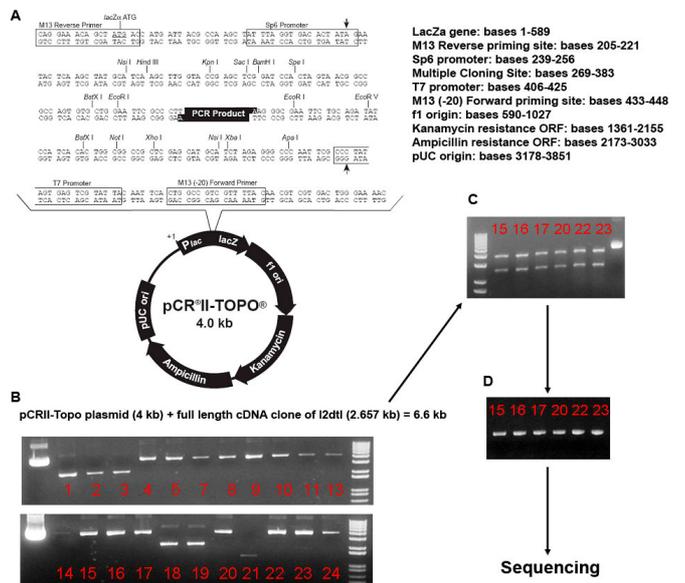


Figure 5: (A) Schematic representations of pCRII-TOPO cloning vector (B) Screening of positive clones for *l(2)dtl* full length cDNA plus vector (C) EcoRI digest of positive plasmids (D) purified BamHI digest linearised positive plasmid for sequencing.

pCRII-TOPO vector (Figure 5A) in order to add pUAST-compatible RE sites. Obtained clones were checked for the presence of full length cDNA by running them on agarose gel ((Figure 5B)) and also by RE digestion of the clones by using appropriate RE (Figure 5C). The positive clones then were sequenced to check for any point mutations incorporated by *Taq* polymerase. The sequencing strategy (Figure 6A) and sequence analysis (Figure 6B-E) was done by using DNAMAN software. The analysis shows incorporation of a single point mutation at position 1778, a transition of T to C nucleotide (Figure 6B and E). This was further analyzed to find out if this mutation caused any change in amino acid sequence. The point mutation obtained leads to a silent mutation as CCT (wild type) and CTC (clone) both coding for leucine. So clone 17 was used in making of *UAS-l(2)dtl* transgenic construct as the other clones had more mutations. The transgenic flies with this construct will be generated and used for further experiments.

Figure 6: (A) Sequencing strategy showing position of overlapping primers (B) Read out sequences of positive clones obtained from Chromas lite (C) Sequences alignment of the positive clone (second row) to wild type (first row) and third row represent consensus sequence show transition from T to C and amino acid prediction of coding sequences (D) wild type and (E) positive clone 17 obtained from DNAMAN.

D. Preparation of DIG-labeled *l(2)dtl* RNA probes for RNA *in situ*

As *l(2)dtl* levels in the brain are very high compared to its level in fat body, it critical to find out which part or domains of the brain require more of it. So to look into the location of enriched compartments in greater details, RNA probes for *l(2)dtl* were generated. A probe size ranging between 150-400 bp is more effective than the larger fragments and hence *l(2)dtl* primers were designed to generate a 232bp amplicon (Figure 7A)

and were purified and cloned into the polylinker site of pCRII-TOPO transcription vector (Figure 5A), which contains promoters for SP6 and T7 RNA polymerase. Positive clones were obtained and confirmed for the presence of *l(2)dtl* fragment (Figure 7B). Even though cloning the probe is more work intensive, it is useful because it gives enough pure starting material for amplification and avoids non-specific amplification. Cloning into the dual promoter vector allows generation of sense and antisense probes from the starting material. These positive clones were linearized and then purified (Figure 7C). To get specific probes without the TOPO vector sequence, the vectors were RE digested at the the polylinker site that is absent in the probe. This linearization of the vector was done by using BamHI and NotI REs. Then these vectors were used as a template for PCR amplification of *l(2)dtl* fragment and used for sequencing to find the orientation in the vector (Figure 7D). After orientation mapping it became clear that SP6 promoter leads to antisense and

Figure 7: Generation of DIG-labeled *l(2)dtl* RNA probes (A) PCR amplification of *l(2)dtl* fragment (B) and (C) Screening by EcoRI digest and purification of positive clones (D) Sequencing read out of positive clone for *l(2)dtl* to check orientation of insert (E) and (F) Linearised vector with BamHI and NotI ERs for sense and antisense probe generation respectively (G) Integrity analysis of sense and antisense RNA probes and (H) Quantification of RNA probes by spot test.

T7 polymerase to sense probes (Figure 7E-F). SP6 and T7 polymerases were used respectively to generate probes. DIG-labeled probes were generated by using Roche RNA *in vitro* transcription and labeling kit and their integrity was assayed by running them on RNase free agarose gel (Figure 7G). An accurate quantification of DIG-labeled RNA obtained by *in vitro* transcription is most important for optimal and reproducible results *in situ* hybridization. Very high concentration of probe usually causes high background while too low concentration leads to weak signals. So to estimate the yield of DIG-labeling, a dilution series of labeling reaction and also of control RNA were spotted on nylon membrane and colorimetric detection procedure

using NBT/BCIP was performed as per Roche RNA labeling kit protocol. The DIG-labeled probe spots were compared to that of control spots and the amount of DIG-labeled RNA was calculated (Figure 7H).

IV. CONCLUSIONS

l(2)dtl mutants in *Drosophila* are lethal as embryos and *l(2)dtl* transcripts are up-regulated under heat-shock [1]. The molecular function of *l(2)dtl* has not been investigated in *Drosophila*. A functional analysis of *l(2)dtl* gene by using *l(2)dtl* RNAi was carried out in *Drosophila itpr* mutants. The results show additive effect. The present study indicates that *l(2)dtl* has a potential role in InsP₃ mediated intracellular Ca²⁺ signaling pathway. Down-regulation of this gene enhances the lethality of the weak InsP₃R heteroallelic mutant combination. As this gene is highly enriched in brain [16], RNA *in situ* will provide a better picture about its involvement of neuronal domains. Using *UAS-l(2)dtl* can enhance the reliability as compared to *l(2)dtl* RNAi. This will help validate their potential regulation by InsP₃ mediated intracellular Ca²⁺ signaling and also in understanding how developmental pathways impact growth and metabolism.

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Land Resources Expansion Monitoring and Management: A RS-GIS Approach

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Abstract- Land resource monitor use is necessary to prepare the land use plans because of rapidly land use changes/expansion around the Shivpuri city, India. For this purpose exploratory, semi-detail and detailed surveys are undertaken using remote sensing techniques and satellite imageries in order to acquire useful and variety of information at same scale and assist in monitoring valuable information. In this paper, study on land resource mapping through supervised classification has presented for better understand the land uses characteristics and expansion monitoring. On 1:15,000 scale, supervised classification image generated from supervised signature classes varies pixel to pixel (sample points using a random point generate or for each land cover class) land uses on satellite images and accuracy assessment designed and implemented on the IRS-1D satellite 2003 and 2006 images data. IRS-1D facilitated multi faceted applications in the fields of agriculture, forestry, land use etc. The accuracies varied according to the class and classified data verified on ground with the help of GPS. This approach encourage to govt. and local development agencies to use remote sensing and gis based land resource mapping and their management in respective areas.

Index Terms- Accuracy assessment, Change detection, Land resource map, Land resource management, Supervised classification.

I. INTRODUCTION

The Shivpuri city, after became Shivpuri district, has growth and developmental activities such as building, road construction, agricultural, forest, urban population growth, human encroachment and also expansion of touristic culture etc. These activities are resulting in unplanned land use and increased the land consumption and modification of land uses over built day-by-day. Land resource is a fundamental unit of production and finite resource for most human activities including forestry, industry, agriculture, settlement and water storage. For sustainable land utilization, it is essential to know the land characteristics, extent and location, In order to improve the economic condition of the area without further deteriorating the bioenvironmental; every bit of the available land has to be used and manage in the most rational way. This requires present and past land expansion monitoring data of the area. Land resource image classifications have been used alongwith multitemporal satellite data for features identification, analysis, and pattern recognition on the image. The classification process is based on object patterns of their DNs (Digital Numbers) with neighbouring pixels, reducing the range of DNs (Digital Numbers) in several spectral bands to a few classes in a single image data.

II. STUDY AREA AND DATA USED

The area under study lies between 25°20'-25°30' degrees latitude and 77°35'-77°45' degrees longitude and falls in SOI toposheet number 54G/11 covering total area of approximately- 309 sq. km and height from the mean sea level is 521.5m. It forms a part of Shivpuri district which is bounded on the north and south by Gwalior and Guna districts of M.P. respectively, on the east by Jhansi district (U.P.), and on the west by Kota district of Rajasthan Figure 2.1. NRSA (National Remote Sensing Agency, Hyderabad) collected the IRS-1D LISS-III data (22nd February, 2003 and 24th January, 2006) in digital form which have been used in the present study. The topographic map 54G/11 at scale 1:50,000 published by Survey of India (SOI) has been utilized for image interpretation and GCPs collection.

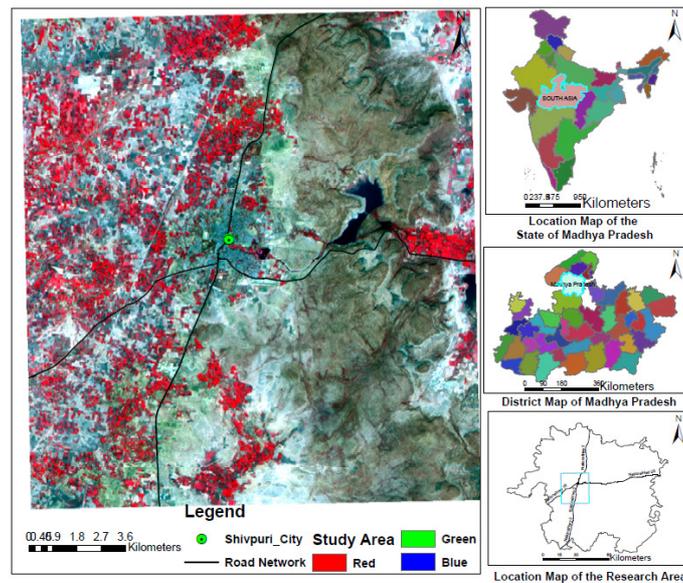


Figure 1: Location map of the study area (24th January, 2006)

III. RESULT AND DISCUSSION

A number of data processing steps are involved in land resource data classification. The steps divided into following two categories....

- Pre-field Work
- Post-field Work

Pre-field work carried out include that satellite data, 54G/11 toposheet, geo-referencing the image (well-distributed points on prominent features such as- (intersection of streams, permanent waterbody .etc) and subset of the area (AOI), image enhancement techniques (spectral and spatial), image interpretation as well as, preparation of base maps at 1:50,000 scale of the study area (Gupta et al, 2004). Post-field work carried out include that land resource expansion classified maps based on supervised techniques, accuracy assessment, modification according to pre-field work and ground truth surveys. The GPS points were collected to prepare GPS map, analyzed and validated through ground truth survey to finalizing the classified image (GPS points overlap on image) and SOI topographic sheets. All the processing has been done on ERDAS Imagine, ArcGIS software.

A. Supervised Classification

The land resource classification operations were performed to produce land resource use and cover map from LISS III images figure 4 and 5. The process of resource classification involve such as:- Selection of a land resource classification scheme-in this study, six land resource use and cover classes were defined, the detail description of these classes along with their interpretative characteristics on the False Colour Composite (FCC) of LISS-III image given in Table 1. Sample of training signature-The number of training samples for each class have been collected from relatively homogeneous areas consisting of those classes as respective classes on the ground (D. Lu et al, 2007). Maximum likelihood classification-This classifier is based on the decision rule that the pixels of unknown class membership are allocated to those classes with which they have the highest likelihood of membership (Foody et al., 1992). In supervised classification assigned each cell in a study area to a class or category which corresponds to a meaningful grouping of locations such as- forests, water body, fields and residential areas (Peihuang et al, 2008) and algorithm examines the pixels or aggregates of each location into one of the specified number of groups or clusters present in the image. The methodology adopted for supervised classification has been shown in Figure 2.

The land use/land cover study has been carried out on 1:50,000 scale images with 23.3 meters resolution depending on rate, pattern and trend in the study area (X. H. Liu et al, 2002). The land use/land cover supervised classified images are shown in Figure 6 and 7. The methodology adopted for temporal comparison has been shown in Figure 3. Multitemporal satellite data have been used to generate land use/land cover classes such as- forest, agriculture, waterbody, fallow land, settlement and waste land alongwith visual interpretation techniques which are verified during the field work. The temporal comparison of and use/ land cover (22nd February, 2003 image and 24th January, 2006 image) are shown in Table 2 and Figure 8.

Table 1: Characteristics of land use/land cover classes

Land Cover Class	Description	Characteristics on LISS-III FCC
Agriculture	Regular shape, size pattern	Dull red and smooth appearance
Forest	Tall dense trees	Light brownish to red to dark brownish with rough texture
Fallow Land	Agricultural fields without crops	Bluish/greenish grey with smooth texture
Settlement	Towns and villages; block appearance	Bluish
Waste Land	Degraded land, slopes in foot hills, eroded soils,	Light brown to greenish blue, varying in size and dispersed pattern
Water Bodies	Reservoir and lakes	Cyanish blue to blue according to the depth of water and sediment content

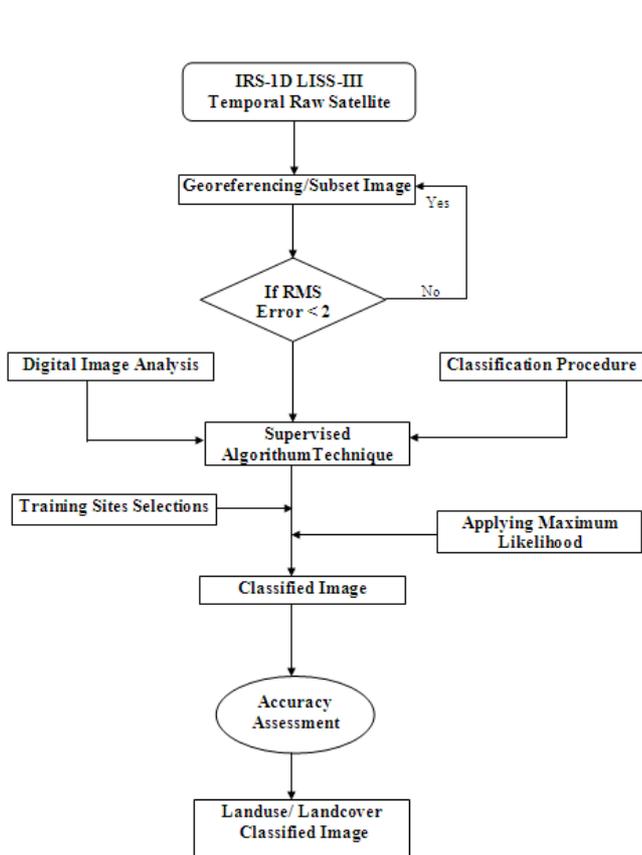


Figure 2: Methodology of Supervised Classification

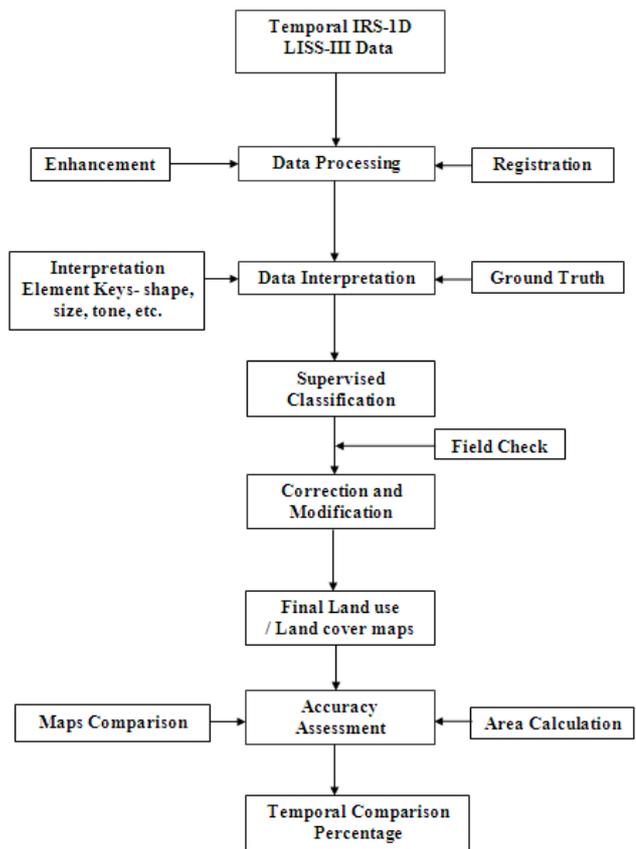


Figure 3: Methodology of Temporal Comparison

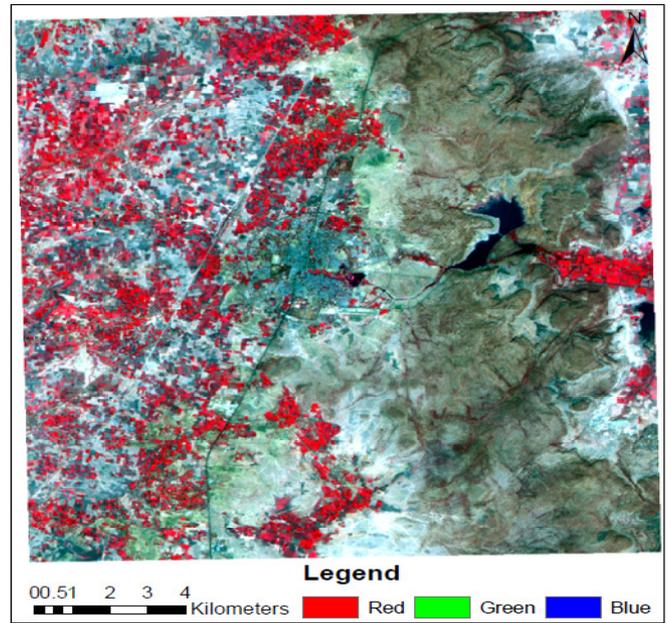
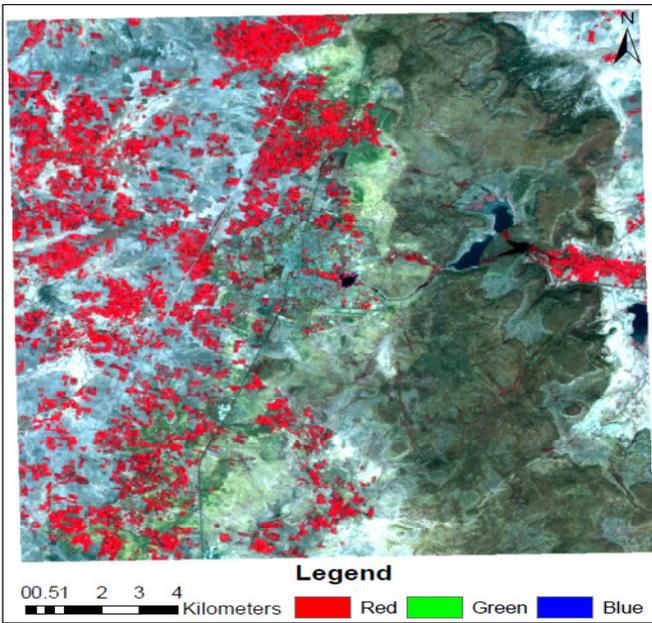


Figure 4: FCC Image of the study area (22nd February, 2003)

Figure 5: FCC Image of the study area (24th January, 2006)

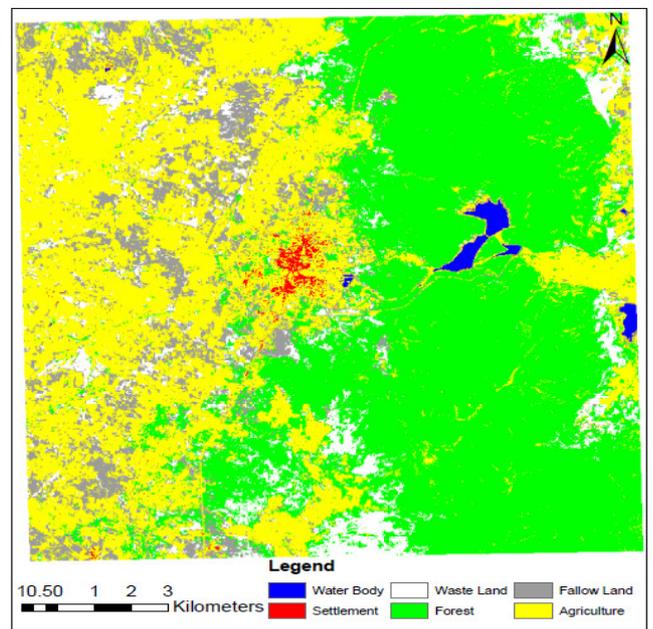
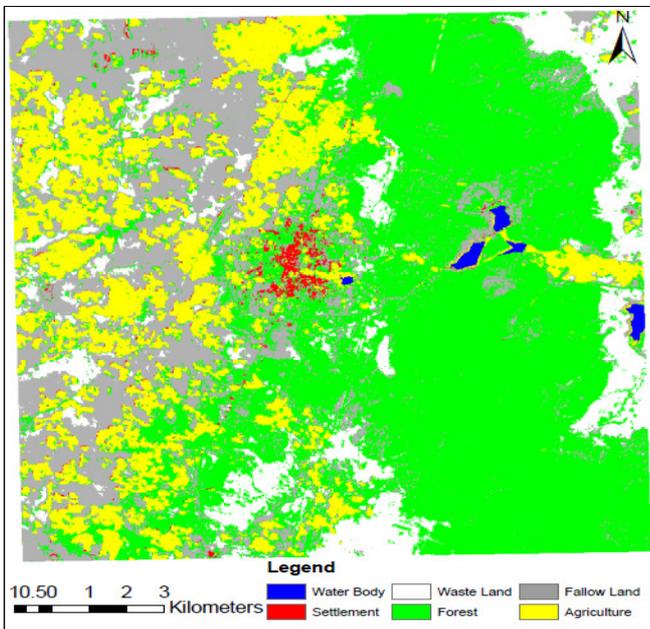


Figure 6: Supervised Image (22nd February, 2003)

Figure 7: Supervised Image (24th January, 2006)

1 Agricultural Land

The Kharif and Rabi are two main crops cultivated in the area. The Kharif crops are Soyabean, Ground nut etc. while the major Rabi crops are Wheat, Gram etc. Mostly agricultural area occurs in the western portion and the eastern margin of the study area. The agriculture area covers approximately 65.415sq.km and 115.165sq.km on classified images of 2003 and 2006 respectively (Figure 6 and 7). In the study area, the temporal comparison is +12.756% (Table 2). The agricultural activities are distinct by geometric arrangements of the field. Agricultural land appears in bright red to red in color and is easily separated from surrounding forest area with the regular shape, size in contiguous to non-contiguous pattern on satellite images (Anderson et al., 1976).

2 Fallow Land

The fallow land is clearly separated from crop land with dark greenish tone, smaller size, and regular/irregular shape, contiguous to non-contiguous pattern on satellite images (Anderson et al., 1976). These lands are used for cultivation but temporally allowed to uncultivation for one or more seasons. It is under dry land farming, paddy and other dry crops. Mostly fallow lands are found in most of the western portion of the study area. The area under fallow land covers 68.594sq.km and 29.610sq.km approx on classified images of 2003 and 2006 respectively (Figure 6 and 7). The temporal comparison is -9.996% in the study area (Table 2).

3 Forest Land

Forests of the study area are largely tropical to sub tropical type from which the timbers, fuel wood, fodder and food products are extracted as well as encroachment in nature. Most of the forest area is covered by the reserved forest such as- Madhav National Park, Chironji Park with dense canopy of tall trees, occupying the eastern half of the study area with characteristic light brownish to red to dark brownish, smooth texture and irregular shape on satellite images. The forest area covers about of 148.607sq.km and 126.351sq.km on classified images of 2003 and 2006 respectively (Figure 6 and 7). The temporal comparison is -5.707% (Table 2) in the study area.

4 Settlement

Settlement covers buildings, transportation, communication utilities etc. in association with waterbody, agricultural and forest lands. Settlement is widely spread in central part of the study area. Roads and Railway lines are distinguished by characteristic linear features. It covers an area of 1.338sq.km 2.596sq.km on classified images of 2003 and 2006 respectively (Figure 6 and 7) along with the temporal comparison +0.323% (Table 2). Settlement appears scattered in bluish green tone in varying shape and size, located close to water and agricultural sources (Anderson et al., 1976).

5 Waste Land

Waste lands are covering significant portion of available land resources. It is generally degraded land in hilly topographic locations. Waste lands are associated with moderate slopes in foot hills, eroded soils, rocks and are surrounded by agricultural plain land. Mostly waste lands are distributed haphazardly in the study area with characteristic light brown to greenish blue, varying in size and dispersed pattern on satellite images (Anderson et al., 1976). It covers approximately an area of 23.784sq.km and 33.338sq.km on classified images of 2003 and 2006 respectively (Figure 6 and 7). The temporal comparison in the study area is +2.450% (Table 2).

6 Water Body

A number of reservoirs, lakes are found in study area such as- Bhagora Tal, Chand Pata Tal, Madhav Lake, Signiwias Tal, Raichand Kheri Tal etc. These water bodies are occupying low land, plain lands, surrounded by hills and are generally used for domestic water supply, hydel power generation and irrigation purposes. It is depending on the availability of seasonal water in the nature. These are seen clearly on satellite images in blue or cyan colour depending on the depth of water (Anderson et al., 1976). It covers an area of 1.325sq.km and 2.028sq.km NE-SE on classified images of 2003 and 2006 respectively (Figure 6 and 7) along with the temporal comparison +0.180% (Table 2).

Table 2: Supervised Comparison (generated from 22nd February, 2003 & 24th January, 2006 images)

Supervised LU/LC	LISS-III (2003)		LISS-III (2006)		Differences	
	Area (sq.km)	%	Area (sq.km)	%	Area (sq.km)	%
Agriculture	65.415	21.170	115.165	37.270	+49.750	+12.756
Forest	148.607	48.093	126.351	40.890	-22.257	-5.707
Fallow Land	68.594	22.199	29.610	9.583	-38.983	-9.996
Settlement	1.338	0.433	2.596	0.840	+1.258	+0.323
Waste Land	23.784	7.697	33.338	10.789	+9.554	+2.450
Water Bodies	1.325	0.429	2.028	0.656	+0.702	+0.180

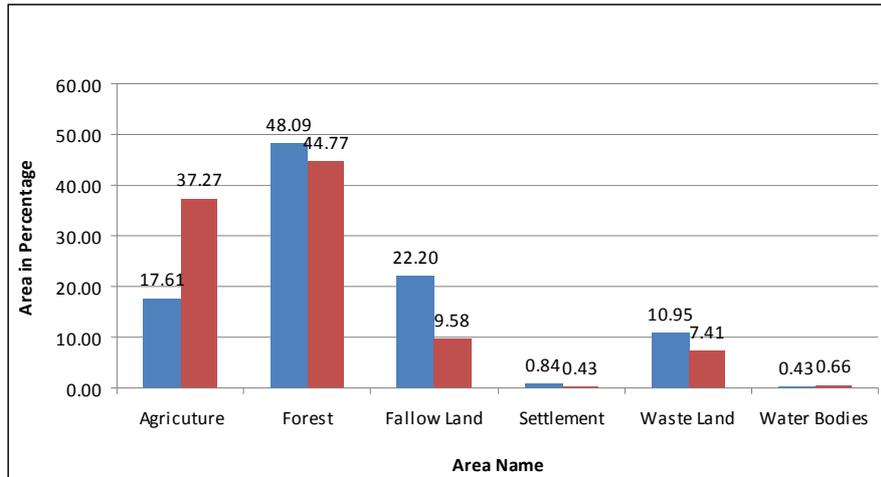


Figure 8: Supervised Comparison Chart (generated from 22nd February, 2003 & 24th January, 2006 images)

B. Thematic Accuracy Assessment:

Thematic maps produced with remote sensing and geographical information systems (GIS) technologies have provided detailed information to the users of the land use/land cover maps (J. E. Mendoza et al, 2002). Key to the usefulness of a map for any user is the degree of quality, or accuracy of the map. Accuracy assessment of the classified images has been carried out based on the land use/land cover ground truth data collected. Random sampling points have been implemented based on the land cover classes (D. P. Roy et al, 2002). The results of the accuracy assessment are presented in Table 3. The overall accuracy of the land use/land cover calculated are 83.63% and 0.8238 respectively for 2003 image, while accuracy measures and kappa statistics of 87.60% and 0.8814 were obtained for 2006 image.

Table 3: Thematic Accuracy Assessment (22nd February, 2003 & 24th January, 2006)

S. No.	Supervised LU/LC	LISS-III (2003)		LISS-III (2006)	
		Area (sq.km)	Accuracy (%)	Area (sq.km)	Accuracy (%)
1	Agriculture	65.415	84.48	115.165	88.96
2	Forest	148.607	78.95	126.351	92.65
3	Fallow Land	68.594	80.95	29.610	84.76
4	Settlement	1.338	94.24	2.596	95.87
5	Waste Land	23.784	70.43	33.338	82.92
6	Water Bodies	1.325	92.78	2.028	80.45
Overall Accuracy (%)		83.63		87.60	
Overall Kappa Statistics		0.8238		0.8814	

C. Land use/Land cover management:

To determine the land use/land cover management factors, the application of Remote Sensing and GIS techniques is needed. Each land resource management factor does not have same effect but it is interlinked with agriculture, watershed, soil condition, environment, topography, forest etc. (Xian-Jun Shi et al, 2008). The land use/land cover management views are given below.

5.1 Agricultural Management

In the western portion of the study area, most of the area is occupied by agricultural land. They produce wheat, groundnut, mustered, gram, sugarcane, and soyabean etc. Agricultural lands are increasing due to peoples cutting valuable tree that are surrounding the agricultural land for increasing the agricultural fields and settlement. Management point of view, Set up the agricultural land priorities based on farming systems, valley area utilized, crop types, the area under green cover, black soil type with

good ground water potential etc. the agricultural land having gentle slope should be properly fenced with adequate irrigation facilities. Steep hill slopes should be developed as grass lands, strip cropping, stream frequency and drainage density should use in the agricultural land development and management.

5.2 Forest Management

In the northern to southern portion of the study area, hilly undulating terrain land and dry deciduous forest are in the study area. They based on statistics, forest lands are being converted into degraded and open forest which is due to soil erosion, high run-off, cutting of thick forest cover for fibre and timber, improper drainage system contribute to the degradation phenomena of the forest and agricultural, settlement expansion in the northern and southern portions of the study area. Degraded and open forest covers are needed to be converted into thick forest cover in areas having black soil through systematic and rich plantation, protection by forest boundary, proper drainage system (Mundia et al, 2005) and control over the agricultural and settlement expansion towards the forest area for protection and management.

5.3 Fallow Land Management

Fallow land is being converted into other uses. The variations in area covered under agriculture and fallow land attributed to changes in crop rotation, harvesting time and conversion of these lands into plantation. The areas indicated (southern to western) as fallow do not represent the true potential area available as land currently under pasture maybe suitable for cultivation and would add to the estimation of fallow area. Identifying pastoral lands as distinct from field crops is the next phase in providing a more accurate assessment of the extent of fallow land during this period.

5.4 Settlement Management

Rapid and unplanned urbanization not only results in adverse economic development but also causes unguided expansion of the city and creates problems of infrastructure planning and management. The urban area is creating pressure on the city surrounded rural systems and other resources. Most of the urban and industrial development occurs in the around the city and central part of the study area. Urban area can be managed through minimization of unplanned expansion towards agricultural and forest area. Urban environmental issues, change detection and trend analysis, area estimation, site selection, digital elevation model studies have provided information regarding the presence of open land, sparsely vegetated land and unfertile land for agriculture (waste land) which are needed to be managed and developed in the study area (Defreis et al, 1999). Remote Sensing has helped in analyzing these problems at their very root and suggest remedial measures.

5.5 Waste Land Management

The north-western portion of the study area, all lands are not equally resourceful, some are good and some are waste. Waste lands are found at many places in the study area and waste land increasing because of improper drainage frequency, settlement garbage, water level down and some palace soil not having porosity, permeability, and soil mix with rocks. Management points of view, after proper treatment, are suitable for settlement and afforestation purposes. In the public awareness and drainage systems, recharge of the ground water, vegetation density be increased while the siltation rate in water bodies and over grazing by animals be checked.

5.6 Water Body Management

The water body occurs in the eastern portion of the study area. A number of water harvesting structures for the artificial recharge surface and sub-surface water bodies such as check dams, percolation tanks etc. should be constructed over natural streams where suitable geologic and hydrologic conditions prevail. Existing ponds and lakes should be renovated, their embankments be restrengthened and desiltified and the rate of siltation in lakes and reservoirs be checked. The quality and quantity of water in these water bodies be periodically determined and adequate mitigation measurements be adopted for monitoring and control of pollution in the water regime.

IV. RESULTS AND DISCUSSIONS:

Land resource mapping and management serves as a basic inventory of land resources for all levels of government, private industry. Rapid developments in Shivpuri city, there is a need for real time monitoring of the land based changes. This study implemented a multi-temporal data classification approach to produce an accurate land use/land cover map and analysis and identify the temporal change detection in last few years. Basically, two approaches are used for the classification of land use/land cover maps. The first is the visual discrimination and second approach supervised classification carried out for some of the classes, accuracy assessments were examined on various land use/land cover classes through the multi-temporal satellite images.

The methodologies described above have been shown in Figure 2 and 3. The various land use and land cover classes delineated include settlement, agriculture, forest, water body, waste land and fallow land. Comparison of land use/land cover maps indicate temporal changes between land use/land cover features. The observation detected that the forest (-5.707%) and fallow land (-9.996%) are decreasing while agricultural land (+12.756%), settlement areas (+0.323%), waste land (+2.450%) and water bodies (+0.180%) are increasing. The area of each class for LISS-III (year 2003) and LISS-III (year 2006) data has been compiled in Table 2 and also shows

the change pattern in the land utilization from year 2003 to 2006 for the Shivpuri city. Accuracy assessment of the classified images has been carried out based on the land use/land cover ground truth data collected. The overall accuracy and kappa statistics of the land use/land cover calculated are 83.63% and 0.8238 respectively for 2003 image, while accuracy measures of 87.60% and 0.8814 were obtained for 2006 image and compiled in Table 3.

V. CONCLUSION:

The study has shown that it is possible to land resource classification of satellite images (agricultural land, forest land, fallow land, settlement, waste land and water body), accuracy assessment and their management carried out successfully through IRS-1D satellite. IRS-1D satellite carried a LISS-III camera providing a resolution of 23.5 m. This resolution has been used for land resource expansion mapping and monitoring of the study area. For ensuring planned development and monitoring the land utilization pattern, preparation of land resource mapping map is necessary. The usefulness of satellite data for the preparation of land resource expansion maps depicting existing land classes for analyzing their change pattern for Shivpuri city by utilizing supervised classification. It is expected to be useful for formulating meaningful plans and policies so as to achieve a balanced and sustainable development in the region.

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Impact of Domestic Wastewater Irrigation on Soil Properties and Crop Yield

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Abstract- The population increase has not only increased the fresh water demand but also increased the volume of wastewater generated. Treated or recycled wastewater (RWW) appears to be the only water resource that is increasing as other sources are dwindling. Increasing need for water has resulted in the emergence of domestic wastewater application for agriculture and its relative use. In the present study, crops were irrigated with groundwater and domestic wastewater. Each crop was applied at recommended NPK dose of fertilizers for treatment. The use of the domestic wastewater has shown improvement in the physicochemical properties of the soil, yield along with the nutrient status as compared to the application of groundwater. The results showed better crop growth with increased fertility status of the soil. The findings give applicable advice to commercial farmers and agricultural researchers for proper management and use of domestic wastewater for agricultural purpose.

Index Terms- Crops, Domestic wastewater, Irrigation, Soil Properties

I. INTRODUCTION

Water is a vital resource but a severely limited in most countries. Rapid industrial developmental activities and increasing population growth had declined the resources day to day throughout the world. The population increase has not only increased the fresh water demand but also increased the volume of wastewater generated. Therefore, there is an urgent need to conserve and protect fresh water and to use the water of lower quality for irrigation [1]. Treated or recycled wastewater (RWW) appears to be the only water resource that is increasing as other sources are dwindling [2].

Consequently the reuse of wastewater for agriculture is highly encouraged [3, 4]. The reuse of wastewater for agricultural irrigation purposes reduces the amount of water that needs to be extracted from water resource [2, 5]. It is the potential solution to reduce the freshwater demand for zero water discharge avoiding the pollution load in the receiving sources. It is the necessity of the present era to think about the existing urban wastewater disposal infrastructure, wastewater agriculture practices, quality of water used, the health implications and the level of institutional awareness of wastewater related issued [6].

Due to ever increasing population huge volume of domestic wastewater is being produced in cities. Indiscriminate disposal of such water is a cause for pollution of air, soil and groundwater supplies. Cost of treatment of Domestic wastewater for recycling

is too high to be generally feasible in developing countries like India. However, such wastewater exerting most of the nutrient load and could be used as irrigation water to certain crops, tree and plants that may lead to increase in agricultural produce and plantation. It has a potential to supply (organic) carbon nutrients Nitrogen, Phosphorus, Potassium (NPK) and (inorganic) micro nutrients to support crop/plant growth [7].

In the agriculture practices, the irrigation water quality is believed to have an effect on the soil characteristics, crops production and management of water [8]. Particularly, the application of saline/sodic water results in the reduction of crop yield and deterioration of the physico-chemical characteristics of soil. Present study deals with application of domestic wastewater for irrigation and its effect on soil characteristics

II. MATERIAL AND METHODS

Site Description: An experimental setup was made for conducting the study to investigate the effects of application of domestic wastewater and ground water on soil. Field experiments were carried out at agriculture farm. Research work was carried out using domestic wastewater generated from the Nagpur city which was discharged into nallah. Initial characteristics prior to application of domestic wastewater and ground water are depicted in Table 1. Micronutrients (heavy metal) content in soil are depicted in Figure 1.

The experiment was a factorial, completely randomized design with two main treatments of domestic wastewater and groundwater. Each treatment had three replications. Crops like Wheat, Gram, Palak, were grown by dibbling method for irrigation with the application of domestic wastewater and groundwater.

Sampling of Domestic Wastewater and Groundwater: The Domestic wastewater was collected from Nag Nallah, Nagpur (India). Groundwater was collected from nearby field. Samples from Domestic wastewater were collected two times during the study period in pre-sowing and after harvesting field crops and analyzed in the laboratory for their physico-chemical parameters (Table 2). Micronutrients (heavy metals) in the Domestic wastewater and Ground water are depicted in Figure 2.

Methods of analysis for Domestic Wastewater and Groundwater: The pH of the samples was determined using the pH meter, by calibrating the pH meter using the buffer solutions of known pH values. Electrical conductivity (EC) was determined using the Conductivity Meter calibrated with conductivity standard (0.01 m KCl with conductivity 1413 μ Scm⁻¹). Na⁺ and K⁺ was estimated using Flame photometer,

carbonates and bicarbonates were determined by Alkalinity method and Chlorides of the samples were determined by using argentometric method of precipitation.

For the analysis of the heavy metals 50 ml sample was taken and 5 ml conc. HNO_3 was added then samples were digested. The digested samples were filtered through Whatman filter paper no. 42 after filtration the volume was made to 50 ml with the deionized water. Samples were analyzed on Atomic Absorption Spectrophotometer for concentration by using specific cathode lamp. AAS was calibrated for each element using standard solution of known concentration before sample injection. All the methods for the analysis were followed according to the Standard methods [9].

Soil sample Collection and Analysis: The composite surface soil sample (0-15 cm) was collected from experimental site prior to the start of the field experiment. After harvest of the crop, treatment wise soil samples were collected, air dried ground to pass through 2 mm sieve and stored in plastic bottles before analysis. The samples were analyzed for different physical and chemical properties as per the standard procedure. Particle size distribution was carried out by successive sieving to determine the proportion of coarse rock fragments (2, fine rock fragments, sand and by sedimentation, for <0.05 mm fraction for determining properties of coarse silt (20-50 μm), fine silt (2-20 μm) and clay (<2 μm). International pipette method was used to determine the individual soil fraction i.e. sand, silt and clay [10]. The soil pH was estimated by pH metry in the saturation paste (1:1 suspension) [11]. In the same suspension electrical conductivity was also measured using conductivity meter (Orion, EA 940 USA). Soil organic carbon was estimated by Walkley-Black method [12] (Jackson, 1967), available phosphorous was determined by Olsen's method [13] (Olsen, et.al. 1954), available potassium estimated by leaching the soil with in ammonium acetate and the determination of potassium by using flame photometer as per the standard method, available nitrogen was estimated by Kjeldhal method. Total Nitrogen was determined using the Kjeldahl procedure (Bremner and Mulvaney, 1982). [14] Cation exchange capacity (CEC) by neutral normal ammonium acetate method (Jackson, 1967) [12]. Free calcium carbonate (CaCO_3) was determined by rapid titration method (Piper, 1966) [10]. Available micronutrients and heavy metals were estimated as per procedure described by Lindsay and Norvell (1978) [15]. Groundwater samples were analyzed for heavy metals on AAS. Concentrations of soluble Ca and Mg were measured using the EDTA(Ethylene DiamineTetraaceticacid) titration method and Na and K was measured using flame photometer. Phosphorus was determined using OLSEN extraction (0.5 M NaHCO_3).

III. RESULTS AND DISCUSSION

Physical and Chemical Properties of the Experimental Soil:

The experimental soil was classified under the clay textural class, which has a considerable amount of smectite clay minerals. The calcium carbonate content of the soil was slightly calcareous (3.45%). The domestic wastewater irrigation applied for a season had no significant effect on a clay soil.

The pH of the pre-sowing soil was found to be normal (8.1) which is most desirable in agricultural soil. In field irrigation with domestic wastewater, the pH of soil extract was found to be slightly decreased from 8.1 before sowing to the range of 7.45-7.66 after harvesting (Table 3). EC of soil before sowing was 0.45 dSm^{-1} which after harvest with domestic wastewater was found to be 0.50-0.55 dSm^{-1} whereas in irrigation with Ground water it was found to be 0.44-0.47 dSm^{-1} . It is expected that the SAR problem could not occur as the wastewater itself has a low SAR (Sodium Absorption Ratio) value of 0.79 results are depicted in Table 3.

Effect of Irrigation Water on Fertility Status of Soil after Harvest: The organic carbon of soil irrigated with domestic wastewater was increased from 4.9 g kg^{-1} to 5.46-5.92 range and which is superior to irrigation with ground water. This indicates that domestic wastewater irrigation helps to improve in fertility status of soil after harvest of *Rabi* crops.

The organic carbon content in domestic wastewater irrigated crops like Wheat, Gram; Palak resulted superior than ground water irrigation as presented in Table 3. Organic carbon content of domestic wastewater fed soils were found to be slightly higher (5.46-5.92 g kg^{-1}) than those of canal irrigated soils (5.12-5.33 g kg^{-1}) and this is possible due to incorporation of organic matter through domestic wastewater .

The effect of irrigation water on fertility status of soil after harvest of *Rabi* crops was observed to be significant for available N, P and K (Table 3). Amongst these crops wheat, gram, Palak, recorded significantly higher available N, P and K as compared to crops irrigated with ground water (Table 3). This indicates that domestic wastewater irrigation provides the essential nutrients to the crops. It has been noted that domestic wastewater improves fertility levels of soil as reported by Baddesha *et.al.* (1997). [16]

Effect of Irrigation Water on Micronutrient (Heavy Metal) of Soil after Harvest: The experiments showed significant improvement in fertility status of soil with respect to micronutrient as recorded after harvest of crops (Figure 3-Figure 5). The improvement might be due to irrigation with domestic wastewater in all the crops. The DTPA (Diethylenetriaminepenta-acetic acid) extractable consisting Fe, Mn, Zn, Cu, Pb, Ni and Cd after harvest slightly higher than ground water however slip at par with normal limits as compared to pure domestic wastewater. The findings were in conformity with the earlier studies reported by Datta *et.al.* (2000)[17].

Crop Yield

Effect of Irrigated Water on Crop Yield and Quality of Crops: The use of domestic wastewater has favorably influenced the crop production; its continuous application for number of years may result in enrichment in top soils (Anderson & Nilsson, 1972; Haque and Sharma, 1980).[18, 19].

The crops yield irrigated with ground water along with fertilizer was found to be better as compared to application of wastewater without a recommended dose of fertilizer. The test weight of crops like wheat, gram, Palak was significantly maximum as recorded by domestic wastewater over the ground water irrigation.

The crop yield of grain and straw was significantly influenced due to irrigation of crops through different sources (Table 4). The significantly higher grain and straw yield was

recorded due to application of domestic wastewater over ground water irrigation. The domestic wastewater contains large amount of nutrients and therefore could be used as a source of irrigation (Maiti *et.al.*, 1992) [20] as evident by the results [21, 22] .

Amongst the crops, Wheat recorded highest grain yield (17.37 q ha^{-1}), which was found better than gram (13.18 q ha^{-1}), whereas highest straw yield was recorded in gram (25.03 q ha^{-1}), which was found to be better than wheat (22.81 q ha^{-1}). The lowest grain and straw yield was recorded in Palak (9.36 q ha^{-1} and 8.57 q ha^{-1}). The differences in yields of the crops are associated with the source potential. The interaction effect of sources of irrigation and crops were recorded significant results on grain and straw yield. Significantly maximum grain and straw yield of wheat (17.37 and 22.81 q ha^{-1}) was recorded due to application of domestic wastewater. The results also indicated that Wheat, Palak required screened domestic wastewater, and it indicates that these crops showed phytotoxicity to some heavy metals. Whereas, gram seems to be well in well water irrigation.

Treated municipal wastewater to lucern, maize, potato and wheat has potential to increase yield than control. Similar results were also recorded by Juwarkar *et.al.* (1990), Juwarkar *et.al.* (1994). [23, 24]

IV. CONCLUSIONS

Use of domestic wastewater for irrigation has gain importance throughout the world due to limited water sources and costly wastewater treatment for discharge. If land with suitable topography, soil characteristics and drainage is available, domestic effluent can put good use as a source of both irrigation water and plant nutrients. Domestic wastewater contains high amount of organic matter, nutrients and some heavy metals which are toxic to plants beyond a certain limit. The screening of domestic wastewater proved to be the best for physical treatment to reduce heavy metals. Application of domestic water increased the yield of crops compared to irrigation with ground water; it also increases total N, P, K and organic carbon content of soil. In India, encountering the problems of water scarcity and high cost of fertilizers, domestic wastewater could be successfully use for irrigation. Findings indicate that, the use of domestic wastewater with physical treatment could increase water resources for irrigation may prove to be beneficial for agricultural production.

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Table 1: Initial characteristics of the soil at the experimental field

Soil Characteristics	pH	EC	CEC	Free CaCo ₃	Organic Matter	Total Nitrogen	Available Nitrogen	Available Phosphorus	Available Potassium
Unit		dS m ⁻¹	Cmol(P+)Kg ⁻¹	%	g kg ⁻¹	%	Kg ha ⁻¹		
Depth 0–15 cm	8.1	0.45 ±0.13	39.40 ±2.26	3.45 ±0.55	4.9 ±0.55	0.038 ±0.04	195.30 ±3.4	12.01 ±2.00	297.65 ±3.0

CEC: Cation Exchange Capacity; EC: Electrical Conductivity

Table 2: Characteristics of domestic wastewater and Ground water used for irrigation

Characteristic	Domestic Wastewater	Ground water
pH	7.6±0.09	7.1±0.86
Electrical conductivity (µS)	780.0±0.34	400.0±0.016
Carbonates (CO ₃ ²⁻)	0.85±0.09	0.30±0.012
Bicarbonates (HCO ₃ ⁻)	5.10±1.24	2.38±0.034
Chlorides (Cl ⁻)	5.10±2.00	1.57±0.86
Calcium (mg L ⁻¹)	4.76±0.46	2.65±0.012
Magnesium (mg L ⁻¹)	1.60±0.032	0.74±0.09
Sodium (Na) (mg L ⁻¹)	1.40±0.022	0.80±0.014
Potassium (K) (mg L ⁻¹)	0.31±0.07	0.18±0.016
Sodium Absorption Ratio (SAR)	0.790±0.042	0.586±0.34

Table 3: Effect of Domestic wastewater and Ground water irrigation on Chemical Properties of soil after harvest.

Irrigation sources	PH	Electrical conductivity (dSm ⁻¹)	Organic matter (g kg ⁻¹)	Avail. Nitrogen (Kg ha ⁻¹)	Avail. Phosphorus (Kg ha ⁻¹)	Avail. Potassium (Kg ha ⁻¹)
<i>Wheat</i>						
DW	7.62	0.50±0.012	5.92±1.00	296.26±44	26.92±4.00	343.25±2.6
GW	7.45	0.45±0.010	5.53±0.29	266.51±72	18.13±0.68	323.26±5.4
<i>Gram</i>						
DW	7.66	0.55±0.012	5.49±0.022	238.92±22	22.87±0.39	317.82±7.8
GW	7.57	0.47±0.09	5.38±0.068	248.78±0.96	17.76±1.4	345.20±4.4
<i>Palak</i>						
DW	7.62	0.53±0.016	5.46±0.32	238.65±38	23.87±0.86	332.92±2.9
GW	7.49	0.44±0.064	5.24±0.64	205.92±68	20.13±2.00	310.15±1.4

DW–Domestic Wastewater
GW –Ground water

Table 4: Effect of Domestic waste water and Ground water irrigation on Crop yield and quality after harvest.

Irrigation sources	Test weight (100 seeds)	Grain yield	Straw yield
<i>Wheat</i>			
DW	3.70±0.34	17.37±0.22	22.81±1.24
GW	3.53±0.72	17.14±0.56	22.33±3.36
<i>Gram</i>			
DW	16.70±0.84	13.18±2.20	25.03±3.44
GW	16.23±1.24	13.88±0.46	25.42±1.26
<i>Palak</i>			
DW	1.40±0.22	9.36±0.44	8.57±1.18
GW	1.13±0.16	9.02±0.56	8.06±0.28

DW–Domestic Wastewater
 GW –Ground water

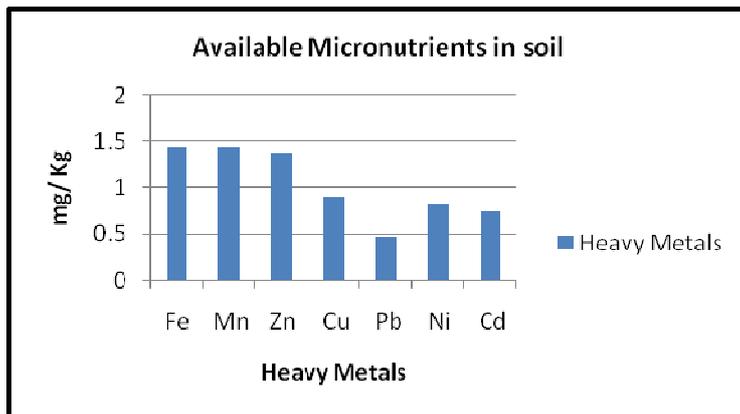


Figure 1: Available Micronutrients in Soil

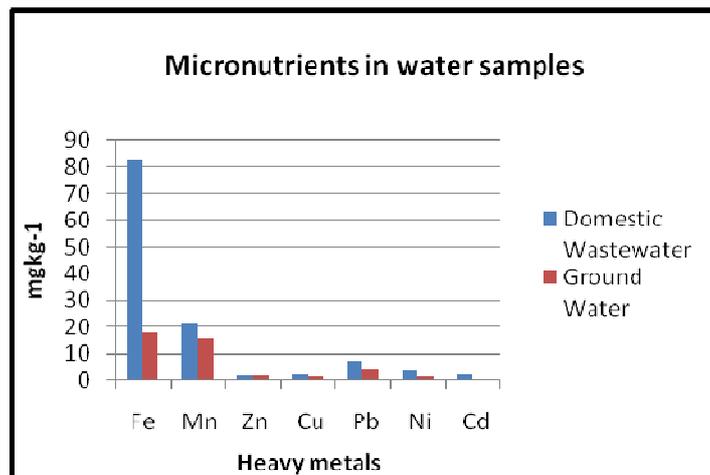


Figure 2: Available Micronutrients Domestic wastewater and Ground Water

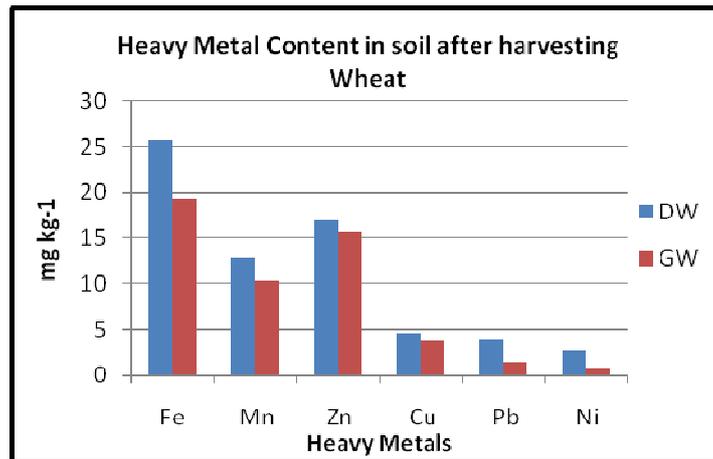


Figure 3: Available Micronutrients in soil after harvesting Wheat

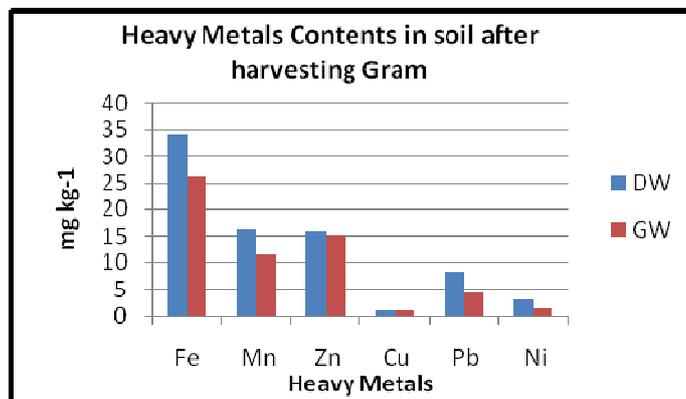


Figure 4: Available Micronutrients in soil after harvesting Gram

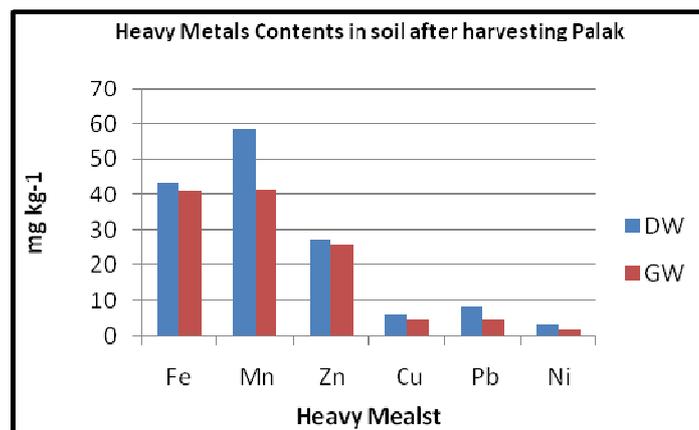


Figure 5: Available Micronutrients in soil after harvesting Palak

A study on Cooperative Banks in India with special reference to Lending Practices

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Abstract- Banking business has done wonders for the world economy. The simple looking method of accepting money deposits from savers and then lending the same money to borrowers, banking activity encourages the flow of money to productive use and investments. This in turn allows the economy to grow. In the absence of banking business, savings would sit idle in our homes, the entrepreneurs would not be in a position to raise the money, ordinary people dreaming for a new car or house would not be able to purchase cars or houses. The government of India started the cooperative movement of India in 1904. Then the government therefore decided to develop the cooperatives as the institutional agency to tackle the problem of usury and rural indebtedness, which has become a curse for population. In such a situation cooperative banks operate as a balancing centre. At present there are several cooperative banks which are performing multipurpose functions of financial, administrative, supervisory and development in nature of expansion and development of cooperative credit system. In brief, the cooperative banks have to act as a friend, philosopher and guide to entire cooperative structure. The study is based on some successful co-op banks in Delhi (India). The study of the bank's performance along with the lending practices provided to the customers is herewith undertaken. The customer has taken more than one type of loan from the banks. Moreover they suggested that the bank should adopt the latest technology of the banking like ATMs, internet / online banking, credit cards etc. so as to bring the bank at par with the private sector banks.

Index Terms- Cooperative movement of India, Usury, Rural Indebtedness, Cooperative Banks, Bank's Performance, Lending Practices, Loan, ATMs, Internet/Online Banking, Credit Cards, Private Sector Banks

I. INTRODUCTION

Co-operative banks are small-sized units organized in the co-operative sector which operate both in urban and non-urban regions. These banks are traditionally centered on communities, localities and work place groups and they essentially lend to small borrowers and businesses. The term Urban Co-operative Banks (UCBs), though not formally defined, refers to primary cooperative banks located in urban and semi-urban areas.

These banks, until 1996, could only lend for non-agricultural purposes. As at end-March 2011, there were 1,645 UCBs operating in the country, of which majority were non-scheduled UCBs. Moreover, while majority of the UCBs were operating within a single State, there were 42 UCBs having operations in more than one State. However, today this limitation

is no longer prevalent. While the co-operative banks in rural areas mainly finance agricultural based activities including farming, cattle, milk, hatchery, personal finance, etc. along with some small scale industries and self-employment driven activities, the co-operative banks in urban areas mainly finance various categories of people for self-employment, industries, small scale units and home finance.

These banks provide most services such as savings and current accounts, safe deposit lockers, loan or mortgages to private and business customers. For middle class users, for whom a bank is where they can save their money, facilities like Internet banking or phone banking is not very important. Although they are not better than private banks in terms of facilities provided, their interest rates are definitely competitive. However, unlike private banks, the documentation process is lengthy if not stringent and getting a loan approved quickly is rather difficult. The criteria for getting a loan from a UCB are less stringent than for a loan from a commercial bank.

II. OBJECTIVES OF THE STUDY

- To know the lending practices of cooperative banks in India.
- To measure and compare the efficiency of Cooperative Banks of India.
- To study the impact of 'size' on the efficiency of the Cooperative Banks.
- To suggest the appropriate measures to improve the efficiency of the Cooperative banks.
- To know different type of loans preferred by different sets of customers.
- To know the satisfaction level of the customers from Bank's lending policies.

III. REVIEW OF THE LITERATURE

Various studies conducted and numerous suggestions were sought to bring effectiveness in the working and operations of financial institutions. Narsimham Committee (1991) emphasized on capital adequacy and liquidity, Padamanabhan Committee (1995) suggested CAMEL rating (in the form of ratios) to evaluate financial and operational efficiency, Tarapore Committee (1997) talked about Non-performing assets and asset quality, Kannan Committee (1998) opined about working capital and lending methods, Basel committee (1998 and revised in 2001) recommended capital adequacy norms and risk management measures. Kapoor Committee (1998) recommended for credit delivery system and credit guarantee and Verma

Committee (1999) recommended seven parameters (ratios) to judge financial performance and several other committees constituted by Reserve Bank of India to bring reforms in the banking sector by emphasizing on the improvement in the financial health of the banks. Experts suggested various tools and techniques for effective analysis and interpretation of the financial and operational aspects of the financial institutions specifically banks. These have focus on the analysis of financial viability and credit worthiness of money lending institutions with a view to predict corporate failures and incipient incidence of bankruptcy among these institutions.

Bhaskaran and Josh (2000) concluded that the recovery performance of co-operative credit institutions continues to unsatisfactory which contributes to the growth of NPA even after the introduction of prudential regulations. They suggested legislative and policy prescriptions to make co-operative credit institutions more efficient, productive and profitable organization in tune with competitive commercial banking. **Jain (2001)** has done a comparative performance analysis of District Central Co-operative Banks (DCCBs) of Western India, namely Maharashtra, Gujarat and Rajasthan and found that DCCBs of Rajasthan have performed better in profitability and liquidity as compared to Gujarat and Maharashtra. **Singh and Singh (2006)** studied the funds management in the District Central Co-operative Banks (DCCBs) of Punjab with specific reference to the analysis of financial margin. It noted that a higher proportion of own funds and the recovery concerns have resulted in the increased margin of the Central Co-operative Banks and thus had a larger provision for non-performing assets. **Mavaluri, Boppana and Nagarjuna (2006)** suggested that performance of banking in terms of profitability, productivity, asset quality and financial management has become important to stable the economy. They found that public sector banks have been more efficient than other banks operating in India. **Pal and Malik (2007)** investigated the differences in the financial characteristics of 74 (public, private and foreign) banks in India based on factors, such as profitability, liquidity, risk and efficiency. It is suggested that foreign banks were better performers, as compared to other two categories of banks, in general and in terms of utilization of resources in particular. **Campbell (2007)** focused on the relationship between nonperforming loans (NPLs) and bank failure and argued for an effective bank insolvency law for the prevention and control of NPLs for developing and transitional economies as these have been suffering severe problems due to NPLs. **Singla(2008)** emphasized on financial management and examined the financial position of sixteen banks by considering profitability, capital adequacy, debt-equity and NPA. **Dutta and Basak (2008)** suggested that Co-operative banks should improve their recovery performance, adopt new system of computerized monitoring of loans, implement proper prudential norms and organize regular workshops to sustain in the competitive banking environment. **Chander and Chandel (2010)** analyzed the financial efficiency and viability of HARCO Bank and found poor performance of the bank on capital adequacy, liquidity, earning quality and the management efficiency parameters.

IV. RESEARCH METHODOLOGY

4.1 Type of Research - Descriptive research is used in this study in order to identify the lending practices of bank and determining customer's level of satisfaction. The method used was questionnaire and interview of the experienced loan officers.

4.2 Collection of data:

4.2.1 Primary Data

- a. Observation Method
- b. Interview Method
- c. Structured Questionnaire
- d.

4.2.2 Secondary Data

- a. Annual reports of the bank
- b. Manual of instructions on loans and advances
- c. Books
- d. Articles and Research Papers
- e. Internet

4.3 SAMPLING UNIT: The Study population includes the customers of bank and Sampling Unit for Study was Individual Customer.

4.4 SAMPLING SIZE: 200 Respondents

V. DATA ANALYSIS AND INTERPRETATION

Table 1: Preferences of the customers for the loans

Kind of Loan	No. of Respondent	Percentage (%)
House loan	16	32%
Personal loan	15	30%
Consumer loan	6	12%
Educational loan	8	16%
Vehicle loan	3	6%
Other	2	4%

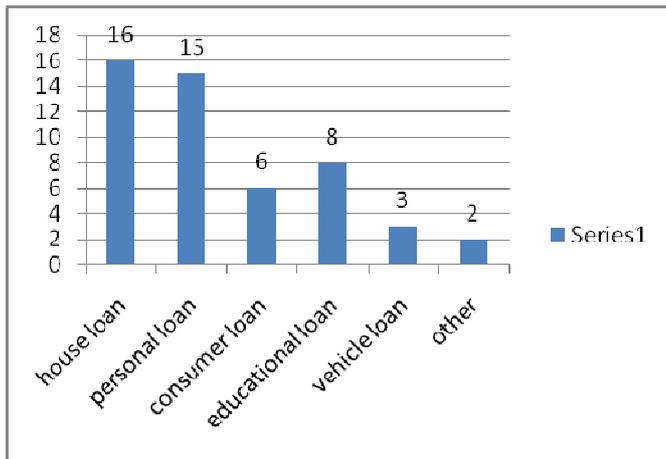


Figure 1: Preferences of the customers for the loans

Present study reveals that majority of the respondents have taken house loans & personal loans and less respondents prefer consumer, educational and vehicle loans.

Table 2: Range of the amount of loans

Loan Amount	No. of Respondent	Percentage (%)
Less than 20,000	4	8%
20,000-50,000	10	20%
50,000- 1 lac	6	12%
More than 1 lac	30	60%

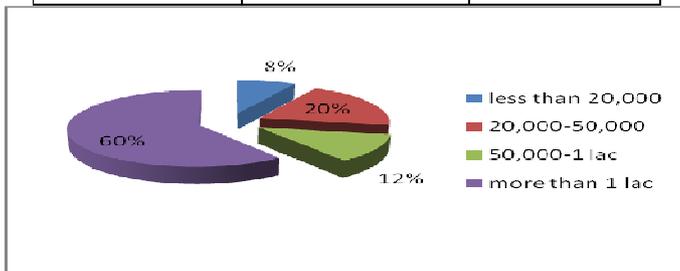


Figure 2: Range of the amount of loans

Present Study reveals that 8 % people prefer loan less than 20,000, 20 % respondents prefer 20,000 to 50,000,12 % prefer more than 1 lac and 60% of the respondents prefer more than 1 lac.

Table 3: Preferable term of loan

Term of Loan	No. of respondent	Percentage(%)
Less than 1 year	6	12%
1 to 3 years	10	20%
More than 3 years	32	64%

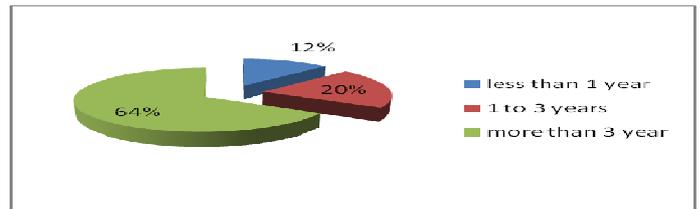


Figure 3: Preferable term of loan

Study shows that 64 % respondents take loan for more than 3 years, 20 % take loan for 1 to 3 years and 12% take loan for the period of less than 1 year.

Table 4: What prompted the customers to take loan from cooperative banks

Reason for taking loan	No. of Respondent	Percentage (%)
Reasonable rate of interest	6	12%
More schemes	5	10%
Less formalities	17	34%
Easy repayment	19	38%
Any other	3	6%

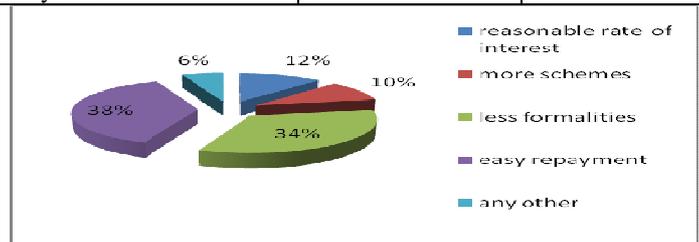


Figure 4: What prompted the customers to take loan from cooperative banks

Study reveals that 38 % take loan because banks provide easy payment,34% take loans because of less formalities and other respondents take loan because of reasonable rate of interest, more schemes .

Table 5: Average time taken for the processing of the loan

Average time for processing of loan	No. of respondent	Percentage (%)
Less than 7 days	34	68%
Between 7 to 14 days	13	26%
More than 14 days	3	6%

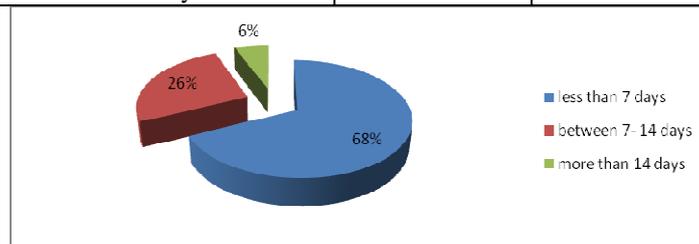


Figure 5: Average time taken for the processing of the loan

Study reveals that 68% respondents says that average time taken for processing of the loan is less than 7 days, 26% says that it takes 7 – 14 days and 6 % says that it takes more than 14 days.

Table 6. Ranking of the facilities provided by the co-op. banks

Rank the facility	No. of respondent	Percentage (%)
Above average	16	32%
Average	30	60%
Below average	4	8%

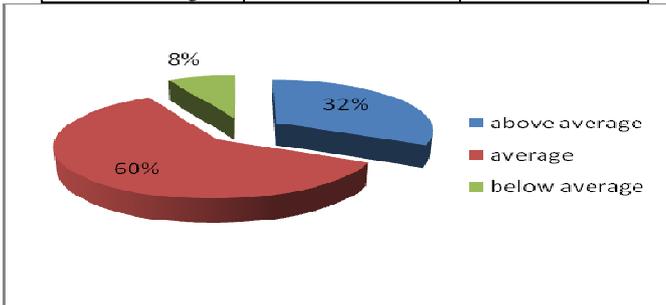


Figure 6: Ranking of the facilities provided by the co-op. banks

Study shows that 60% of the respondent says that facility provided by the bank are average, 32% say that its above average and 8% says that its below average.

Table 7: Customer’s ranking for service of the bank

Rank the customer services	No. of responedent	Percentage(%)
Excellent	12	24%
Good	26	52%
Average	12	24%
Poor	1	2%

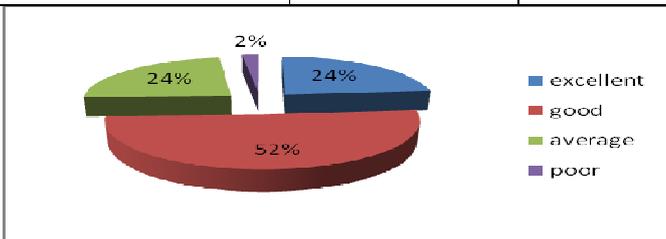


Figure 8: Customer’s ranking for service of the bank

Study shows that 52% of the respondents says that customer service of the bank is good,24% says that it is excellent and another 24 % says its average and only 2 % says its poor.

Table 8: Satisfaction of the customers with the amount & period of instalment

	No. Of respondent	Percentage (%)
Yes	34	68%
No	6	12%
Can't say	10	20%

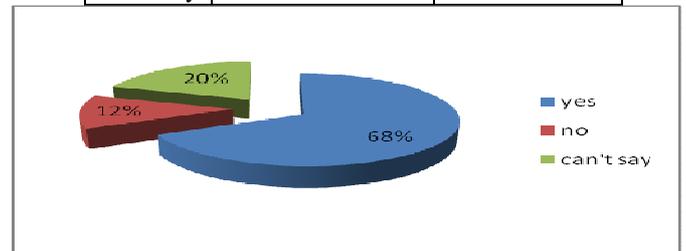


Figure 9: Satisfaction of the customers with the amount & period of installment

Study reveals that 68% are satisfied with the amount and period of installment, 12 % are not satisfied and 20 % can't say.

Table 9: Preferable banks for borrowing facilities

Preferable banks in future	No. of respondent	Percentage (%)
Public banks	7	14%
Private banks	15	30%
Cooperative bank	28	56%

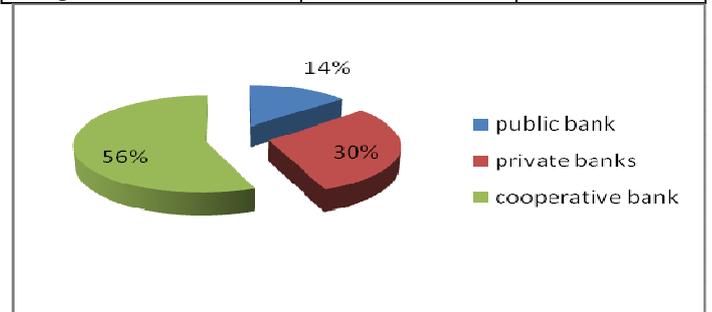


Figure 10: Preferable banks for borrowing facilities

Study shows that 56 % of the respondents wil prefer loans from co-operative banks, 30 % from the private banks and 14 % from the public banks

Table 10: Customers who would like to refer the co-op. banks to their friends and relatives

Bank refer to others	No. of respondent	Percentage (%)
Always	39	78%
Sometimes	9	18%
Never	2	4%

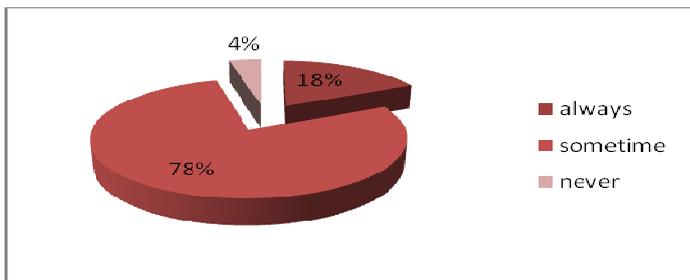


Figure 11: Customers who would like to refer the co-op banks to their friends and relatives

78% of the respondents would like to refer the bank to their friends and relatives which shows that they are satisfied from the services and lending practices of the bank.

VI. FINDINGS OF THE STUDY

1. Majority (32% as per the study) of the respondent were having housing loan from this bank.
2. Most (64% as per the study) of the people prefer to take long term loan which is more than 3 years.
3. There is a very simple procedure followed by bank for loan .
4. Easy repayment and less formalities are the main factors determining customer's selection of loans.
5. Quality of services provided by the staff is satisfactory because bank is catering to a small segment only and the customers are properly dealt with.
6. Customers are satisfied with the mode of repayment of installments.
7. Average time for the processing of loan is less i.e approx 7 days.

The financial performances of Urban Cooperative Banks (UCBs) improved in 2010-11 though there are some concerns with regard to some of the UCBs reporting negative CRAR. Within the rural cooperative sector, State Cooperative Banks (StCBs) and District Central Cooperative Banks (DCCBs) reported profits but the ground level institutions, i.e., Primary Agricultural Credit Societies (PACS) continued incurring huge losses. The financial performance of long term cooperatives was found to be even weaker than their short term counterparts. Also, it was observed that the branch network of cooperatives, though widespread across the country, continued to be concentrated in certain regions.

Moreover, the network of cooperatives was not broad based in the north-eastern region of the country. This suggests that efforts need to be taken to improve banking penetration in the north-eastern part of the country along with improving the financial health of the ground level cooperative institutions.

Increased Inter-linkages between UCBs and Commercial Banks

In recent years, the integration of cooperative banks with the financial sector has increased following the inclusion of UCBs in Indian Financial Network (INFINET) and Real Time Gross

Settlement System (RTGS) from November 2010. Further the annual policy statement of the Reserve Bank for 2010-11 envisages inclusion of financially sound UCBs in the Negotiated Dealing System (NDS) and opening up of internet banking channel for UCBs satisfying certain criteria. An analysis of deposits and advances base wise distribution of UCBs revealed that banking business was predominantly concentrated in favour of larger UCBs. UCBs with larger deposit base (more than or equal to `500 crore), though accounted for only 4 per cent of total number of UCBs, contributed almost 53 per cent of total deposits Balance sheet of UCBs expanded at a rate of 15 per cent at end-March 2011 over the previous year. This expansion in balance sheet was largely attributed to borrowings on the liabilities side and loans and advances on the assets side.

VII. PROBLEMS FACED BY COOPERATIVE BANKS

1. The cooperative financial institution is facing severe problems which have restricted their ability to ensure smooth flow of credit
 - i. Limited ability to mobilize resources.
 - ii. Low Level of recovery.
 - iii. High transaction of cost.
 - iv. Administered rate of interest structure for a long time.
2. Due to cooperative legislation and administration, Govt. interference has become a regular feature in the day-to-day administration of the cooperative institution. Some of the problem area that arise out of the applicability of the cooperatives legislative are:
 - Deliberate control of cooperatives by the government.
 - Nomination of board of director by the government.
 - Participation of the nominated director by the government.
 - Deputation of government officials to cooperative institution etc.
3. The state cooperative banks are not able to formulate their respective policies for investment of their funds that include their surplus resources because of certain restrictions.
4. Prior approval of RBI is mandatory for opening of new branches of SCBs. The SCBs are required to submit the proposal for opening of new branches to RBI through NABARD, whose recommendation is primarily taken into consideration while according permission.

VIII. SUGGESTIONS

1. The banks should adopt the modern methods of banking like internet banking, credit cards, ATM, etc.
2. The banks should plan to introduce new schemes for attracting new customers and satisfying the present ones.
3. The banks should plan for expansion of branches.
4. The banks should improve the customer services of the bank to a better extent.

IX. LIMITATIONS

1. The study is based on the data of past three or four years only.
2. The data for study mainly based on a single bank.
3. As majority of the customers are employees of the bank, they might be biased in giving the information
4. The time period of the research was limited.

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Mapping Disease: Deciphering Geographic Patterns of Breast Cancer risk Areas in the Western region of Tamil Nadu, India

Valarmathi Ramya Rathan, Latha K C, Ayesha Sulthana

Abstract- Cancer is second largest non-communicable disease and it has a large contribution in the total number of deaths. It is important for the public health professionals to understand the dynamics of cancer incidence for future strategies. Epidemiological Maps describe the Geographical distribution of the disease and the identification of the high risk areas. These maps are useful in resource allocation of policies and health decision making (Assuncao *et al.*, 2001). Therefore, this paper is attempted with the objective of understanding the distribution of breast cancer in Western Region of Tamil Nadu, using Thematic Maps. The data for the present study was collected from the records of NCRP, as well as the concerned private hospitals. The population density was calculated for each taluk and the incidences based on population density were calculated and attributed. Based on this, Using thematic maps the taluks were categorized into high incidences, moderate incidences and low incidences. All the analyses were performed using ArcGIS 9.1 (ESRI). From the observations, it is clear that the breast cancer incidence in the Western region of Tamil Nadu was found to be varying from one area to another, with high incidences in Coimbatore North and South taluks.

Index Terms- Breast Cancer, Epidemiological Maps, ArcGIS

I. INTRODUCTION

Maps depicting the geographic variation in cancer mortality or treatment can be useful tools for developing cancer control and prevention programs (Kulldorff *et al.*, 2006). Epidemiologically, breast cancer occupies a unique position in the field of oncology. ICMR has suggested that the early detection and prognosis of breast cancer through the training and awareness programs by the medical officers for developing a strategy for its control in India. Medical Geography is the interconnection of medical and geographic knowledge in analyzing the impact of the geographical environment on disease outbreak and spread. Medical Geography with GIS is extremely useful for decision making in epidemiological surveillance programs. Health researchers need improved tools and analysis methods for examining health related information (Hubner and Oliveira, 2004), as the disease alters itself according to the localized environment.

Epidemiologists have traditionally used maps for analyzing the relationships between location, environment and the disease. GIS is a powerful analytical tool to integrate data from many sources and provide knowledge about the relationship between disease and other factors. This tool can be used to prepare maps and develop strategies to combat the deadly outbreak of diseases.

Kennedy and Brody (2003) stated that GIS allows the researcher to integrate different layers of spatial information, and describe or quantify the spatial and temporal relationships. Hubner and Oliveira (2004) described that GIS is used to evaluate and illustrate the correlation between breast cancer occurrences and potential environmental factors using thematic map. Maps can be represented as dot-density, proportional circles, spheres, grey-scale (chloropleth) maps, contours (isopleth maps), cartograms and 3D surface plots (Cliff and Haggett, 1988). Geographic patterns of diseases provide insight into incidence and mortality locations and help to identify environmental sources of risk (Ross, 2003). McManus (2005) stated that the thematic map displays the spatial pattern of a theme or series of related attributes. On a general comparison, reference maps show many geographic features (forests, roads, and political boundaries) but thematic maps emphasize spatial variation of one or a small number of geographic distributions using ranges of colours. These distributions may be physical processes (climate), or demographic pattern (population density, socio-economic status and health status) displaying, intensity, location, distribution and pattern at the same time. The three primary purposes of thematic maps as stated by Briney (2009) is that they provide specific information about particular locations, spatial patterns and they can be used to compare patterns on two or more maps.

According to epidemiological studies, the physical environment (water, earth and air), the occupational environment (chemical industries and alike), the dietary environment (food and medicine) and the social and cultural environment (life styles and habits), influence the manifestation of breast cancer (Rouquayrol, 1994). Statistical models were constructed by Reynolds and Hurley (2003) to evaluate the high breast cancer incidences associated with socio-demographic and environmental characteristics. With the increase of urbanization and industrialization, environmental and ecological relations have been disrupted and unfavorable alterations have resulted due to the direct action of physical, chemical and biological agents triggered by humans. Rouquayrol (1994) stated that the exposure to a large number of carcinogenic substances through consumption, inhalation, absorption or introduction into the body (ingestion of medicines or by accidents) leading to breast cancer or generally cancer may be pointed out as a public health problem.

Fighting against breast cancer requires knowledge about the occurrence, the risk of exposures, consequences and variations in disease risk among the population. This seeks for an expert tool like GIS which is a promising option to establish relationships between environmental factors, regional exposures and individual health. The objective of this section is to identify the

breast cancer risk areas in Tamil Nadu region through thematic maps.

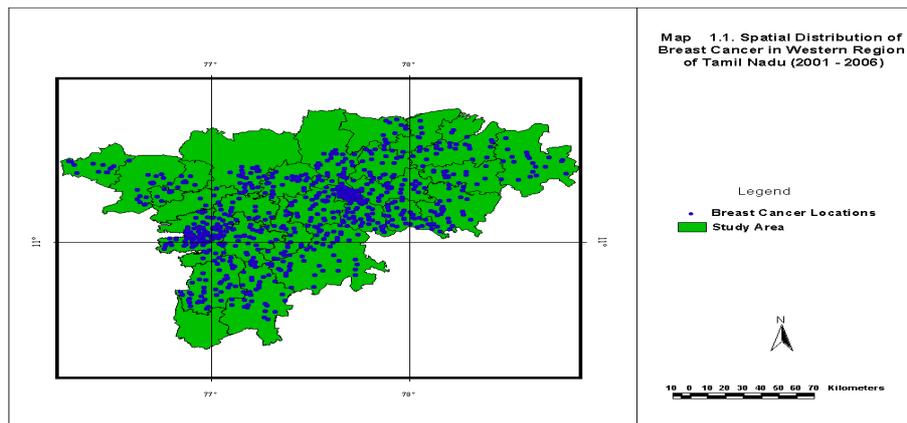
II. MATERIALS AND METHODS

The data for the present cross-sectional study on cancer was collected from the records of National Cancer Registry Program, (NCRP), Bangalore, Government Hospitals of Coimbatore, Erode, Namakkal, Salem and Nilgiri, Tamil Nadu, VNCC (Valavadi Naryanaswamy Cancer Centre), Oncology wing, G. Kuppuswamy Naidu Memorial Hospital, Coimbatore, Tamil Nadu, Department of Oncology, Surgical Oncology and Radiation Oncology, Sri Ramakrishna Hospital, Coimbatore, Tamil Nadu for six years from 2001 to 2006. The cancer incidences from the Western region of Tamil Nadu were collected from hospital registers with respect to the study area. The geographical location of each individual case (address of the patient) was geocoded in GIS environment and the latitude-longitude values were retrieved. Point map was prepared to visualize the distribution of breast cancer in the Western region

of Tamil Nadu from 2001 to 2006. The population density was calculated for each taluk and the incidences based on population density were calculated and attributed. Based on this, a thematic map was prepared to classify the taluks into high incidences, moderate incidences and low incidences. All the analyses were performed using ArcGIS 9.1 (ESRI).

III. RESULT & DISCUSSION

The point map 1.1 shows the distribution of breast cancer in the Western region of Tamil Nadu. The maximum number of points was seen in the taluks of Coimbatore (North and South) and Erode than other taluks. This concentration may be due to the migration of the people from rural areas to the urban areas for their employment, industrialization, education, hospital facilities and also due to their change in lifestyle and environmental exposures.



The number of breast cancer records in each taluk were scrutinized, aggregated and presented in Table 1.2. From the Table 1.2, it was observed that breast cancer cases were reported in 28 taluks out of 29 taluks (no breast cancer cases in Valparai taluk) in the Western regions of Tamil Nadu. The total number of breast cancer cases was reported as 1,862 after omitting some of the incomplete records. For the present study, natural break data classification technique was used to classify the breast cancer incidence data for the preparation of thematic map. Data of the breast cancer for six years were classified as high incidence, moderate incidence and low incidence. The digitized map of the Western region of Tamil Nadu comprises of five districts and divided into 29 taluks. Each polygon of the map is considered as a taluk in the study area. The geocoded records were then transferred to the digital map using ArcGIS 9.1.

The polygons were classified based on natural break to prepare a thematic map of intensity for the breast cancer cases and is presented as Map 1.2. From the thematic map, it is observed that Coimbatore North and South taluks recorded the highest number of cases. Moderate incidence ranging from 118 to 234 were observed in Erode taluk, low cases in remaining twenty five taluks of the Western region of Tamil Nadu and with no incidence in Valparai taluk. From the results, it is observed that as the rate of population increases, the number of cases increase revealing that the cases are dependent on the population size. The rate may vary over time as urbanization increases and as centrifugation of population expands. Hence, total population for each taluk were scrutinized and used for calculating the breast cancer incidence rate.

Table 1.2. Breast Cancer Incidence Rate and Population Density for the Western Regions of Tamil Nadu from 2001

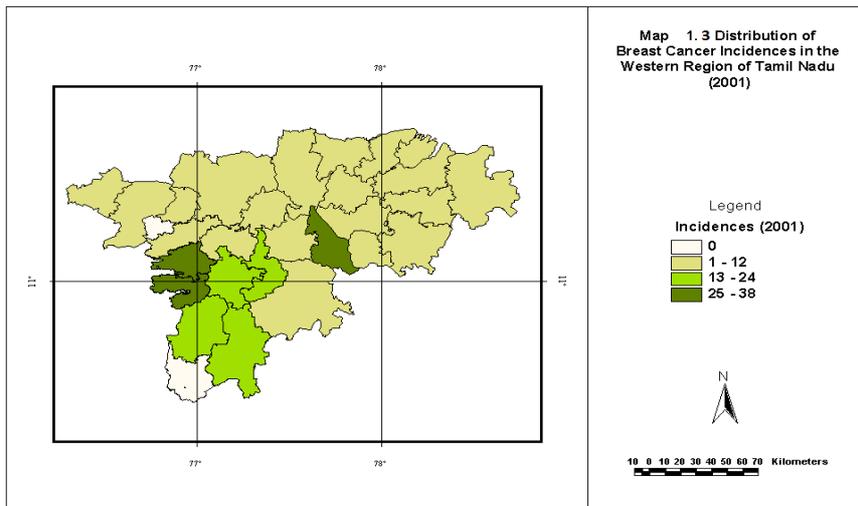
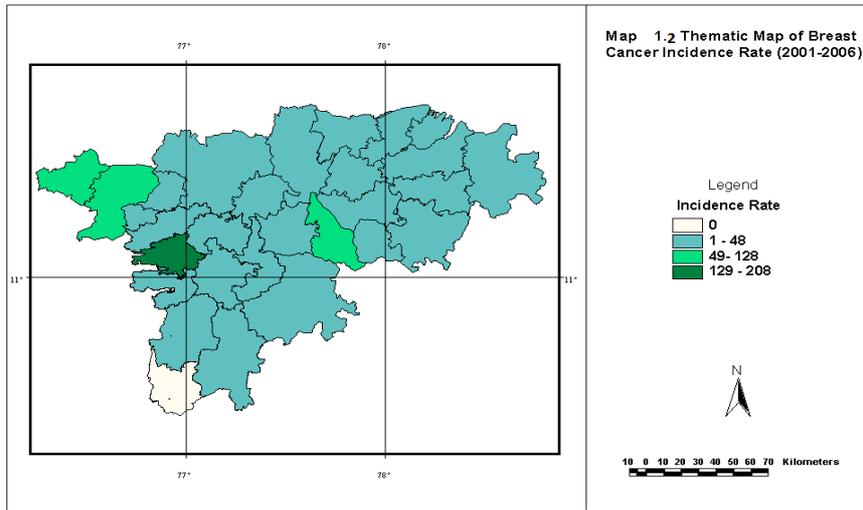
S.No	Districts	Taluks	Area in Sq km	Total Population	Population Density	Female Population	Breast Cancer Incidence	Incidence Rate for Female Population	Incidence Rate for Total Population
1.	COIMBATORE	Avinashi	671.19	252753	376.6	124578	55	44.149	21.760
		Coimbatore North	610.16	349225	572.34	170878	355	207.750	101.654
		Coimbatore South	593.82	1332789	2244.4	651031	301	46.234	22.584
		Mettupalayam	629.49	237805	377.8	117509	43	36.593	18.082
		Palladam	882.53	393171	445.5	192462	80	41.566	20.347
		Pollachi	1217.37	544194	447.0	271139	91	33.562	16.722
		Tirupur	679.10	677978	998.4	326067	117	35.882	17.257
		Udumalpet	1563.13	388834	248.8	194015	77	39.687	19.802
		Valparai	958.00	94962	99.1	48430	-	-	-
		2.	ERODE	Bhavani	1506.80	423708	281.2	206328	43
Dharapuram	2317.49			278783	120.3	139274	39	28.002	13.989
Erode	753.15			706529	938.1	347478	195	56.119	27.599
Gobi	714.70			361201	505.4	179347	50	27.879	13.842
Perundurai	827.19			326782	395.1	160823	33	20.519	10.098
Sathyamangalam	2316.31			287605	124.2	141585	32	22.601	11.126
3.	NAMAKKAL	Namakkal	1279.92	459296	358.8	226849	24	10.579	5.225
		Paramathi	532.66	186909	350.9	92987	39	41.941	20.866
		Rasipuram	826.33	317571	384.3	155627	20	12.851	6.298
		Thiruchengode	825.16	529686	641.9	258448	29	11.221	5.475
4.	SALEM	Sankagiri	726.44	223775	308.0	105330	6	5.696	2.681
		Yercaud	390.99	39080	100.0	19246	5	25.979	12.794
		Attur	1691.03	384642	227.5	189950	46	24.217	11.959
		Mettur	811	378337	466.5	177601	22	12.387	5.815
		Omalur	676.43	405302	599.2	189452	13	6.862	3.207
		Salem	975.18	1071211	1098.5	523102	18	3.441	1.680
5.	NILGIRIS	Coonoor	222.29	175067	787.6	87714	22	22.082	12.566
		Gudalur	734.51	98212	133.7	6893	4	58.030	4.073
		Kotagiri	423.90	113597	268.0	57862	17	29.380	14.965
		Ooty	1220.62	205633	168.5	103054	56	54.340	27.232

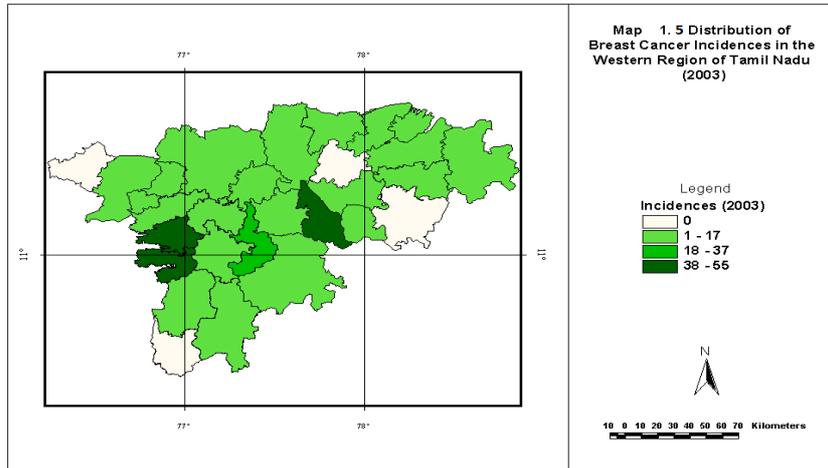
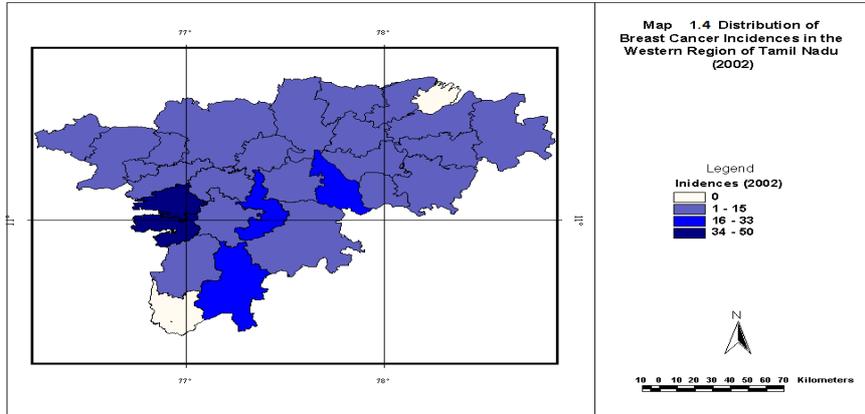
Incidence rate of breast cancer

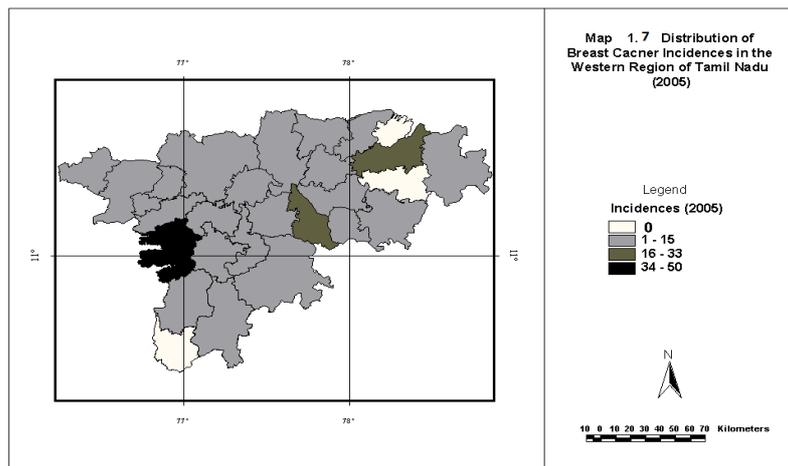
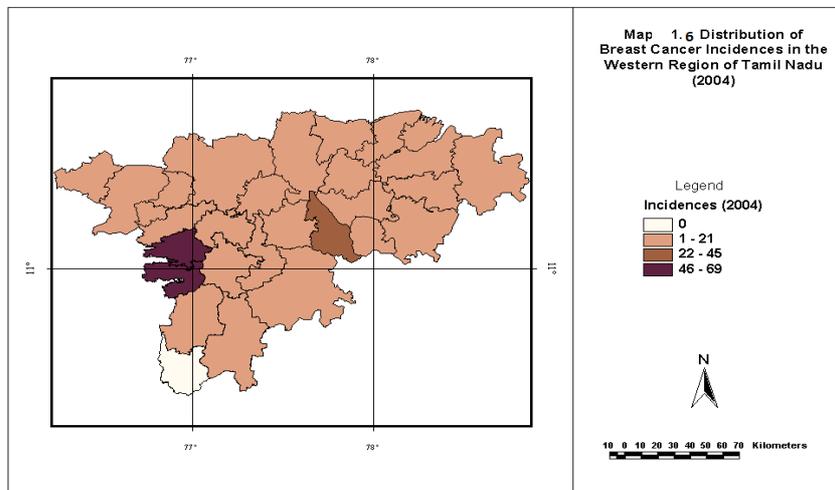
$$\text{Incidence rate} = \frac{\text{Total number of breast cancer incidences}}{\text{Total population}} \times 100,000 \dots\dots(1)$$

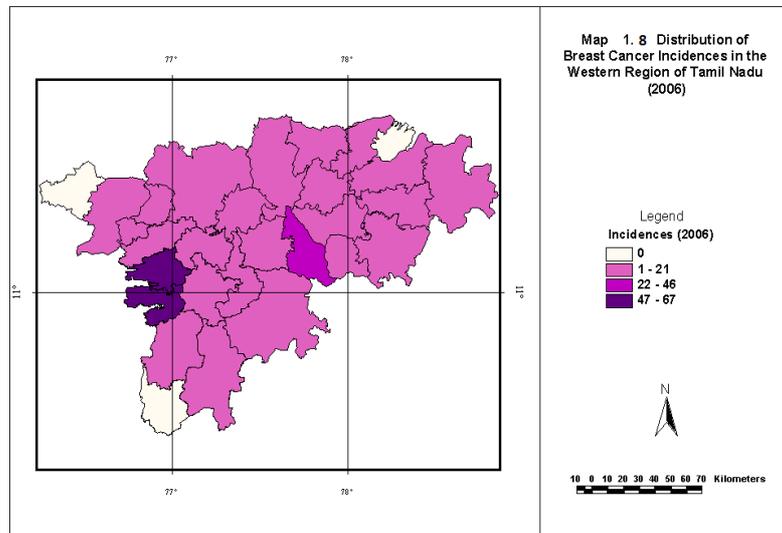
The calculated incidence rate was used and plotted on the thematic map of incidence rate in Western region of Tamil Nadu (Map 1.2). The natural break classification method was used to classify the area into high, moderate and low incidence rate. The incidence rate was found to be very high in the Coimbatore North taluk. The moderate incidence rate of breast cancer was observed in Ooty, Gudalur and Erode taluks in which the rate ranges from 49 to 128. The remaining 24 taluks have low incidence rate and no breast cancer incidence rate was observed in Valparai taluk as it has no reported breast cancer cases. This increase in incidence rate in Coimbatore North may be due to the industrialization and increase in hospital facilities, education, etc.; many people migrate temporarily from rural area to urban area.

Thematic maps for each year were collected individually and presented as maps from 1.3 to 1.11, to understand the significant regional variation with respect to the temporal changes on breast cancer cases in the study area. The natural break classification was adopted and classified into high, moderate and low incidences of breast cancer. For the year 2001 (Map 1.3), the high incidence rate of breast cancer was observed in Coimbatore (North and South) and Erode taluks. The moderate incidence rate of breast cancer was seen in Palladam, Pollachi, Tirupur and Udumalpet, and the taluks of Coonoor and Valparai showed no incidence. The remaining taluks were considered as low incidence area in the Western regions of TamilNadu.









For the year 2002, the thematic map (Map 1.4) showed the high breast cancer incidences in the taluks of Coimbatore North and South, with the moderate incidence in Erode, Tirupur and Udumalpet taluks. There was no incidence in taluks of Valparai and Yercaud. The remaining 22 taluks in the study area were considered as low incidence of breast cancer.

The thematic map of 2003 (Map 1.5), showed that high incidence was observed in Coimbatore (North and South) and Erode taluks and moderate incidence in Tirupur taluk. No incidence was reported in the taluks of Valparai, Gudalur, Sankagiri and Namakkal and the remaining taluks showed low incidence rate of breast cancer in the study area. In 2004 (Map 1.6), the high breast cancer incidences was observed in the taluks of Coimbatore North and South, with moderate incidence in Erode taluk. There was no incidence in Valparai taluk and the other 25 taluks was found to represent most of the regions in the study area with low incidence of breast cancer.

The thematic map of the year 2005 (Map 1.7) and 2006 (Map 1.8) showed high incidence of breast cancer in the taluks of Coimbatore North and South as seen in the previous year 2004. In 2005, moderate incidence was observed in Erode and Salem taluks and no incidence was seen in the taluks of Rasipuram, Valparai and Yercaud. The remaining 22 taluk showed low incidence rate of breast cancer in the study area. Whereas, in 2006, the moderate incidence rate was observed in Erode taluk and no incidence of breast cancer was seen in Gudalur, Valparai and Yercaud taluks. The remaining 23 taluks showed low incidence of breast cancer.

Increase in low incidence rate may be due to the awareness of the public by the health organizations, varying presence of hazards in the environment, demographics and lifestyle of the

mobile population, subgroups of susceptible individuals, changes and advances in medical practice and health care management. The majority of the taluks showed low incidences in breast cancer while studying the thematic map for all the six years. The significant high incidence was observed in the Coimbatore taluk throughout the study period.

A tabulated summary of the breast cancer incidences in the taluks of the Western regions of Tamil Nadu is prepared and presented in Table 1.3. From the Table, it was observed that except Coimbatore (North and South) other taluks showed moderate or low incidences or fluctuations from moderate to low incidences of breast cancer. These taluks were also displayed fluctuations of moderate and high incidences both spatially and temporally. Low incidences were observed in most of the taluks of the study area and few taluks showed no incidence in breast cancer.

The breast cancer maps demonstrate that there exist spatial / temporal variations in the study region. This relatively stable method makes little difference in the appearance of the maps. Mason *et al.* (1975); Blot *et al.* (1977); Pickel *et al.* (1999) have reported the spatial variation of breast cancer mortality in United States. Prashanthi Devi and Balasubramanian (2006) have stated that the thematic map predicts the malaria risk in Salem district, India – a case control study using spatial analysis and modelling. Goodwin *et al.*, (1998) has reported that the geographical variation in mortality among white women in USA is due to the known risk factors such as age at first live birth. Breast cancer rates are rising in many Western countries, but deaths from the disease have decreased as a result of improved screening and treatment.

Table 1.3 Temporal Distribution of Breast Cancer Incidences in the Western Regions of Tamil Nadu from 2001 to 2006

Districts	Taluk	2001	2002	2003	2004	2005	2006
COIMBATORE	Avinashi	*	*	*	*	*	*
	Coimbatore North	***	***	***	***	***	***
	Coimbatore South	***	***	***	***	***	***
	Mettupalayam	*	*	*	*	*	*
	Palladam	**	*	*	*	*	*
	Pollachi	**	*	*	*	*	*
	Tirupur	**	**	**	*	*	*
	Udumalpet	**	**	*	*	*	*
ERODE	Valparai	---	---	---	---	---	---
	Bhavani	*	*	*	*	*	*
	Dharapuram	*	*	*	*	*	*
	Erode	***	**	***	**	**	**
	Gobi	*	*	*	*	*	*
	Perundurai	*	*	*	*	*	*
SALEM	Sathyamangalam	*	*	*	*	*	*
	Sankagiri	*	*	---	*	*	*
	Yercaud	*	---	*	*	---	---
	Attur	*	*	*	*	*	*
	Mettur	*	*	*	*	*	*
	Omalur	*	*	*	*	*	*
NAMAKKAL	Salem	*	*	*	*	**	*
	Namakkal	*	*	---	*	*	*
	Paramathi	*	*	*	*	*	*
	Rasipuram	*	*	*	*	---	*
NILGIRIS	Thiruchengode	*	*	*	*	*	*
	Coonoor	---	*	*	*	*	*
	Gudalur	*	*	---	*	*	---
	Kotagiri	*	*	*	*	*	*
	Ooty	*	*	*	*	*	*
	Low	20	22	21	25	22	23
	Moderate	4	3	1	1	2	1
	High	3	2	3	2	2	2
	No	2	2	4	1	3	3

* Low incidences
** Moderate incidences
*** High incidences

IV. CONCLUSION

From the observations, it is clear that the breast cancer incidence in the Western region of Tamil Nadu was found to be varying from one area to another, with high incidences in Coimbatore North and South taluks. The breast cancer in female and male is not uniform because it is sex-specific. However, the treatment for the female and male breast cancer was found to be similar. Therefore, a brief study with effective measures is required to control the breast cancer incidences.

Spatial distribution of any disease particularly cancer gives the current scenario offering information on intensity, location and spread. To make a precise decision, a temporal trend based on the historical information is required which estimates if the disease cases have increased / decreased over time. Using this trend, a futuristic prediction can be made for better implementation of plans.

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Economic Aspects of Construction Waste Materials in terms of cost savings – A case of Indian construction Industry

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Abstract- The excessive wastage of materials, improper management on site and low awareness of the need for waste reduction are common in the local construction sites in India. Today, in most European countries, it is economically feasible to recycle up to 80–90% of the total amount of construction waste and most demolition and recycling technologies are generally easy to implement and control (Lauritzen, 1998). Considering enormous increase in amount of waste generation owing to the growth in construction industry can lead to wastage of materials which has its economic value. Currently, existence of regional and national policies, laws and regulations governing reuse and recycle principles for C & D waste is minimal in India. Thus the paper aims to focus on the economic feasibility of waste minimisation of construction waste materials in terms of cost savings in India.

Index Terms- material waste, Indian construction industry, economic relevance.

I. INTRODUCTION

In most parts of the world, construction industry consumes huge amount of natural resources and often generates large quantities of construction waste. According to US EPA (1998) activities like construction, renovation or demolition of structures generate a mixture of inert and non-inert materials which are particularly defined as construction wastes. Statistical data shows, construction and demolition (C&D) debris frequently makes up 10–30% of the waste received at many landfill sites around the world (Fishbein, 1998).

Indian construction industry is one of the largest in terms of economic expenditure, volume of raw materials/natural resources consumed, volume of materials and products manufactured, employment generated, environmental impacts, etc. Owing to the growth in the construction activity, it is appropriate to link C&D waste generation with the national and global economic growth related issues. Presently there is lack of awareness of resource-efficient construction practices and techniques. Significant

portion of Indian construction waste is still disposed off in landfills.

The economic and environmental benefits to be gained from waste minimisation and recycling are enormous (Gutherie, Woolveridge, & Patel, 1999), since it will benefit both the environment and the construction industry in terms of cost savings. Thus this paper aims to focus the problem of construction waste and management awareness, techniques and practices in the Indian construction industry, further evaluating economic feasibility of construction waste management (reduce, reuse and recycle) of projects.

II. OVERVIEW OF CURRENT PRACTICES

Indian construction Industry

According to 11th five year plan, construction industry is the second largest economic activity after agriculture. Based on an analysis of the forward and backward linkages of construction, the multiplier effect for construction on the economy is estimated to be significant (Srivastava & Chini, 2009).

The construction industry sets in motion the process of economical growth in the country. Construction accounts for nearly 65 per cent of the total investment in infrastructure and is expected to be the biggest beneficiary of the surge in infrastructure investment over the next five years. Investment in construction accounts for nearly 11 per cent of India's Gross Domestic Product (GDP) (Market, 2009). This sector is likely to continue to record higher growth in the coming years due to the Government of India's (GOI) recent initiative to allow 100 per cent foreign direct investment in real estate development projects (India(GOI), 2007). Technology Information, Forecasting and Assessment Council (TIFAC) study mentions that total construction work for five years during 2006-2011 is equivalent to \$847 billion.

	Materials %	Construction equipment %	Labor %	Finance %	Enabling Expenses %	Admin. Expenses %	Surplus %
Building	58-60	4-5	11-13	7-8	5.5-6.5	3.5-4.5	5-6
Roads	42-45	21-23	10-12	7-8	5.5-6.5	3.5-4.5	5-6
Bridges	46-48	16-18	11-13	7-8	5.5-6.5	3.5-4.5	5-6
Dams, etc	42-46	21-23	10-12	7-8	5.5-6.5	3.5-4.5	5-6
Power	41-43	21-24	10-12	7-8	5.5-6.5	3.5-4.5	5-6
Railway	51-53	6-8	16-18	7-8	5.5-6.5	3.5-4.5	5-6
Mineral plant	41-44	20-22	12-14	7-8	5.5-6.5	3.5-4.5	5-6
Transmission	49-51	5-7	19-21	7-8	5.5-6.5	3.5-4.5	5-6

Table 1: Percentage Cost Distribution In Construction Industry (India(GOI), 2007)

Table 1 shows the distribution of cost among various modes of expenses in Indian construction industry. The importance of materials cost can be seen from the fact that the component of materials cost comprises nearly 40%–60% of the project cost. Therefore material waste generation from construction activity is also huge in monetary terms. Thus economically evaluating cost benefits

Thus cost saving potential for India runs for millions of dollars.

Figure 1 and Table 2 show the percentage distribution and tonnage of various constituents of C&D waste in India in 2000, respectively (TIFAC, 2000).

Present C & D waste handling in India.

Clients, contractors, architects and the Government should play an important role in improving construction site waste management techniques and approach in India. According to TIFAC (2000) study, following are the present waste handling measures adopted by the industry at various levels.

- Items recovered during construction /demolition is sold in the market at a discount with respect to price of new material.
- Items that cannot be re-used are disposed to landfill site.
- Municipal corporations allow C&D waste in their landfills. No landfill tax is imposed.
- Different constituents of waste are not segregated prior to disposal.
- Builders/ owners bear the cost of transportation, which at present, ranges between US\$ 6 to 13/truckload depending on the distance of demolition site from landfill area.
- Municipal authorities incur cost of US\$ 1.50 to 2 per tonnes of waste, but presently no charge is levied by them on the owner or builder.
- Though directives exist for disposal of waste to landfill areas, presently penal action against violators is practically not taken.

The above study indicate the attempts made to handle C&D waste in the industry but still majority of it is not implemented in an appropriate manner. This shows lack of awareness in the industry concerning the possibilities of cost savings from proper handling of C&D waste. Managing building material waste can in fact achieve higher construction productivity, save in time and improvement in safety (Chan & Ma, 1998) while disposal of extra waste takes extra time and resources that may slow down the progress of construction.

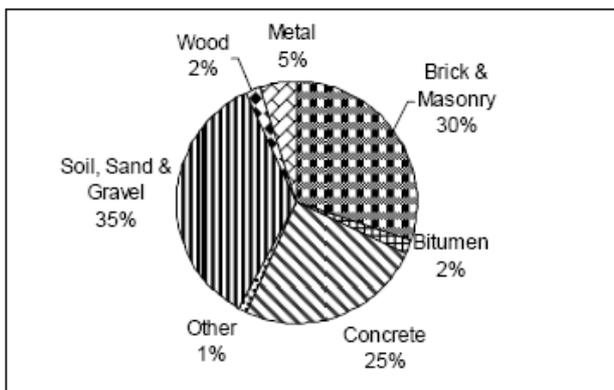


Figure 1 : Various constituents of construction WASTE (TIFAC, 2000).

Constituent	million tonnes/yr
Soil, Sand and gravel	4.20 to 5.14
Bricks and masonry	3.60 to 4.40
Concrete	2.40 to 3.67
Metals	0.60 to 0.73
Bitumen	0.25 to 0.30
Wood	0.25 to 0.30
Others	0.10 to 0.15

Table 2: Tones of C&D WASTE (TIFAC, 2000)

III. CAUSES OF PROBLEM IN THE INDURTY

Indian industry is unable to take appropriate economic benefits through cost savings particularly because of many reasons that contribute to make this problem appear significantly at the industry level.

Barriers for widespread adoption of waste management (Reduce, reuse and recycle) system as stated by (Wildermuth, 2008) are the following:

1. Lack of Awareness in the Industry: The major barrier in the industry is the lack of awareness among local contractors, construction labor and architects about waste management techniques and approach. Usually most of the waste that is produced during the construction process is the result of poor handling and techniques.
2. Lack of interest from clients: Another main reason for an ignorant industry is lack of importance given by clients in imposing waste reduction and management practices into the projects. Clients do not support those activities which do not offer tangible benefits to them. Potential of significant cost saving is not yet voluntarily implemented in projects and timing is given major preference.
3. Lack of proper training and education: Lack of contractor's federations and professional institutes in the country which could significantly raise awareness among the clients and contractors about the possible economic benefits and its social consequences.
4. Lack of skilled labor: Major portion of construction labor in the industry is unskilled. Due to which proper waste handling methods are not adopted. Thus it is very important that contractors and sub-contractors should develop awareness and skills in labor which is mostly illiterate.
5. Lack of market competition: The above mentioned barriers make the industry as a whole to be fragmented and fail to extract benefits from the much evident aspects. This leads to

lack of competition among contractors, for e.g. if one contractor makes good cost savings from a project and increases their profit margins. Eventually this should then incentivize other contractors to get involved with waste minimization and management techniques. But mostly from a contractor's viewpoint, taking up waste minimization and management is more of *ex ante* issue where risks are associated with the contractor to bear the cost implications. This will become widespread only after taking project initiative and then benefiting from them.

6. Lack of Government Interventions: Government regional, national policies and regulations are limited and are not implemented appropriately. Regulations like landfill tax or tax incentives to incorporate this approach in the project might enforce industry to explore cost savings seriously.
7. Lack of waste reduction approach by architects: Usually architects do not give preference to waste minimization approach during design and planning stage. Designing as per standard minimum sizes will eliminate wastage on sites.

According to "India – A building Industry in Transition" many positive and negative points are associated with Indian construction industry. Continuing strong economic growth, foreign investment, cheap & plentiful labour, strong engineering education systems are some of the positive points. On the other hand, inflationary pressures, relatively low skilled and uneducated labours, government bureaucracy, and lack of infrastructure are some of the negative points that make the construction activity more challenging. It also suggests that there is an urgent requirement for a government sponsored 40–50 year holistic infrastructure plan for India to continue on its high growth path towards economic maturity. (Wildermuth, 2008)

Figure 2 shows different routes of waste generation through improper handling and management. It elaborates how clients, designers, contractors, supply chain, procurement contribute to waste production in construction industry.

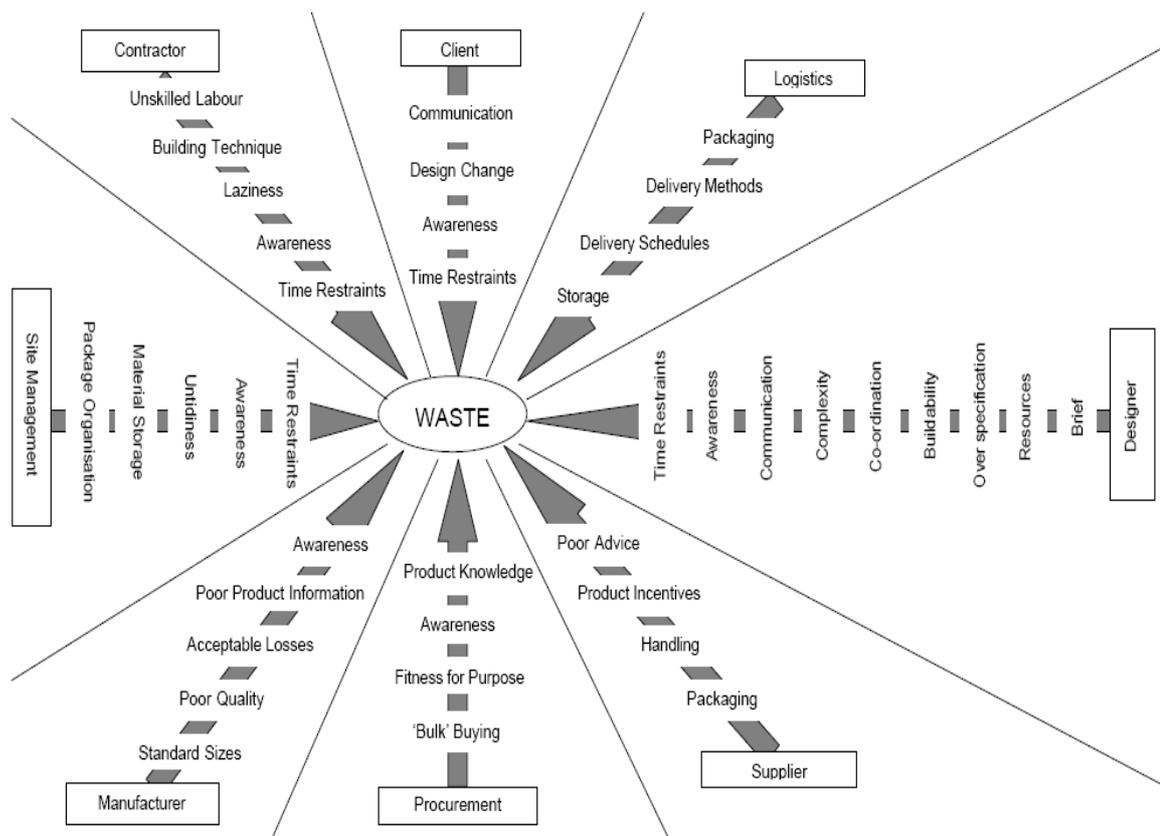


Figure 2 : Waste Generation (Keys, Baldwin, & Austin, 2000)

IV. RELEVANCE TO ECONOMIC THEORY

a. *Economic Feasibility in terms of cost savings*

This section will evaluate and examine how proper waste handling on construction sites can economically benefit a project and the construction industry by saving millions of dollars to the industry. An attempt has been made to identify possibilities in cost savings in a project.

Generally, economic feasibility is carried out by standard measures of profitability, which is cost –benefit analysis. According to the US EPA (2002), waste management makes good economic and business sense and at the same time it can improve production efficiency, profits, good neighbour image, employee participation, product quality and environmental performance. Therefore benefit–cost analysis (BCA) will be examined to estimate the economic feasibility of construction site waste management in terms of cost savings as adopted by Begum & Siwar (2006). We evaluate project level cost and waste management using a cost function including waste as ‘bad output’ to estimate overall , input specific, and marginal production cost of waste reduction . It can increase contractor’s competitiveness through lower production costs and a better public image.

Net benefits can be expressed by eq (1) which is by subtracting total benefits by total costs.

$$\text{Net Benefits} = \text{Total Benefits} - \text{Total Costs}.....(1)$$

$$\text{NB} = \text{TB} - \text{TC}$$

1. *Total Benefits (TB)* is all the advantages of using of reusing and recycling of construction waste materials. This is the sum of all the direct, indirect and intangible benefits. (*Cost Benefits of reducing waste is not included in monetary terms*)

$$\text{TB} = \text{P}_{\text{SC}} + \text{R}_{\text{SM}} + \text{SC}_{\text{CT}} + \text{CS}_{\text{LC}} + \text{A}.....(2)$$

P_{SC} = Purchasing cost savings by reusing construction waste materials. Company can save money by reusing and buying recycled materials instead of buying virgin materials from the market. (*Cost savings from market price = Average market price /unit x total amount of reused and recycled individual material – Cost of purchasing reused and recycled material at lower cost*). This is estimated to be 25% less than virgin materials. (Begum & Siwar, 2006))

R_{SM} = Revenue from selling of construction waste materials.

SC_{CT} = Waste collection and transportation cost savings from disposing less material to landfill.

CS_{LC} = Cost savings from landfill charges by reusing and recycling of construction waste materials

A = Intangible Benefits

2. The *total Costs (TC)* are all the incremental costs associated with the reusing and recycling of construction waste materials. This is sum of all direct, indirect and intangible costs. So the total costs can be expressed by Eq. (3)

$$TC = CS_C + S_C + T_C + A^* \dots \dots \dots (3)$$

CS_C = the collection and separation costs of construction waste materials,

S_C = the storage cost of waste material.

T_C = the transportation cost of disposing waste to landfill

A^* = the intangible costs.

$$Net\ Benefits = Total\ Benefits > Total\ Costs \dots \dots \dots (4)$$

Costs are the key main determinants for decisions and choices for waste management technologies and practices. Financial constraint is the main reason for low priority for waste management. In fact the cost of implementing waste management practices is given more preference than benefits. Quantifying all the associated benefits and the costs in monetary value and also considering the intangible costs and benefits can give a clear picture of the economic benefits of reusing and recycling of construction waste.

Although Begum & Siwar, (2006) suggests that practices that induce waste reduction from the beginning through proper planning, designing etc should be encouraged. This would not only ensure reduced quantity of waste production on site but also less quantity of waste material to be reused and recycled and thereby reducing the cost implications associated with waste management. Following section shall discuss the strategies to mitigate this problem and its economic relevance.

V. STRATEGY TO MITIGATE THE PROBLEM

Examining the lack of practices and its causes in the industry, this section will propose strategies that could be adopted at an industry level to mitigate this problem. Measures to stimulate a widespread adoption of waste minimization and appropriate site waste management practices by extracting benefits from cost savings.

1. Government Initiative - Policy Implications.

Owing to the lack of awareness that makes this problem widespread in the industry. The Indian Government, like other countries should start to legislate and use command and control framework to ensure disposal of waste in landfill sites appropriately by placing liability from 'cradle to the grave' and assigning duties appropriately. Attention can be thus shifted to market – oriented methods to regulate the waste disposal.

Forms of government interventions to stimulate waste reduction are the following:

1. Landfill tax to encourage the reduction of waste thus encouraging movement up the waste hierarchy.
2. Government can impose a subsidy for recycled construction products,

3. Tax credit for the construction that use recycled products.

These changes will encourage reducing, reusing and recycling of material waste in the industry. Such a market mechanism provides incentives for firms to shift attention from end solutions to process solutions for waste minimisation. That is, it underscores the role of production decisions and processes and their likely changes in response to taxes or other forms of the Government intervention to stimulate waste reduction. Such interventions can create awareness among the contractors and clients and direct them towards its economic implications.

2. Create awareness among clients and contractors :

Apart from the Government interventions, voluntary actions by construction firms should be encouraged by setting up of various regional level federations and institutions which readily provide knowledge of economical benefits of waste minimization and management by appropriate techniques. This shall result in location specific 'demand side' characteristics by clients to take up waste minimization and management in their projects and include this from contractual agreement.

However, as material waste management is related to production processes, analysis of waste practices and the potential for – or costs of –waste minimisation requires a supply rather than demand-side approach. And thus will encourage contractors to develop and implement the method appropriately and benefit from cost saving from projects.

3. Training and Education :

Construction firms should take the responsibility to provide appropriate training to the unskilled labour about proper techniques to minimize construction waste. This is a step towards waste reduction at source.

4. Role of an Architect :

Designers should design buildings with waste minimization into consideration. Use of standard dimensions and sizes can greatly improve waste production on sites. Architects should recommend recycled materials in their specifications and should guide clients in other possible design approach to waste minimization.

VI. EVALUATING PRACTICAL RELEVANCE

Strategies to mitigate the problem at industry level will require government intervention to initiate the waste minimization and management system mainly because of lack of market competition and significance. The high costs of landfill charges and high taxes of using virgin materials along with various institutions and organization initiatives can create a derived demand – supply dynamics in the industry.

Demand from the clients will initiate contractors to develop and experiment various methods of waste minimization and extract possible cost savings from various projects. Benefits from cost savings will encourage more contractors to adopt and compete in the market to outbid the other. This will initiate market competition to evolve in the industry which will soon appear at significant level.

As a result of the Government incentives on using recycled material instead of virgin ones, will increase the demand for recycled materials in the industry. The whole process will also make construction material manufacturing firms to actively participate and change their production process. Waste decisions by manufacturing firms in the context of production costs, and thus in terms of their impacts on input use, output production, and efficiency will be considered. A primary goal of firms is the maximization of output production while minimising private costs. Minimising environmental costs may also be a key target, if there is sufficient market or social incentives (Chapple, Morrison, & Harris, 2005). Reaching these objectives involves making choices about waste generation, in combination with other production decisions.

As a result of this lack of appropriate handling of waste in the industry coupled by waste in economic terms can be dealt with in significantly creating a demand in the industry.

Thus the above strategies will contribute in creating a demand – supply dynamics once its economic implications are widely understood and implemented. Demand from clients will initiate a supply side of system from contractors, which in turn will demand appropriate materials from manufacturers and also provide them with raw materials to recycle from the waste.

Recycle and reuse of construction material waste can also help the economy through the creation of jobs related to salvaging and recycling of construction waste. New products create jobs through the manufacture of recycled content materials.

VII. CONCLUSIONS

Due to least priority given to appropriate site waste minimization and management systems in Indian construction industry leads to generation of huge quantities of material waste every year. This problem is not only detrimental at environmental level as most of the waste is disposed off in landfills but also in economic terms as waste materials have their specific economic values before getting mishandled.

Examining various reasons for the problem, lack of awareness among clients and contractors, lack of skilled labor, lack of proper training and education, minimal Government interventions etc are few of the many reasons that significantly affect the Industry as a whole.

Proper site waste management reveal that it is economically viable to do significant cost savings from the whole process. In which total benefits exceeds totals cost by incorporating appropriate methods. And widespread adoption can significantly save huge amount of money which otherwise goes into landfills in form of waste materials.

First step towards mitigating this problem would be the Government's interventions like Landfill tax, higher tax for using virgin materials, tax credits for recycling etc can act as an initial momentum towards seeking various other cost saving measures through waste minimization at source and appropriately managing it on site. Institutions and local organization can create awareness among clients and contractors which will initiate the demand for material waste minimization from clients and voluntarily from contractors.

These steps can create a market driven mechanism in the industry, with demand and supply factor and market competition which will help to mitigate this problem that will both benefit the economy and the environment.

VIII. RECOMMENDATIONS

However, waste management system may also have its limitations. Proper market for recycling and reusing of waste will require an aggressive marketing effort to locate markets to sell waste material to be recycled and then processed recycled material to be sold at appropriate prices. The current rather low level of market development means that significant time and money must be invested in establishing relationships, keeping track of pricing changes and becoming a reliable supplier of materials, in order to ensure a continuous intake of construction waste materials. The operator also has to locate and develop relationships with demolition and general contractors with projects in the area to market their construction recycling business as the disposal option of choice for the contractors. These aspects in economic terms are although beyond the scope of this study.

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Agradweep –A Sectrolal Place Changing Location by Bhagirathi’s River Bank Errision

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Abstract- The study investigates the economic impact of the proposed Riverside County Detention Center (RDC) on the tourism industry of the Palm Springs Area. The geographic, economic, and industry scopes of the study has been defined as consisting area in India. Tourism is one of the fastest growing industries in the world. The dynamic growth Of this industry is evident from the fact that globally tourism accounts for more than 11%of the global GDP and 8% of the world trade employment . Nature has best of Agradweep at Katwa in West Bengal with unique beauty , splendor with its lush green and undisturbed valleys , five climatic zones , peaceful , total sanitation , environment friendly, hospitable & smiling people and a rich cultural heritage –which is unparallel and would be hard put to create and find anywhere else. The most peaceful and crime free in the river bank of Bhagirathi, “The land of Peace & Tranquility” Agradweep at Katwa itself become its natural and unique USP with global appeal.

I. BACKGROUND OF THE STUDY

Religious places are one of the important tourist resources. Religious places are related to all religions have a tourist significant, only the degree of important varies from place to place. One of them is Gopinath Temple which is Hindu (baisnab) religion related. It is quite old and attract a large number of tourist through it has location of disadvantages, find hopefully this tourist resources will have a great tourist significant in the days to come. In this background this religious spot is chosen for the study. This historical place is located on Agradweep village of Katwa sub-division of Bardhaman district.

II. OBJECTIVE OF THE STUDY

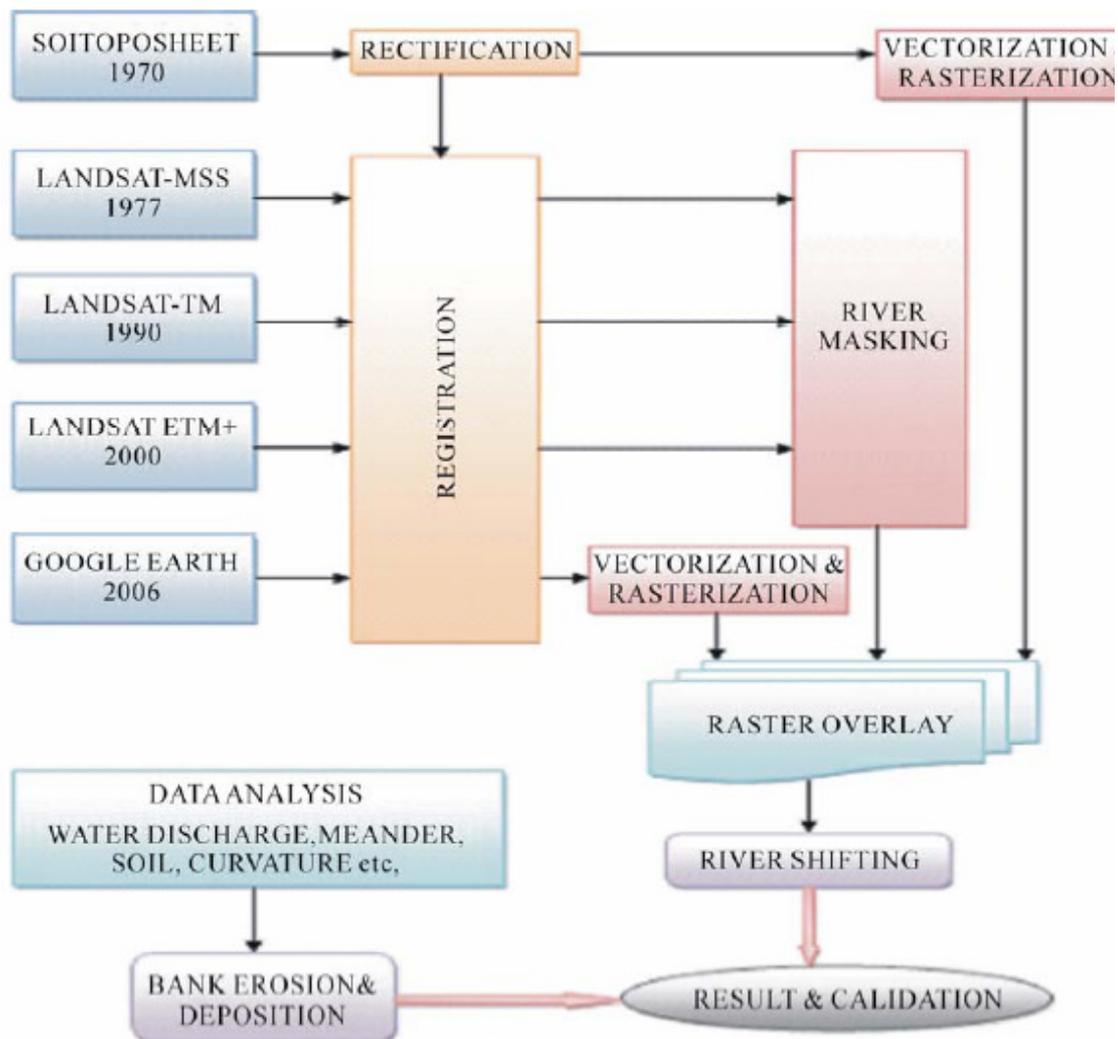
- A. To take a concept about Bhagirathi-Ganga river.
- B. To gain the information on Gopinath Thakur, significant person of ancient Baisnab history and local people’s respect and faithful.
- C. To earn the knowledge in erosion of Bhagirati river and destruction of Gopinath Mandir.
- D. To estimate the information of economic loss on local peoples due to Bhagirati river erosion and people’s believe on Gopinath Thakur.
- E. To develop the tourist spot as Agradweep area to highlight the natural beauty and historical religious significant of the location.

III. METHODOLOGY

In the study of Gopinath Temple two sources of information has been obtained, i.e., primary and secondary data. The primary data is obtained from held survey by collecting the answers of extensive questions which includes all aspects of socioeconomic condition like age, sex, occupation, education level, income of correspondent.

The primary data also collected from the temple authority, prist and person of the villages. Though my study is based mainly on primary data but I also collected secondary data from mahakuma library, Katwa information centre, NATMO, Gazetteer, different books etc. just to get a general idea about the background of the study area and its tourism potentiality.

The dissertation is manly descriptive one, but the discussion and analysis is base: d on field survey as well as secondary data. In this context, I have adopted both statistical analysis and cartographic representation based on survey data. I have computed and used different statistically techniques. Primary date was collected from the fild in the form of temple survey, tourist survey etc.



Flow chart of methodology

IV. RESULTS

HISTORICAL BACKGROUND OF AGRADWEEP AND IT'S IMPORTANCE

Agradweep is an ancient land in katwa Sub-division. Ptolemy mentioned it as Apnagar or Aagaha, Will Ford Called it as Aghodeep and according to Renel, it was Aaghadweep. The present day's Agradweep's main attraction is Ghosh Thakur's Shreepaat's Gopinath. To reach there, one has to get down in Agradweep railway station, which is in Bandel – Katwa railway line and then travel about 2.5 km by toot or rickshaw to reach the Agradeep village, which situated on the banks of the river Bhagirathi. Due to frequent changes in the way of river Bhagirathi, Agradeep in past remained sometimes on east banks and some times on West Banks, Presently, it is on the eastern banks of the river. Every year Krishna Ekadashi and Trayodashi dates of Chaitrya month, to observe passing away of Ghosh thakur and Bhruni bath resectively.

From around five hundred years, the people of Gangetic West Bengal,s large area have immense sense of devotion for Ghosh Thakur's (Govindo Ghosh) Vaishnav idol Lord Gopinath, which is unparallel in India. From the time when Govindo Ghosh a resident of Kulai, a close disciple of Chaitanya establish the idol of Lord Gopinath in Agradweep, it become a place of pilgrimage for the Vaishnavs, but the occurrence of Baruni bath and festival is Known from an ancient time. According to the Scholars, Sometimes around 5000 B.C. and Baruni bath on Krishna trayodashi date of the month of Chaitra, new Year used to start. During Krishna Kadashi, Chandra (moon) remains in Satabhisha Constellation. According to the astrologers, God Varun is the lord of Satabhisha Constellation. For that reason, the other name of Satabhisha is baruni. We can say it for sure that the Barony festival of Agradweep is quite ancient in occurrence. According to the legends, the religious merit or piety one can get by bathing once in the Baruni festival is equals to bathing in the ganges during 100 solar eclipses.

Traditions tell us that King Vikramaditya of Ujjain (in different opinion, King Vikram Kesari of Mangalkot) used to come to Agradweep for Baruni bath. Date of establishment of lord Gopinath idol in Agradweep by Ghosh Thakur coincided with the date of passing away of Ghosh Thakur and Baruni, which increased the importance of Agradweep as Shreepaat. Sometimes in between 1574-76 A.D. King Maansingh came to Bengal to defeat the Pathan Muttan and on his return, he paid a visit to Agradweep for offering prayer to Lord Gopinath. There is mention of Lord Gopinath Agradweep in the epic "Tirthamangal", composed by Vijayram Gupta during 1174 (Bengali era). This implies that the renounce and fame Lord Gopinath of Agradweep is ancient in origin. Gadadhar Das, brother of Kashiram Das who wrote the Bengali Mahabharat, also mentioned Lord Gopinath in his Writings.

**Agradweep Gopinath Rai Padatala,
Nivas amar Sai Charan Kamala**

(Agradweep remains under the feet of Lord Gopinath and I live under the same lotus-like feet)

EMERGENCE AND ESTABLISHMENT OF LORD GOPINATH

In the Ganges West Bengal, there are many here says and traditions the establishment of Vaishnav god Lord Gopinath. The establisher of idol of Lord Gopinath was Govindo Ghosh, who is known as Ghosh Thakur in this region. They lived in the Kashipur Vaishnavtala nearby Agradweep. According to legends, he was born in Vaishnavtala. Govindo Ghosh and Govindananda of Chaitanya Bhagvat is one and same person.

It is written in Chaitanya Charanamrita that Nityananda along with Vasudev and Madhav Ghosh came to Gour from Neelachal Govindo Ghosh remained with Chaitanya to preach. Mahaprabhu for sometimes in Neelachal. During 1515 A.D. when Shreechaitanya for the Second time came to Gour Banga, Govindo Ghosh became his cotraveller. It is not known that exactly where Govindo Ghosh met Chaitanya Mahaprabhu. But according to some, they met in Kashipur Vaishnavtala. According to legends during their travel, Chaitanya Mahaprabhu abandoned Govindo Ghosh after observing his accumulator urge.

The fault of Govindo Ghosh was that he provided myrobalan fruit to Mahaprabhu for month refreshment which he

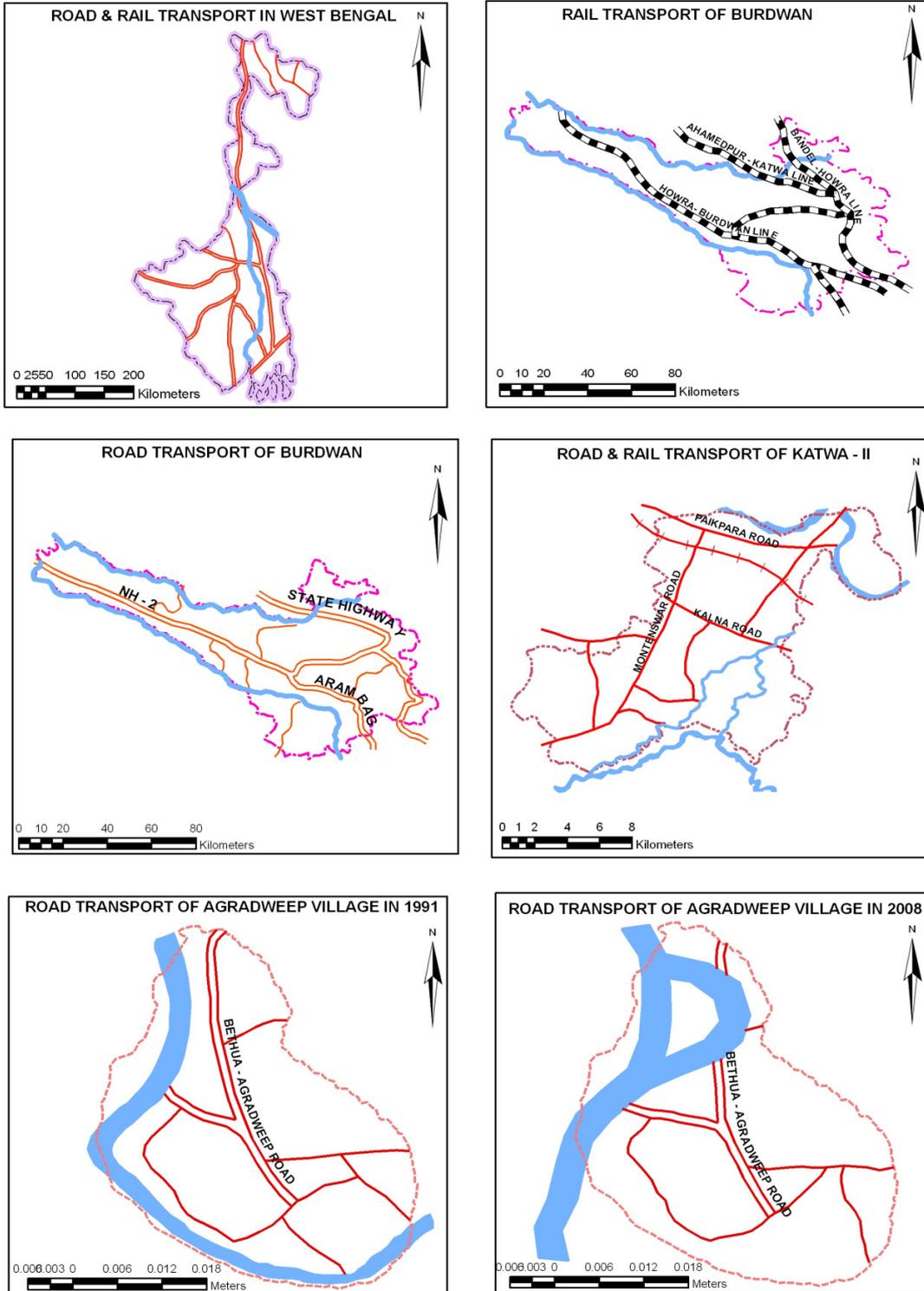
gathers previously. For this sin, Shree Chaitanya left his dear disciple. But at last, due of severe yearning of Govindo Ghosh, Shree Chaitanya asked him to establish Shreepaat in the ancient pilgrim of Agradweep. From then, Govindo Ghosh started living on banks of Ganges in a hut and continued his religious prayers. After this incidence, one day while bathing in the Ganges Govindo Ghosh found a long of wood which he brought to his hut. After some time, Mahaprabhu came to Ghosh Thakur's hut and with his divine commandment that wooden log changed to stone. With Mahaprabhu's directions and hard work of an unknown sculptor, the idol of lord Gopinath was carved out. Mahaprabhu himself established that idol and named it as lord Gopinath. Ghosh Thakur became the first priest of Lord Gopinath.

It is not known for sure that exactly when Lord Gopinath was established in Agradweep but it can be assumed that when Shree Chaitanya for the second or last time came to Gour, sometime during 1514 – 15, the idol was established. Around 2 feet high standing idol was carved out of touchstone, which is not only the pride of the Vaishnav but also of the people of the katwa subdivision and unique piece of Bengal's art craft.

After the establishment of idol of Lord Gopinath, Ghosh Thakur remains alive for many years. He was married to a lady of Singh family of Vaishnavtala. One boy was also born to his wife. But his wife died while giving birth to the child. His son also died in the age of five. For these reasons, Ghosh Thakur was very sad unable to worship with consistency. So, lord Gopinath appeared in front of Govindo Ghosh and him that all the ritual which his son was entitled to perform after his death would be performed by Lord Gopinath.

After this incidence, Govindo Ghosh starting Lord Gopinath as son and on Chaitra Ekadashi just before Baruni festival, Govindo Ghosh passed away. Legends says that even Lord Gopinath shed tears in sorrow and also performed all the ritual of funeral ceremony. From that year onwards, the same day, every year, the idol of Lord Gopinath was made to do the oblation rituals of the unreal ceremony. Govindo Ghosh affectionately that lord Gopinath as his son. In Gour's Vaishnav addition's among punchvarna affection toward children is worth mentioning. In whole of India only in Agradweep's temple, it is said that Lord himself appeared to his worshipper in the incarnation of a child.

ROUTE MAP AND EFFECTS OF RIVER BHAGIRATHI



V. EROSION OF THE RIVER BANK OF BHAGIRATHI AND TRANSFER OF THE GOPINATH TEMPLE

First-time (1514-15):

Sometime during 1514-15, the idol of lord Gopinath was established in the hut of Govindo Ghosh where he used to worship. So, the Gopinath temple was actually the hut of Govindo Ghosh as there was not exactly any sort of temple. According to the legends, this place was on the eastern banks of river Bhagirathi, where the Agradweep Village was situated. But due of the erosion of the river, the exact place cannot be pointed out today.

Second Time (1723):

It is said that during the reign of king of Nadia, Krishnachandra, in 1723, a beautiful temple of lord Gopinath was constructed. This information is present in the book 'Manashamangal' written by Vijay Gupta. It is mentioned in the book, that there was a majestic temple present in Agradweep. There is no confusion about this, that the above said temple is the same temple of lord Gopinath. But due to the erosion of the banks of Bhagirathi River, the temple was destroyed. Due to changes in the way of Bhagirathi, the position of Agradweep Changes from eastern to Western banks of the river and Vice

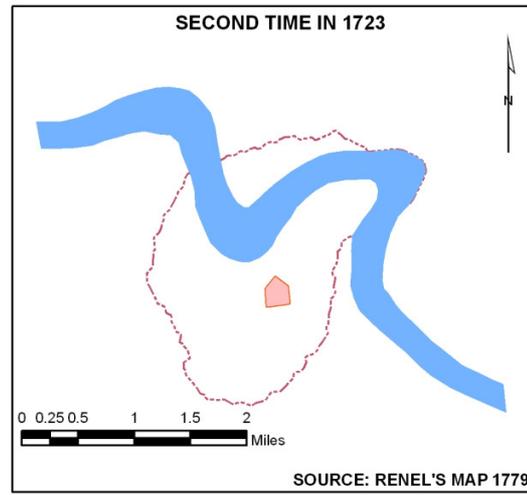
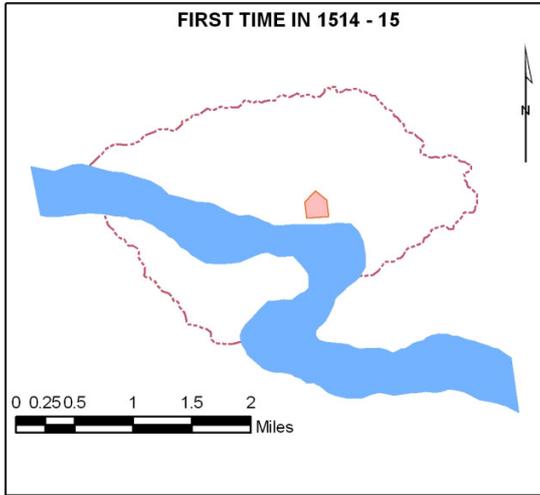
Versa. Along with this, the position of the temple also changed. The idol of lord Gopinath was firstly established on the eastern banks but on second occasion, it was established on western banks, which is considered on the first temple of lord Gopinath.

Third Time (1833):

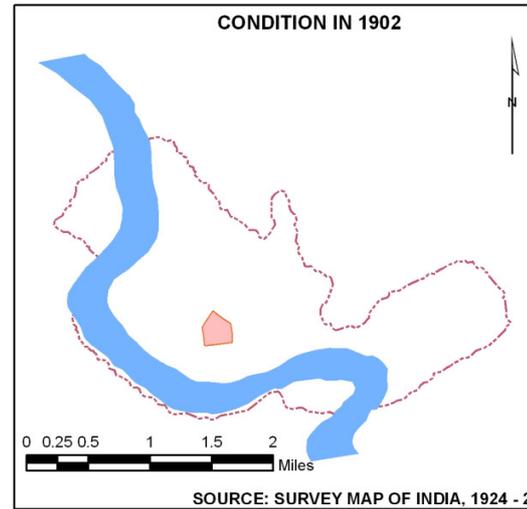
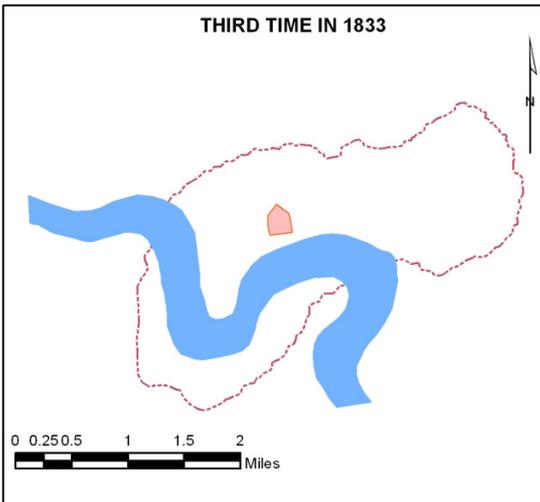
The frequent erosion of bank of Bhagirathi River induced destruction of the temple structure. But it did not resist the people of Agradweep to construct the temple. In 1833 A.D, the people of Agradweep again constructed the temple on the eastern banks of the river as the village Agradweep was then on the eastern bank. From 'Sambad Bhaskar' published on 24 May 1849, it is known that Kalidas Poddar of Jessore (presently in Bangladesh) donated Rs.5000 for the construction of two rooms in the temple and digging of four ponds for the common people. This information is present on a terracotta seal of the temple.

Just near to relics of 1833's temple, a new temple was constructed in 1961. The present temple is still safe from the continuous erosion of river Banks of Bhagirathi. But from 1994, the eastern banks started erosion which stretched to the western bank from 2007. If the erosion on the eastern banks continued till today, the temple of around 200 years old (176 years) which is about 320 meters away from the banks of river Bhagirathi would have been destroyed by the erosion procedure.

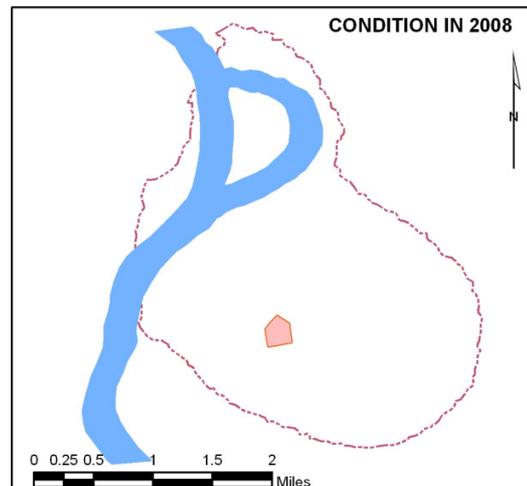
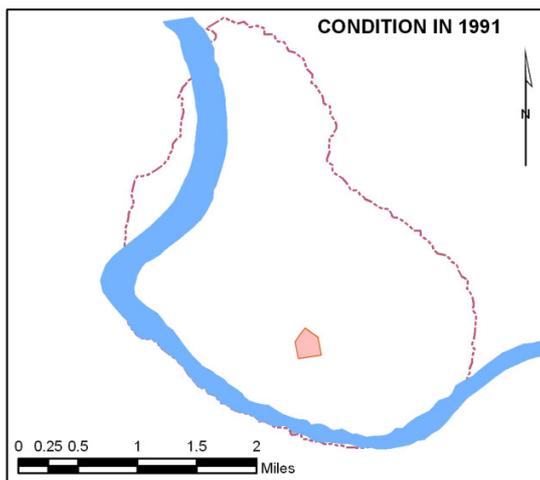
CHANGABLE BHAGIRATHI AND LOCATION OF GOPINATH TEMPLE



SOURCE: RENEL'S MAP 1779



SOURCE: SURVEY MAP OF INDIA, 1924 - 25



VI. CONCLUSION

Even the pride of the hundred year old is huge and about one lakh of people comes to Agradweep for bathing in the Ganges during Barone, there remains a pyramid of ill management of the preparations for food shelter issue of the pilgrims. Many pilgrims, after worshipping in the temple returns to the nearby town Katwa for staying. This a set back for Agradweep to be an attractive tourist-stop.

Transport Problem: On one hand, the location of Agradweep is in deep rural part of W.B. on other hand, there is a huge crisis of the transport facility which prevented Agradweep to be in the lime light for tourist destinations. The main connectivity – the Bethua – Agradweep road is almost destroyed by devastation by Bhagirathi, The only mean of transport direct to temple is the rickshaw. The present condition of Katwa-Agradweep Ghat bus route is miserable. After the onset of darkness in the evening, there remains a huge problem of transportation as nothing is available to a pilgrim or tourists.

The erosion of the banks of the river Bhagirathi manifested the problem of development of Agradweep. Agriculture is the main occupation here. But the erosion devastated the agricultural field to a severe extent. This made a number of young men to find work in different states such as Gujrat, Maharashtra and many other states of the country. This negatively affected the Age sex pyramid of the area.

Due to unruly nature of the most of pilgrims, ignorance of the people of Agradweep and inactive role of the administration and Panchayat Samiti, the pollution free banks of Agradweep becomes a hub of pollution every year during the festival.

All last can said that the erosion of the banks of the river Bhagirathi was able to suppress the sense of devotion of the people of Agradweep and the pilgrims but increased it exponentially. People of Agradweep accepted the erosion by Bhagirathi as the will of lord Gopinath and maintain the age old traditions associated with the temple. This included the Dot Utsav after the Chaitra Ekadashi. During this period, the whole of Agradweep in the mood of Celebrations and enjoyments.

Along with the slight articial to Agradweep due to modernization, the feel of nature continues here with the association of many known and unknown birds, butterflies etc. there remains the continuous flow of Bhagirathi, high lands and bamboo forests in Agradweep.

Last but not letast, it can be said that if someone visit Agradweep, he will not only find the present of joy the devotion to lord Gopinath but also the science beauty of the rural village and natural sceneries of Agradweep.

the lower course of Mahananda. East of the ruins of ancient Gour" (The Changing fact of Bengal, ibid, p. 141).

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Secure Auction Bidding Mobile Environment through Randomized Alphanumeric Cipher Algorithm

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Abstract- Mobile Auction Bidding is a developing mechanism that may widely used by GPRS enabled mobile around the world. Many dependable models existing in internet enabled platform. The proposed Auction Bidding Mobile application is basically based on Japanese auction, Double auction and English auction. Making the business model trustworthy, security is being provided by RAC (Randomized Alphanumeric Cipher) Algorithm.

The developed Mobile application has a strong process direction, in contrast to traditional cryptographic approaches, composed of functional module and the best security analysis, in terms of computational time and effective environment over the network. The infrastructure collects location evidences about the buyer authenticity and the behavior can be used in the future to profile bidders in order to detect frauds.

Index Terms- Security, Auction, Bidding, RAC, Mobile

I. INTRODUCTION

Mobile Auction Bidding is message authentication hence the Auctioneer as well as the Bidder doesn't need to go anywhere; instead they can take part in the auction or bidding during the day or night. The proposed Mobile Auction Bidding has a certain simple process. The only few pre-conditions are that the Auctioneer or Bidder must register and authenticate before he/she can take part in the bidding process. The system uses GPRS forms authentication which creates a session cookie for any signed in user via message authentication. The most important and frequently used method for evaluating the effectiveness of the proposed system is the span of the session and the cookie remains valid until the user logs out. In general, we can classify Message authentication Security Service as Critical Security (CS) where as CS service provides strong security protection by using Randomized alphanumeric Cipher Algorithm which consists of longer key size, strict security access polices, isolation for protecting data, and so on. When a mobile device requests a security service to the GPRS, the system admission controls the entire resource management model about the availability of system resource. The Proposed system maintained the module in such a way so that the closed bid of those products whose closing date is less than the current date is automatically disabled. The process automatically transfers the control and hides it from the users.

The lastly we considered the "Administration" module. Administrator module has been designed in such a way so that it checks all the security apart placing a bid to submission of

product. Once the module in session the administrator can add, edit, modify product categories and assign new auctioneer as well as administrator notify both the Auctioneers and Bidders to complete the transaction without fail.

II. EXISTING AUCTION BIDDING SYSTEM

Auction Bidding System exists in the Internet based auctions, which are rapidly diversifying into various products. Most notable auction companies are eBay [http://www.ebay.com] for a wide range of daily use products, CNET [auctions.cnet.com] basically for electronic goods, Priceline [www.priceline.com] for air-line tickets, and E*Trade [www.etrade.com] for financial products. These auctions bidding basically based on following mentioned Auction Types.

1. Chinese auction: It is a combination of a raffle and auction that is typically featured at charity and also known as penny social, tricky try or pick-a-prize according to avoid causing offence.

2. Dutch Auction: It is also known as clock auction, an open auction or an open-outcry descending-price auction, where the auctioneer begins with a high asking price instead of asking lower price, auctions reserved until some participant is willing to accept the auctioneer's price, or a predetermined reserve price which means the seller's minimum acceptable price is reached.

3. Sealed-bid first price and Second price auction: It is very common in the stamp collecting business. It is basically seen in markets of refinancing credit and in foreign exchange, which is more common in today's society due to the internet auction website, eBay.

4. English Auction: It is commonly being seen in real estate auctions and car auctions as well as it is widely used in offline and online environments to sell various resources such as art, collectables, electronic devices, and so on.

5. Double Auction: A double auction admits multiple buyers and multiple sellers concurrently into the market. When potential bidders submit their bids and potential auctioneers simultaneously submit their bid prices to an auctioneer, after placing a bid price an auctioneer chooses some price q that clears the market: all the sellers who asked less than q sell and all buyers who bid more than q buy at this price q .

III. PROPOSED AUCTION BIDDING SYSTEM

Proposed auction bidding system uses Randomized Alphanumeric Cipher algorithm and applying XOR operation with auctioneers and bidders message and the technique of Bit-

stuffing in specific way. We used private key and the public key which increases the efficiency level of encryption algorithm. Here one 8-bit public key is randomly selected among several generated Alphanumeric Characters and one 5-bit private key. These may vary in real life environment. Our proposed system is basically based on double auction and English auction. During the implementation of proposed system, we also focused on stabilizing revenues in a recurring auction for perishable resources, where the auctioneers must prevent price collapse that requires controlling as well as the supply of resources and solving the bidder drop problem. This system designed in such a way to identify this problem and also attempts to resolve it and provide better security to the system by introducing Randomized Alphanumeric Cipher algorithm to increase the efficiency and also having a tendency to reducing the starvation problem.

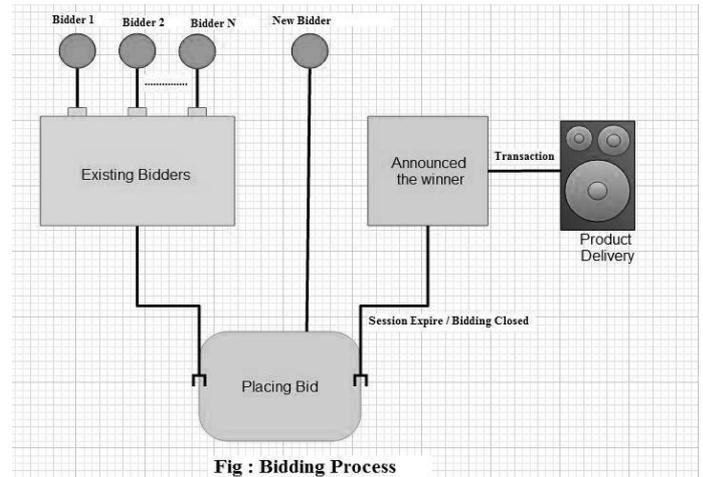


Fig : Bidding Process

IV. INITIAL LEVEL ARCHITECTURE OF AUCTION BIDDING

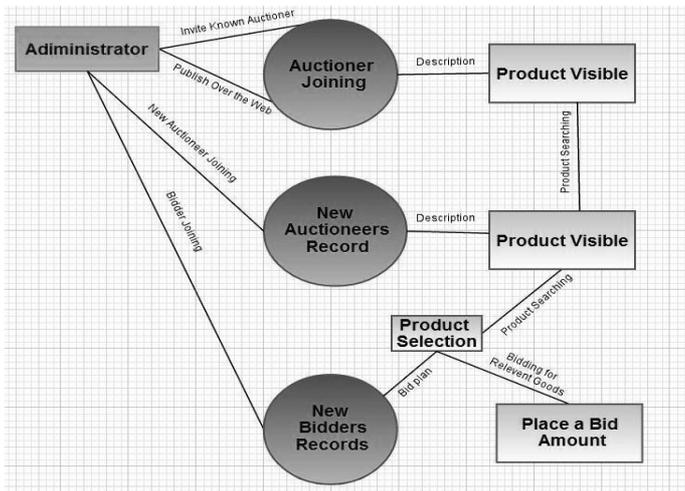


Fig: Auction Bidding System Architecture.

V. ARCHITECTURE OF BIDDING PROCESS

Bidding process starts once the auctioneer provided their product details with all mandatory information and verified by the Administrator. After verification of goods, N number of Bidder can take part and during bidding time stamp M number of bidder can also join. Once the session is being expired the process automatically transfers the control to the closed bidding module and hides the expired product details from the bidding log. Once all the verification is being done Administrator announced the winner and notifies both the Auctioneers and Bidders to complete the transaction without fail.

VI. SECURITY CONSIDERATION FOR AUCTION BIDDING

During the bidding process our proposed security mechanism will ensure that the police are not sabotaged by an external bidder who is not a part of auction. To avoid unauthorized posting and make reliable system, bid is being done by silently and data is being saved in encrypted form. Encryption and decryption is being based on RAC, since we are basically dealing with the mobile auction so that our proposed system will take care of the memory space before saving the encrypted data. This mechanism not only provides incentive compatibility, efficiency, and individual rationality but also minimizes the communication overhead and the expected revenue of allocating the resources. This behavior ensures the reliability and trustworthy of auction bidding system.

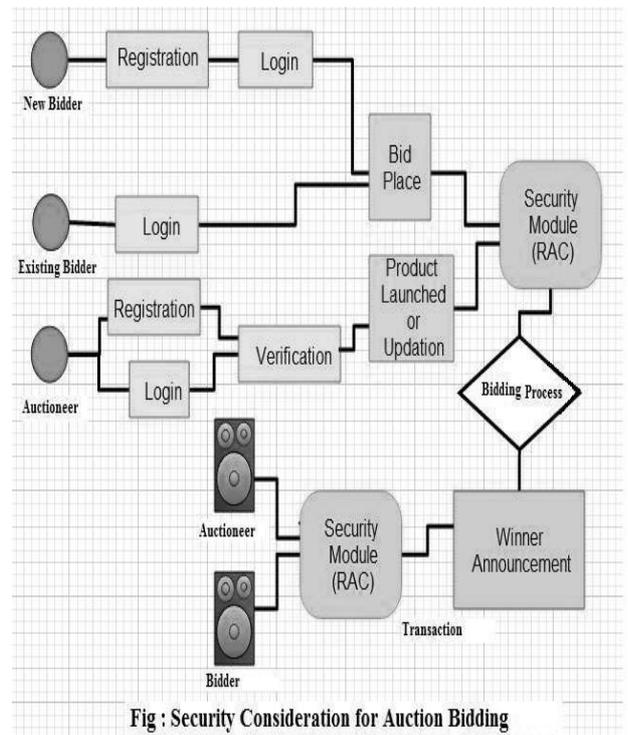


Fig : Security Consideration for Auction Bidding

VII. SECURITY MODULE OF RAC

Encryption Algorithm

1. Generate N number of 8-bit Alphanumeric Characters randomly
2. Randomly select any one among them, denoted as 'A', and 5-bit SECRET KEY assigned as 'B'.
3. Convert 'A' and 'B' in binary format.
4. Compute the quotient of these two $Q=A/B$.
5. Perform XOR operation with Message 'M' and quotient 'Q', $TEXT = M \text{ XOR } Q$.
6. Scanned TEXT and perform the Bit-Stuffing.
7. In this way we get the encrypted message as CIPHERTEXT.

Decryption Algorithm

1. Remove the extra bit from CIPHERTEXT.
2. Perform the XOR operation with 'TEXT' and quotient 'Q'.
3. In this way we get the original message 'M'.

VIII. CONCLUSION

Overall online /offline Auction Bidding plays an important role in the existing commercial environment, But due to lack of information people missed the chance of participating in auction bidding system. Hence our proposed System places an important role to fill the gap via Mobile auction bidding. It also insures that the proposed system will take care of all Security issues by applying RAC and make the model reliable and trustworthy over the mobile environment. As the resultant, our proposed system is one of the useful systems over the mobile devices.

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A Synopsis on the Effects of Anthropogenic Greenhouse Gases Emissions from Power Generation and Energy Consumption

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Abstract- Despite the looming difficult energy context in the majority of countries in the world, global change in environmental dignity resulting from power generation and energy consumption scenario is rapidly becoming a globally disturbing phenomenon. Stakeholders and environmental activists alike have been clamouring for adoption of reduction procedures using sustainable means because ignominious environmental practices have associated disastrous consequences. Increasing essential strategies are needed to fortify the pursuit for the reduction in the emissions from power generation and energy consumption. Therefore, this article presents an overview of the effects of anthropogenic energy generation and consumption practices capable of ejecting emissions of greenhouse gases into the atmosphere. It also endeavors to identify some greenhouse gas emission reduction and control measures.

Index Terms- Emissions, energy consumption, greenhouse gas, power generation

I. INTRODUCTION

Presently, rise in global temperature resulting from energy generation and consumption have become a very worrisome phenomenon to many stakeholders in different progressive sectors. Rise in environmental temperature and changes in related processes are directly connected to increasing anthropogenic greenhouse gas (GHG) emissions in the atmosphere [1]. This rise in temperature was vehemently argued to be generally triggered by the emission of carbon based compound from fossil fuels consumption for power generation. Figure 1 [2] shows the average global temperature rise due to emissions of anthropogenic greenhouse gases (GHGs). The curve exhibits sharp and continuous rising edges which is an indication that the global mean annual temperature have been persistently increasing over a very long period of time. By consequential effects, it has also caused the melting of ice and the rising of sea level which has led to flooding and tsunamis across the globe [3-4]. However, it was also acknowledged in several research works that global environmental stability is also subject to great threat

regarding this unfolding changes if not well-checked. According to [5] change in the condition of earth climate has potential impact on agricultural production as it relates to the issues of soil and water effects. This is because in reality, changing in the weather pattern poses threats to food production [6]. Electrical energy has conventionally being generated using fossil fuels [7] especially large blast of power supply for urban areas and industrial manufacturing activities. Fossil energy resources can be stored such that they are readily available for used. This tendency guarantees continuous energy generation security and supply stability.

Unquestionably, fossil fuel consumption has dominated the global energy production and consumption scene. Hamzeh et al., [8] reiterated that just about 10% of world energy consumption is being generated from renewable energy sources. Despite the ongoing accelerated efforts toward renewable energy development in different parts of the world, the tendency for renewable energy to completely replace conventional energy generation and consumption portfolio is characteristically uncertain and difficult because of its limited power potential. A tremendous resource is needed to harness renewable energy resources for large scale power generation. Energy stakeholders have in several fora advocated the need for sustainable development through clean development mechanism (CDM) which in essence and without dispute has been understood to be attainable by ensuring the ascendancy of renewable energy development. Beside energy generation and consumption, extractive processes of fossil energy resources is another dangerous endeavor to human societies especially the natural gas flaring. Gas flaring is the burning of natural gas that is linked with crude oil when it is pumped up from the ground [9] to the surface of the earth. Most of the observed increase in global average temperature since the mid 20th century [10-11] is very likely due to the observed increase in anthropogenic greenhouse gas concentrations [3].

Figure 1: A curve of the average global temperature rise

II. EMISSIONS IN DIFFERENT ENERGY SECTORS

Today, energy is a stronghold sustainable prerequisite to the present global social and material development. This is because it is a requirement for meeting basic human needs, particularly heat, motive power (e.g., water pumps and transport), light and other applications such as business, industry, commerce, and public services, such as modern healthcare, education, and communication, are highly dependent on access to energy services [12]. Direct relationship exists between the absence of adequate energy services and many poverty indicators, such as infant mortality, illiteracy, and life expectancy [13]. A nation economic and physical development can be judged by the level of her energy consumption. Quest for development has brought several energy generation and consuming sectors as well as their associated environmental pollution such as emission of greenhouse gases (water vapour, methane, oxides of nitrogen, carbon dioxide and oxides of sulphur). From this outlook, energy has become a significant parameter in the daily life of all humanities. Direct reduction in energy generation and consumption as a means of reducing GHGs emissions will spell trouble for all sorts of modern development but the best alternative solution is to exploit renewable energy alternative being that they are either emission free or have characteristic lowest forms of emissions. Realistically, there are several activities contributing to global atmospheric emissions such as:

II.1 Heating and cooking emissions

Heating and cooking are mostly accomplished by the application of renewable and non-renewable energy fuels. Combustion of fuels of any kind is usually another basic source of pollution due to incomplete combustion. Today, development of cooking energy system with 100% efficient combustion have not been achieved and indoor related pollution and heat emissions have not been eliminated. Traditional stoves are not only characterized by very low energy conversion efficiencies, they also emit a large

amount of toxic elements [14] and modern energy stoves as well generate pollutants even though at minimum level. The most common emissions from traditional energy stoves are methane, unburnt suspended particles, nitrogen oxides and sulphur oxides among other toxic organic compounds. Methane is the main source of greenhouse gases among the pollutants. Methane is a basic component of biogas. Biogas is a methane-rich fuel produced from the anaerobic digestion of organic material, such as animal waste, dung and crop residues [15-17]. The heat energy loss to the environment from cooking and heating systems is another source of global temperature rise. Black carbon is soot generated from industrial pollution, traffic, outdoor fires, and the burning of coal and biomass fuels [18-19]. Additionally, in a separately electric power and heat generation systems, tremendous quantity of carbon dioxide and heat is emitted into the environment and eventually contribute to GHGs as shown in Figure 2. In some European countries, the use of combined heat and power facility is common to avoid waste to heat to the environment. Some private operators of combined heat and power plants have been rewarded in Germany [20] while in some countries government the facility is built, operate and own by the government for emission level monitoring and control. More than half of heat produced from the burning of fossil fuels for energy is release into the atmosphere. In some of the heating processes, water is used as coolant such that the return of the heated water back to large water bodies increase temperature of the aquatic environment. A transition towards optimization and exploitation of renewable gaseous fuels such as biogas and hydrogen for cooking will eventually lower the current level of emissions due to heating and cooking.

Figure 2: Structure of Separately Generated Heat and Power [21]

II.2 Automobile systems emission

The present world is rapidly migrating towards becoming transport-energy efficient especially in the urban segment. Modern transport systems are fossil fuels-based energy expended automobile mechanisms. Aviation, water and ground transports systems used varieties of carbon based fossil energy compounds with the tendency to pollute the atmosphere. Emissions from the transport sector of global economy also have some potential impacts on the global climatic changes. The current prevailing shoddy economic background in majority of developing countries where poor quality automobile systems are predominantly used is another source of air pollution. Most of these systems burn fuels insufficiently to produce black carbon which may either be due to poor engine or fuel quality. A significant application of electric vehicles and hydrogen cars will tend to reduce emissions from fossil based energy resources. Bio-fuel and biodiesel application in the transport sector can also reduce emissions [22].

II.3 Power systems emission

Electricity generation can be achieved using various energy resources. Figure 3 shows the combination of different energy resources for electricity generation in the United States of America in 2009. In modern electricity generation and consumption, fossil power sources are more used to provide electrical energy due to cheapness and their ability to generate large power. To this effect, fossil power plants are more common today. Fossil power plants are electric power generators that are used to burn fossil fuels to generate electricity for consumption. Major fossil fuels widely used today are petroleum, coal and natural gas. Operation of fossil fuel power stations give-off carbon dioxide which is a major source of greenhouse gases (GHGs) according to the harmonize opinion of energy and environmental pollution researchers.

Figure 3: Sources of electricity in the United States (2009)
[23]

GHG emissions associated with the provision of energy services are a major cause of climate change [3]. Operations

of modern electric power system generators are based on fossil fuels combustion with overall effects on the biosphere and built environment. In large and semi-urban settlements, there are many activities that needed energy for operations. In every part of the world, demand for electrical energy is highly on the rise due to increase in manufacturing, construction and household and institutional activities. In developing countries, a lot of private businesses supplement their shortage of electricity with petrol and diesel fuel generators to provide the required energy. Tremendous quantity of smoke particles as well as other harmful compounds are expelled from the exhaust pipes of these generators and escape freely into the atmosphere. Without any benefit of doubt, the exhausted wastes are the basic source of greenhouse gas. In many developing countries of sub-Sahara Africa fumes from private individual generators have been reportedly killed many due to careless indoor operations.

In a coal power plant, emissions of particulate matters are another rampant tendency. These are tiny particles release during combustion of coal in a coal-fired power plant. In most modern power plants operating on coal as fuel, electrostatic precipitator, cyclone collector and construction of bag house have been used to remove particulate matters. Other method employed as an effort directed towards the particulate matters emission reduction is the design of Integrated Gasification Combined Cycle (IGCC) power plant. This power plant makes use of synthesis gas produce from a chemical reaction between coal and water to generate electricity. IGCC operates in such a manner that particulate matter pollutants is removed from the synthesis gas used for power generation and the thermal exhaust gases generated as by-product is used to produce steam to operates a steam turbine power plant.

In nuclear power plants, dispersed radioactive materials could be concentrated in the atmosphere such that living organism may lose the ability to tolerate their effects. Most nuclear power plants are well prevented against emissions of radioactive fallout materials. Nevertheless, contact with a significant amount of radioactive trace materials could result into change of genes and chromosomes a phenomenon known as mutation. Apart from mutation effect, several other damages could be caused by the presence of radioactive materials in our environment. A good number of the world nuclear power stations are owned by the advanced countries of the world especially United Kingdom, Canada, Russia, Japan, Germany and France. India and Pakistan are prominent among the few developing countries operating nuclear power plant.

Global political power play have seriously restricted active participation of developing countries in the construction and operation of nuclear power station especially the middle-eastern countries. This is due to the concern that the possession of such technology may advance into proliferation of weapon of mass destruction (WMD) and global terrorism. Nuclear power plant is being operated at an affordable cost today but conventional risks connected with the power plant is catastrophically unique as witnesses in Chernobyl and Fukushima. Although, most of the nuclear

power accidents can be traced to human errors and the need to digitally automate the power plant for adequate reliability and safety is inevitable. This will indeed avoid cascaded failures and reduce errors related to human factors such as forgetfulness.

III. EFFECTS OF GREENHOUSE GAS EMISSIONS

III.1 Health risk

Emissions of greenhouse gases mostly pollute the quality of air. Clean air is prerequisite for sound and healthy living. Air pollution usually result in different cases of premature death especially among children and aged people. Several health related problems was said to have been orchestrated from global climate change. Infectious disease like malaria [3] has been reported. Indoor air pollution has been another rampant situation among the developing world due excessive combustion of solid biomass resources for energy consumption. Indoor air pollution from solid fuels is the cause of very severe health problems [14]. Diseases like eyes cataracts, tuberculosis, asthma attacks and lower birth weight [24-25] are caused by indoor air pollution. Majority of illness related to cardiovascular and acute lower respiratory infections [24,26,27-28] are elicited by indoor air pollution.

III.2 Natural ecological destruction

Ecological destruction has been one of the most visible effects emissions of greenhouse gas and exploitation of energy resources from the human environment. In urban areas, electricity generation and fossil energy consumption are predominantly used by larger percentage of the population compare to the situation in rural areas. Less polluting energy resources is essential to lower emissions of GHGs. In many rural communities with difficult access to electricity from the traditional grid expansion, renewable energy resources have been used to as the main source of energy production. This practice has been very helpful to the environment as per very low related emissions from the renewable energy resources but on the contrary has pronounced effects on the destruction of the ecosystem e.g. continuous deforestation. Marine ecology is not spared in the existing level of greenhouse gas destruction. Increased level of carbon dioxide in the atmosphere has also resulted to oceanic acidification [29] and decline in the amount of dissolve oxygen with adverse effects on aquatic life [30]. In addition, power generation and energy consumption have thoughtful impacts on aquatic and terrestrial habit due to toxic chemical from coal mining and oil spillage. The duos have direct causes of land and water pollution because the harmful chemicals can directly be leached into water bodies with adverse effects on waterways and useable waters.

III.3 Natural ecological destruction

Global warming potential is the capability of greenhouse gas to retain heat and light in the atmosphere and thereby increasing the global ambient temperature. Change in global warming potential (GWP) has been an unfolding issues since the beginning of the era of industrial revolution. Power generation and energy consumption are artificially induced mechanisms which increases the global warming potential. It cannot be argued that some natural mechanisms decrease the GWP by some accepted removal processes such as afforestation for carbon stocking, but aggressive use of energy for rapid development have in recent offset the removal scenarios. Besides, excessive uses of wood for energy have also influences environmental degradation and increase the concentration of carbon-based compounds in the atmosphere which is the fundamental cause of greenhouse gas pollution.

IV. REDUCTION AND CONTROL MEASURES OF GREENHOUSE GASES

Reduction of GHGs is central to all nations because the brunt of the problem is global and no one country or group of countries can provide its own remedy [3]. This is why international and regional cooperation are more sought-after and have been well advocated for in the comity of global atmospheric sanity. In respect to this struggle, United Nations Framework Convention on Climate Change (UNFCCC) recently came into effect to deal with the global climate problem [31]. This was executed in the form of international agreement comprising different countries across diverse regions to lower the dangerous concentration of anthropogenic GHGs in the atmosphere.

IV.1 Clean development mechanism

Clean development mechanism involve massive deployment of renewable energy technologies for power generation and carbon dioxide sequestration to promote the concept of sustainable development. Beside the GHG mitigating potential of renewable energy resources, energy security guarantee is swiftly becoming a reality with the exploitation of different renewable energy resource. Clean development mechanism is a fundamental idea of Kyoto Protocol under the canopy of the United Nations Framework on Convention on Climate Change (UNFCCC). Developing countries are more actively involved in the development of renewable power generation in line with the proposed CDM. In 2009, developing countries hosted 53% of global RE power generation [32]. Initial idea behind the institution of CDM is to strategically lower the level of emissions due to energy generation and consumption to a sustainable intensity. However, it was envisaged that emission reduction mechanisms will be financed by the industrialized nations whereby the fund will be given to developing countries as sponsorship for renewable energy programs. After a decade and more, a good implementation result is yet to be seen and gain in the global pace of renewable power exploitation is not in line with the realistic and expected level of developments.

IV.2 Green energy portfolio standard

Green energy is a type of energy produced conventionally with a reduced amount of negative environmental impact. Green energy is sometimes called renewable energy. Renewable energy application has become an essential ingredient with significant role in the expedition for GHG reduction and increasing the chance for sustainable development. Many countries have introduced and finance green energy programs to generate and consume power with minimum pollution. Green energy portfolio standard (GEPS) involves the uses of regulation to boost generation and consumption of energy from greener sources with the minimum rank of pollution propensity. In some countries where green energy portfolio standard is strongly advocated, compulsions are placed on electric power generation companies to provide certain percentage of the national electricity demand from renewable sources as a strategic measure to lower emissions. Intergovernmental Panel on Climate Change (IPCC) direct countries to communicate their emissions from all sorts of energy related activities. Advocates of GEPS listed the benefits among which are innovation, pollution control and competition can eventually lower the per unit price of renewable power. Sustainable development of green energy can provide numerous environmental benefits alongside fossil resources conservation for far future generations.

IV.3 Financing low carbon energy

CO₂ emission resulting from the combustion of petroleum products contributes substantial quantity of greenhouse gas to the atmosphere [33]. As a critical factor towards development, a secure access to modern energy is essential for development. With the current global acknowledgement on the need to reduce emissions from energy, financing low carbon energy can be used as a strategy to reduce greenhouse gas emissions. Many financing initiatives exist for funding energy projects [34] but financing low carbon projects is indispensable especially in countries where oils are the major source of income and energy production. Driven an economy by a low-polluting energy technologies reduces the vulnerability of the human environmental sustainability. This envisioned low carbon economy can be harnessed by unlocking the untapped renewable energy resources potential. Optimization of renewable sources for energy application provides noteworthy opportunities to spread out and upgrade the energy infrastructure especially in the rural communities due to their diverseness. Via this strategic measure, the solution to energy poverty in developing regions can be provided by decentralization of the renewable energy systems. In some countries, emissions trading scheme (ETS) through carbon taxation is already implemented to control and monitor emissions. Carbon taxation has been adopted in United Kingdom, Denmark, Finland, Norway, Sweden, the Netherlands

and Canada and under debate or proposed in other places, including in the EU, Japan and South Africa [14]. This is due to the fact that there is rising profile in GHGs due to energy use. In 2005, as much as 68% of total anthropogenic GHG discharges were estimated from energy related-activities [35].

V. CONCLUSION

This study has shown that activities related to power generation and energy consumption has associated emissions with potential to influence greenhouse gas which is the main source of impending global warming. In reality, anthropogenic greenhouse gas emissions from energy activities are greater than the greenhouse gas emission from other human activities. Essentially, the study also advocated the need to strategically tackle GHG reduction to prevent the sanctity of the global environmental distinction for sustainable development and biodiversity interaction. Finally, it supported the need to increase renewable energy consumption to help in dealing with problems of energy security, energy control and health related problems.

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Power Aware Instruction Scheduling for Microcontrollers

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Abstract- The ability to reduce power consumption of a device is attractive for several reasons. On one hand, reducing power in high end computers will reduce the cost of cooling and the performance loss due to overheating cores. On the other hand, ubiquitous battery powered devices will enjoy a longer battery life due to the reduction in power consumption. In this paper, we present a set of mechanisms that uses instruction scheduling to reduce the power consumption of RISC like microcontrollers that are common in battery powered devices. Initially, we devised a method to measure the approximate power consumption of each basic assembly instruction of the microcontroller. By a statistical analysis of the power measurement, we categorized the basic instructions into groups. Our measurements demonstrate that some instruction combinations consume more power than others which will perform the same functional operations. We leveraged this observation to rearrange the scheduling of basic machine instructions of a high level programming language, such that the final program is optimized for power. Some of our test cases demonstrate significant reduction in power consumption without any performance degradation. The resultant ideas can therefore be used by both system programmers and compiler designers.

Index Terms- energy, instruction scheduling, microcontroller, power aware scheduling, power consumption

I. INTRODUCTION

Portable or hand held devices containing embedded systems have covered a lot of areas of modern technological development. Lots of people have become addicted to popular embedded devices like mobile phones, PDAs, e-book readers, etc. Regardless of the technology or the microcontroller type (PIC, AVR, ARM, etc.) used, power management of the embedded devices is a major challenge that the designers and the manufacturers have to consider seriously.

There are two main reasons for why power management has become a major issue in designing embedded devices and why having a low power consuming microcontroller has become a plus point for embedded devices. One reason is the battery backup time of the device. As we know a lot of embedded devices are portable and are working with DC powered cells and the battery backup time enforces a limitation on the usage of the device. Having reduced or well managed power consumption can increase the battery backup time of the device and that will be a

desirable quality. The second reason to have power management is the heat produced by the device.

Heat is definitely an undesired quality that affects the performance and the durability of the device, and it may add an additional cost if that excessive heat has to be reduced using a hardware solution (such as heat sinks and fans). Reducing the power consumption of embedded devices can reduce the heat generation while the device is active.

One of the main features that effects on the power consumption of an embedded device is the way in which the low level instructions are scheduled or combined together, as each machine instruction has a different power consumption value. For a given higher level language code (such as C and mikroC), there can be more than one combinations of basic hardware instructions (assembly) for a given embedded microcontroller architecture. Therefore, by selecting the optimum combination of basic assembly instructions, the total power consumption of the particular device can be reduced. When you consider an application program, converting its higher level language codes into relevant assembly instruction combination is performed by a compiler (that is, the instruction scheduler of the compiler). Therefore, by optimizing a compiler to produce the optimum assembly instruction combinations targeting power of each instruction, the power consumption of the targeted embedded system can be reduced.

Given the above facts, in our project we concentrate on analyzing the comparative power consumptions of the basic assembly instruction sets of embedded microcontroller architecture and analyzing methods of using different instruction scheduling methods to minimize the power consumption.

The rest of the paper is organized as follows. In Section II, we discuss some related work under two categories: (1) Related work on obtaining power profiles of basic instructions; and (2) Related work on power aware instruction scheduling. The methodology used in our project is presented in Section III followed by results in Section IV. In Section V, we discuss the behavior of our results and concluded the paper in Section VI.

II. RELATED WORK

There are a large amount of researches which have considered power consumption of the microcontroller systems, instruction scheduling for power optimization and power profiles of assembly instructions.

A. Related work on obtaining power profiles of basic instructions:

Many researches have been done on power profiles and power management of microcontrollers and microprocessors.

In most of these projects, microprocessors power profiles have been presented using power/energy models based on their internal architectures. Tiwari et al. have presented the power consumption of machine instructions of Intel 486DX2, a CISC microprocessor, based on an energy model [10]. Tiwari and Lee [9] have performed a set of experiments on Fujitsu- SPARClite MB86934, a 32bit RISC microprocessor and compared the results with [10]. According to them, the power model they have used in [10] and [9] can be used for any 32 bit RISC architecture.

Russel et al. [7] has followed a different approach to obtain detailed power profiles for Intel 80960 JF [3] and Intel 80960 HD [2] microprocessors. Their method includes an energy model but also involves some measurements using a digital oscilloscope. They have also presented the power variation against the clock frequency. In our work the usage of oscilloscope for power measurement was not feasible due to low sensitivity of the device.

No work among mentioned above has measured the power consumption values of each single instruction of a microcontroller in order to obtain the power profiles of instructions of a microprocessor and most of the values presented were based on estimations and power/energy models.

Even though they have provided some values based on estimations, those values cannot be used to get a clear idea on comparative power consumption of machine instructions of microcontrollers in general. The different in our approach is that, when we are obtaining power profiles of the instructions, we take actual power consumptions through power readings of a microcontroller instruction.

B. Related work on Instruction Scheduling:

When it comes to instruction scheduling of microcontrollers (or basic idea of a compiler to optimize power), there were some proposals.

The basic idea behind the work done by Steinke et al. in [8] is having a “power aware compiler” based on the energy model for ARM7TDMI-RISC microprocessor.

The authors in [6] have compared the traditional performance-oriented instruction scheduling and power-oriented instruction scheduling and based on the results they have implemented three new instruction scheduling algorithms. A cost model for the switching activities of the instruction bus for very large instructions has been presented by Lee et al. in [1]. Based on the cost model, they have implemented an instruction scheduling scheme optimized for performance. Then they have implemented two instruction scheduling algorithms to optimize the power of those instructions and compared. Kandemir et al. in [4] has presented a number of techniques for energy optimization of compilers.

We make use of the real power measurements for performing the instruction scheduling. Although we are yet to incorporate our scheduler to a compiler, we have tested our hypothesis with some smaller handwritten code snippets.

III. METHODOLOGY

We had two major steps in this project, first was measuring power consumption values of basic assembly instructions of a microcontroller system. The second step was testing possibilities and implementing models of minimizing power consumption using instruction scheduling. The methodologies we used for each one of them are discussed in detail below.

A. Measuring power consumption values of basic assembly instructions:

We used Microchip’s PIC16F877a, an eight bit microcontroller with RISC architecture for our experiments. When a program or an instruction is running in the microcontroller, the only considerable amount of power dissipation takes place on the voltage-in pin (V_{DD}). Therefore by measuring voltage levels and the input current of V_{DD} pin of the microcontroller, approximate power consumption for the running instruction can be observed.

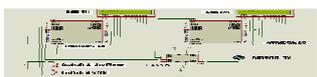
Figure 1. Model of the voltage measurement

As shown in Figure 1, when the voltage level of the voltage-in pin of the microcontroller is V_{in} and input current is I_{in} , the power dissipation can be given as in Equation (1).

$$P_{diss} = V_{in} \cdot I_{in} \quad (1)$$

The circuit in Figure 1 was used to measure values for calculating power consumption according to Equation 1. We measured the voltage drop across a shunt resistor connected to the voltage-in pin of the microcontroller.

According to the above measurement, the power dissipation value could be represented as in Equation (2). In this form of measurement we can eliminate the need of measuring current values.



$$P_{diss} = V_{in} \cdot \frac{V_{drop}}{R_{shunt}} \quad (2)$$

The instructions are executed in very high speed (in the domain of power measurement equipment) in the microcontroller (we used a 4 MHz clock speed in our system). Therefore, the duration of a single execution is extremely small and the power value to be measured is also very small. Even if we use measuring equipment with very high sensitivity, it will not be possible to measure the power consumption values for the execution of a single instruction. Therefore we measured the voltage values by executing a large number of cycles with the same instruction and taking the average over time.

We used National Instrument's 6221-PCIdata acquisition card for measuring voltage. In our measurements, we used Single ended-Non referenced (NRSE) terminal configuration with grounded-source as in Figure2. The maximum sampling rate we could obtain was 200 kHz.

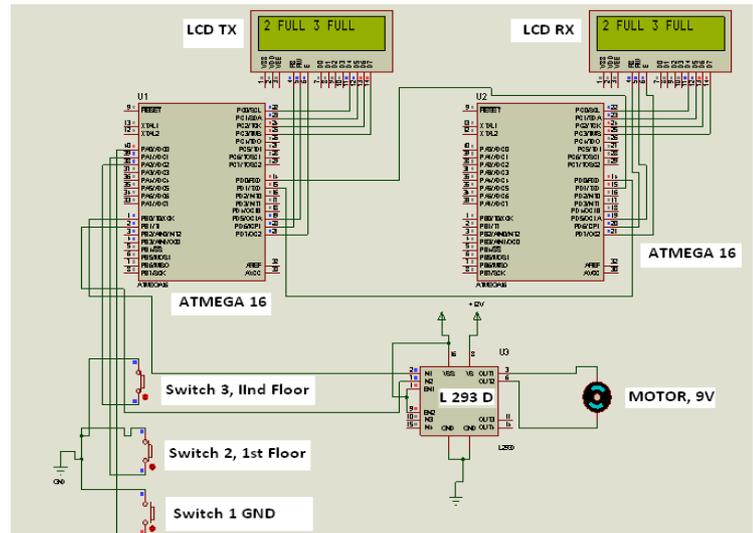


Figure 2. Circuit diagram for the voltage measurement port

We categorize 35 basic assembly instructions in PIC16F877a microcontroller. We took voltage readings for 3 sets of samples read at 200 kHz, with 100,000 samples in each sample set for each basic assembly instruction. We used DAQ tool kit 2.1 in Matlab R2008b to read and sample the voltage readings from the NI-DAQ 6221 card. After saving the sample data as Matlab matrix files, we used Statistical Analysis Toolkit in Matlab to obtain average voltage readings and the variance of the samples. Using average voltage values, we calculated average power consumption values for each basic assembly instruction.

B. Possibilities of minimizing power consumption values using instruction scheduling:

In this step we explored various methods in scheduling assembly instructions for given high-level arithmetic and logic functions, and checked whether there is any effect on power consumption by selecting different assembly instruction combination. We followed the following procedure:

Step 1: Select a higher level function (multiplication, division, sorting, etc.)

Step 2: Obtain various possibilities of implementing that higher level functions in assembly instruction combinations with exactly same operands/variables (same functionality).

Step 3: Assigning power consumption values for each assembly instruction from what we measured in Step A of the research we measured the energy consumption for each combination from step 2 using Equation (3).



$$P_{diss} = V_{in} \cdot \frac{V_{drop}}{R_{shunt}} \quad (3)$$

Step 4: Assuming each instruction has same clock cycle time, we calculated the average power for each assembly combination using Equation (4).

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2} \quad (4)$$

We report the results on our experiments in the next section.

IV. RESULTS

The measured average voltages of some important instructions are shown in Figure 3 and the calculated average power consumption using the average of the measured voltages for basic assembly instructions in PIC 16F877a are given in Table I.

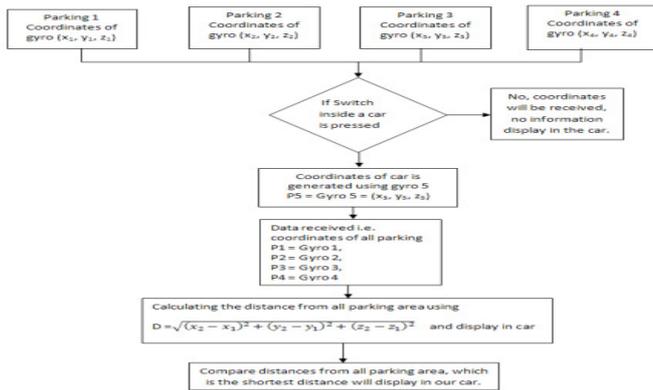


Figure 3. Average voltages of some important instructions

As it can be seen, different instructions consume different power values and this information is used to perform the power aware instruction scheduling.

Table I: Description and Calculated power values of instructions

Instruction	Description	Average power Consumption (mW)
MOVLW k	Move constant to W	8.792
MOVF f	Move W to f	8.719
MOVWFf,d	Move f to d	8.850
CLRW	Clear W	8.797
CLRF f	Clear f	9.403
SWAPFf,d	Swap nibbles in f	8.520
ADDLW k	Add W and constant	9.021
ADDWFf,d	Add W and f	8.880
SUBLW k	Subtract W from constant	8.737
SUBWFf,d	Subtract W from f	11.712

ANDLW k	Logical AND with W with constant	8.729
ANDWFf,d	Logical AND with W with f	8.875
IORLW k	Logical OR with W with constant	8.629
IORWFf,d	Logical OR with W with f	8.553
XORLW k	Logical exclusive OR with W with constant	8.773
XORWFf,d	Logical exclusive OR with W with f	8.727
INCFf,d	Increment f by 1	8.973
DECFf,d	Decrement f by 1	8.905
RLFFf,d	Rotate left f through CARRY bit	8.397
RRFFf,d	Rotate right f through CARRY bit	8.611
COMFFf,d	Complement f	11.068
BCFFf,b	Clear bit b in f	8.766
BSFFf,b	Clear bit b in f	12.184
BTFSCf,b	Test bit b of f. Skip the following instruction if 0.	8.978
BTFSSf,b	Test bit b of f. Skip the following instruction if 1.	9.082
DECFSZf,d	Decrement f. Skip the following instruction if 0.	9.546
INCFSZf,d	Increment f. Skip the following instruction if 1.	8.715
GOTO k	Go to address	8.791
CALL k	Call subroutine	9.318
RETURN	Return from subroutine	11.182
RETLW k	Return with constant in W	9.214
RETFIE	Return from interrupt	8.790
NOP	No operation	8.984
CLRWDT	Clear watchdog timer	9.768
SLEEP	Go into sleep mode	7.586

f - Any memory location (register)
 W - Working register (accumulator)
 k - Constant
 b - Bit address within an 8-bit register
 d - Destination bit (If d = w or d = 0 the result is stored in the W register. If d = f or d = 1 the result is stored in register f.)
 * The variances for the measurements were negligible and therefore not mentioned.

We considered different combinations of assembly instructions to implement the multiplication of two 4-bit numbers. Let us look at two ways of implementing the same function in assembly of PIC16F877a. In the second step of our work, we implemented multiplication of two 4-bit numbers as two different combinations (as A and B) of assembly instructions of PIC16F877a as given in Figure 4.

Assembly combination A:

```

SWAPF N1, W;
BTFS N2, 0
ADDWF N2, F
RRF N2, F
BTFS N2, 0
ADDWF N2, F
RRF N2, F
BTFS N2, 0
ADDWF N2, F
RRF N2, F
BTFS N2, 0
ADDWF N2, F
RRF N2, F
BTFS N2, 0
ADDWF N2, F
RRF N2, F
    
```

Assembly combination B:

```

MOVF X
ADDWF X, F
BTFS Y, 0
MOVLW 0
BTFS Y, 1
ADDWF X, W
RLF X, F
BTFS Y, 2
ADDWF X, W
RLF X, F
BTFS W, 3
ADDWF Y, W
    
```

Figure 4. PIC16F877a assembly instructions for 4bit multiplication

The energy and power analysis of both of the assembly combinations are given in Table II.

Table II: Power and energy for two assembly combination of multiplication of two 4-bit numbers

	combination A	Combination B
No of total instructions	13	12
Total energy (if time for each instruction = t)	114.8121 t	105.9721 t
Average Power consumption (mW)	8.832	8.831

Similarly, we analyzed different combinations of assembly instructions for some other high level functions such as, bubble sorting, square root of an integer number, analogue to digital converter, etc. Some of the results are presented in Table III and Table IV. We have not given the assembly combinations here due to the space limitation (each one of them is very long).

Table III: Power and energy for two assembly combination of analog to digital converter

	combination A	Combination B
No of total instructions	114	90
Total energy (if time for each instruction = t)	1039.6291 t	822.4749 t
Average Power consumption (mW)	9.120	9.139

Table IV: Power and energy for two assembly combination of analog to digital converter

	combination A	Combination B
No of total instructions	208	197
Total energy (if time for each instruction = t)	1937.9373t	1820.4801t
Average Power consumption (mW)	9.137	9.241

This idea of selecting the optimum combination of instructions can be used in the system programmer’s level, when the code is written by the programmer. Some basic techniques can be applied by the programmer for example using iteration instead of recursion in order to minimize the number of RETURN instructions (note that the RETURN instruction has higher power consumption). Inline functions (eg: In C) can also be used. When a function is to be called, inline programming techniques copy the written code of the called function into the place in the higher level language, where the function is called, before it is compiled.

V. DISCUSSION

When measuring the power consumption of assembly instructions, there were many limitations and short coming:

- The sampling rate we used in the experiment (200 kHz) was not enough (to have cycle accurate power measurement) as the measured instructions were running at 4MHz.
- There were interference and environmental noise during the measurement.
- Due to the reasons mentioned above, there could be errors in the voltage readings and calculated power values.
- In some of these instructions there are observable differences in power consumption values.

When looking at the different combinations of assembly instructions for higher level functions, we could find some instances with considerably lesser power/energy consumption. And in almost all the occasions where some assembly combinations take less power to operate, there wasn’t any performance digression as number of clock cycles was not higher.

Having lesser average power consumption does not necessarily mean having less energy consumption. As the number of clock cycles increases, energy is higher regardless of the average power (Equation (5)).

$$d_2 = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2} \quad (5)$$

VI. CONCLUSION

As we have found out from our research, there are possibilities of using instruction scheduling to select the best combination among various combinations of assembly instruction for the same higher level function to reduce the power consumption. Even though it will be only minor amount of power difference per single iteration; between two different assembly instruction combinations, it can have a larger impact for long running embedded applications. The idea of selecting the best assembly instruction combination considering the power consumption can be integrated into a compiler designed for embedded microcontrollers.

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Design, Development and Testing of Parking Availability System Based on Vehicular Ad hoc Network

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Abstract—Vehicle Ad Hoc Networks (VANETs) have been received particular attention both in industrial and academic levels. Searching for a vacant parking space in a congested area or a large parking lot and preventing auto theft are major concerns to our daily lives. In this paper, an efficient parking scheme for large parking lots through vehicular communication is described. The proposed scheme can provide the drivers with real-time parking navigation service, and friendly parking information dissemination. Performance analysis via extensive simulations demonstrates its efficiency and practicality. The system is designed, developed and tested using network simulator NS-2. AODV protocol is used for implementation and found that the system works satisfactory.

Index Terms— Vehicular communications, Efficient parking, NS-2, Ad hoc network, AODV.

I. INTRODUCTION

A Vehicular Ad-Hoc network is a form of Mobile ad-hoc Networks, to provide communication among nearby vehicles and between vehicles and nearby fixed equipment i.e. roadside equipment. Each vehicle equipped with VANET device will be a node in the Ad-hoc network and can receive & relay other messages through the wireless network.

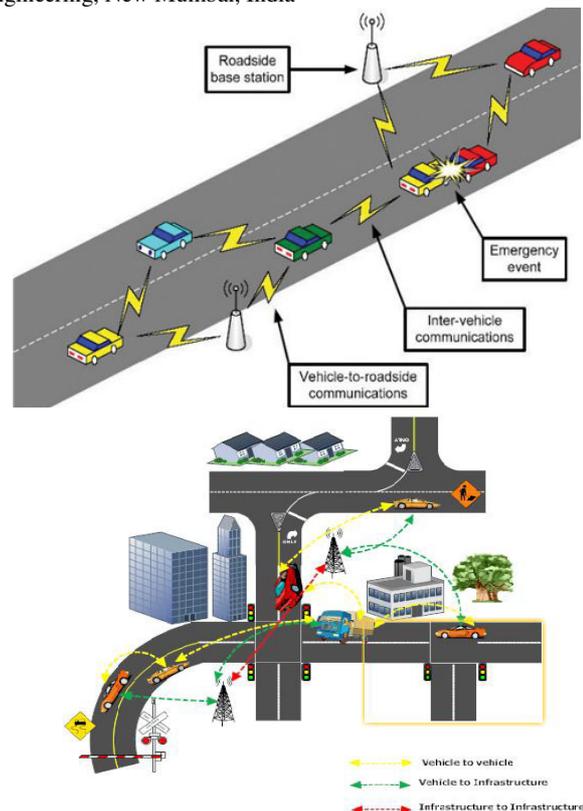


Fig 1.1: Vehicular Ad-Hoc Networks.

Fig 2.1: VANET Infrastructure.

Vehicle Ad Hoc Networks (VANETs), as shown in have been received particular attention both in industrial and academic levels [1-4]. With the advance and wide deployment of wireless communication technologies, many major car manufactories and telecommunication industries gear up to equip each car with the On Board Unit (OBU) communication device, which allows different cars to communicate with each other as well as roadside infrastructure, i.e., Roadside Units (RSUs), in order to improve not only road safety but also better driving experience [5]. Searching for a vacant parking space in a congested area or a large parking lot especially in peak hours is the major concerns to our daily lives. Finding a vacant parking space in a congested area or a large parking lot, especially, in peak hours, is always time consuming and frustrating to drivers. It is common for drivers to keep circling parking lot and look for a vacant parking space. In this paper development of a smart parking scheme using Vehicular Ad-Hoc Network is described which helps drivers to find the vacant parking space efficiently.

First objective of the proposed system is to provide real-time parking navigation service to drivers in large parking lots. With the real-time parking navigation, the drivers can find the vacant parking space quickly. Therefore, the fuel and time wasted in search of vacant parking space can be reduced.

Second objective is to provide friendly parking information dissemination service to the moving vehicles. With this friendly parking information, the drivers can conveniently and quickly choose their preferred parking lots close to their destinations. In friendly parking information scheme two mobile vehicles can communicate with each other for sharing the information about available parking space. In this paper the network behavior simulation using Network Simulator (NS-2) is shown.

Responsibility of the proposed system is:

1. Parking availability information passing on an ad-hoc network.
2. Recognition of Vehicles.
3. Path changing of vehicles on unavailability of parking space.

II. PREVIOUS RELATED WORK.

To minimize hassle and inconvenience to the drivers parking guidance systems based on Vehicular Ad Hoc Networks (VANETs) have been developed over the past decade [6-8], where the system provides accurate, real-time car park space availability to the drivers looking for parking spaces and then guides them to the available spaces by dynamically updated guide signs. Besides searching for available parking spaces, vehicle theft in large parking lots also has become a serious concern facing our lives. It becomes possible to track the parking space occupancy, guide drivers to the empty parking spaces near the places like shopping mall, stadium or railway stations. Recently, several previous research works related to the parking lots have been appeared in [9, 10]. VANET-based approach for parking space availability is shown in [9]. In this approach, the parking lots are managed by RSUs, and these RSUs can provide open parking space information to the drivers, which is very similar as the proposed SPARK scheme. In addition, the approach also provides security architecture to solve some possible security vulnerabilities. However, the approach doesn't provide the real-time parking navigation in large parking lots, nor any anti-theft protection function [10]. During the last years several attempts to combine inter-vehicle networking and vehicular traffic simulation were presented. These proposals either suggested to incorporate disciplines, vehicular traffic and networking, into a single simulation engine (cf. e.g., [11]) or to couple and synchronize two simulators of the respective area (cf. e.g. [12,13]). The majority of the works following the latter approach used the network simulator NS-2 and interlinked it with diverse traffic simulators. The studies present results on traffic performance (e.g., average speed) and on network characteristics (e.g., latency), however, their focus is not primarily on scalability.

III. VEHICULAR AD HOC NETWORK USED FOR PROPOSED SYSTEM.

Vehicular Ad hoc Networks (VANET) is the subclass of Mobile Ad Hoc Networks (MANETs). VANET is one of the

influencing areas for the improvement of Intelligent Transportation System (ITS) in order to provide safety and comfort to the road users. VANET assists vehicle drivers to communicate and to coordinate among themselves in order to avoid any critical situation through Vehicle to Vehicle communication e.g. road side accidents, traffic jams, speed control, free passage of emergency vehicles and unseen obstacles etc. Besides safety applications VANET also provide comfort applications to the road users. Fig 2.1 shows the overall working structure of VANET.

Each node within VANET act as both, the participant and router of the network as the nodes communicates through other intermediate node that lies within their own transmission range. VANET are self organizing network. It does not rely on any fixed network infrastructure. Although some fixed nodes act as the roadside units to facilitate the vehicular networks for serving geographical data or a gateway to internet etc. Higher node mobility, speed and rapid pattern movement are the main characteristics of VANET. This also causes rapid changes in network topology. VANET is a special type of MANET, in which vehicles act as nodes.

Unlike MANET, vehicles move on predefined roads, vehicles velocity depends on the speed signs and in addition these vehicles also have to follow traffic signs and traffic signals. There are many challenges in VANET that are needed to be solved in order to provide reliable services. Stable & reliable routing in VANET is one of the major issues. Hence more research is needed to be conducted in order to make VANET more applicable. As vehicles have dynamic behavior, high speed and mobility that make routing even more challenging.

Vehicular ad hoc networks present a promising way to build up a decentralized parking guidance system. Designing such an application can be decomposed into major issues: (1) which information on a parking place needs to be known by the vehicles and thus has to be distributed in the vehicular ad hoc network? And finally, (2) how can this information be used to maximize the benefit for the driver?

The working of the occupancy information is collected at the respective parking lot, e. g. by parking meters or parking fee payment terminals. This information is broadcasted, received by vehicles within communication range, and then disseminated within the vehicular ad hoc network.

The vehicle can communicate with other vehicle within its range. Vehicles on their way to some destination area can then use it to make their decision amongst several possible parking opportunities. This phenomenon in VANET is used in our objective of friendly parking system.

IV. ROUTING PROTOCOLS USED IN VANET

Vehicular Ad Hoc Networks (VANETs) tend to exhibit a drastically different behavior from the usual mobile ad hoc networks (MANETs). High speeds of vehicles, mobility constraints on a straight road and driver behavior are some factors due to which VANETs possess very different characteristics from the typical MANET models. Broadly speaking, four such characteristics are rapid topology changes, frequent fragmentation of the network, small effective network diameter and limited temporal and functional redundancy

A routing protocol governs the way that two communication entities exchange information; it includes the procedure in establishing a route, decision in forwarding, and action in maintaining the route or recovering from routing failure. This section describes recent unicast routing protocols proposed in the literature where a single data packet is transported to the destination Node without any duplication due to the overhead concern. Some of these routing protocols have been introduced in MANETs but have been used for comparison purposes or adapted to suit VANETs' unique characteristics. Because of the plethora of MANET routing protocols and surveys written on them, we will only restrict our attention to MANET routing protocols used in the VANET context. VANET routing protocols can be classified as topology-based and geographic (position-based) in VANET.

4.1 Topology-based Routing Protocols

These routing protocols use links' information that exists in the network to perform packet forwarding. They can further be divided into proactive (table-driven) and reactive (on-demand) routing.

4.2 Proactive (table-driven) Routing protocols

Proactive routing carries the distinct feature: the routing information such as the next forwarding hop is maintained in the background regardless of communication requests. Control packets are constantly broadcast and flooded among nodes to maintain the paths or the link states between any pair of nodes even though some of paths are never used. A table is then constructed within a node such that each entry in the table indicates the next hop node toward a certain destination. The advantage of the proactive routing protocols is that there is no route discovery since route to the destination is maintained in the background and is always available upon lookup. Despite its good property of providing low latency for real-time applications, the maintenance of unused paths occupies a significant part of the available bandwidth, especially in highly mobile VANETs.

4.3 Ad Hoc On Demand Distance Vector Routing- AODV

Ad Hoc On Demand Distance Vector Routing (AODV) is an example of pure reactive routing protocol. AODV belongs to multihop type of reactive routing. AODV routing protocol works purely on demand basis when it is required by network, which is fulfilled by nodes within the network. Route discovery and route maintenance is also carried out on demand basis even if only two nodes need to communicate with each other. AODV cuts down the need of nodes in order to always remain active and to continuously update routing information at each node. In other words, AODV maintains and discovers routes only when there is a need of communication among different nodes.

AODV uses an efficient method of routing that reduces network load by broadcasting route discovery mechanism and by dynamically updating routing information at each intermediate node. Change in topology and loop free routing is maintained by using most recent routing information lying among the intermediate node by utilizing Destination Sequence Numbers of DSDV.

4.3.1 AODV Route Discovery

Route discovery is one of the most important characteristics of any protocol in wireless communication. The need for basic route discovery arises when a source node wants to communicate with any particular destination node in order to forward data packet. AODV uses route discovery by broadcasting RREQ to all its neighboring nodes. The broadcasted RREQ contains addresses of source and destination nodes in order identify those particular nodes for whom route has been demanded. RREQ also contains source and destination nodes sequence numbers to maintain recent fresh route information from source to destination and vice versa. Moreover, RREQ also contains broadcast ID and a counter, which counts how many times RREQ has been generated from a specific node. When a source node broadcast a RREQ to its neighbors it acquires RREP either from its neighbors or that neighbor(s) rebroadcasts RREQ to their neighbors by increment in the hop counter. If node receives multiple route requests from same broadcast ID, it drops repeated route requests to make the communication loop free.

RREQ is generated from one source towards different destinations in order to reach at particular destination. If RREP is not received by the source node, it automatically setups reverse path to the source node. A reverse path is settled only when each node keeps the record of its neighbor from which it gets the RREQ. Reverse path is used to send a reply to source node, if any intermediate node does not satisfies the RREQ, moreover reverse path is settled for only the limited period of time.

All intermediate nodes stored the particular destination sequence number information and compare it with the RREQ destination sequence number. If RREQ sequence number is greater than or equal to stored sequence number of the intermediate node. Then the RREP is generated to source node following the same route from destination node to source node. This method is also known as the forward path discovery. And in this way a route is discovered for two nodes that need to communicate.

4.3.2 AODV Route Maintenance

When nodes in the network detects that a route is not valid anymore for communication it delete all the related entries from the routing table for those invalid routes. And sends the RREP to current active neighboring nodes that route is not valid anymore for communication. AODV maintains only the loop free routes, when the source node receives the link failure notification it either start the process of rebroadcasting RREQ or the source node stop sending data through invalid route . Moreover, AODV uses the active neighbor's information to keep tracking of currently used route.

4.4.3 AODV Features

AODV reduces several problems that occurred in proactive routing protocols. It provides support by reacting at on demand needs for communication for such ad hoc network where large numbers of nodes and this can help when the sudden change in topology happens. AODV updates the information of active nodes in the routing table. This feature can help maintaining the routing tables with the related number of entries and Nodes only have the information of currently active routes for

communication. AODV reduces flooding of messages in the network as compared to proactive routing protocols so AODV reduces the network overhead. AODV also minimizes the route redundancy and large memory requirements. AODV eliminates the loop-free routes by using destination node sequence numbers. If the route become invalid for a particular communication then the source node resend the RREQ with the greater destination sequence number in order to rebuild the route.

V. DESIGN AND IMPLEMENTATION OF PROPOSED SYSTEM.

The current parking guidance systems obtain the availability of parking spaces using the sensors installed across the whole parking lot. However, deploying sensors in a large parking lot can be very expensive. Furthermore, the sensors can become inaccurate and would stop functioning easily when time passes. Therefore, it is highly desired to have a reliable and cost effective way to track available parking spaces and guide drivers to the available parking spaces.

Besides searching for available parking spaces, Recently, Vehicle Ad Hoc Networks (VANETs), as shown in Fig. 1.1, have been received particular attention both in industrial and academic levels. With the advance and wide deployment of wireless communication technologies, many major car manufactories and telecommunication industries gear up to equip each car with the On Board Unit (OBU) communication device, which allows different cars to communicate with each other .

Roadside infrastructure, i.e., Roadside Units (RSUs), in order to improve not only road safety but also better driving experience. Therefore, it becomes possible to track the parking space occupancy, guide drivers to the empty parking spaces, through vehicular communications. The system model consists of a trusted authority (TA), OBUs equipped on the vehicles, stationary parking lot RSUs and a large number of parking spaces. TA is a trust and powerful entity, whose responsibility is in charge of the registration of both OBUs and the parking lot RSUs. OBUs are installed on the vehicles, which can communicate with each other and RSUs for achieving useful information, i.e., traffic information and parking lot information. Each OBU has a unique identifier ID_i. In order to protect the privacy of the OBU, when an OBU with ID_i registers itself to TA,

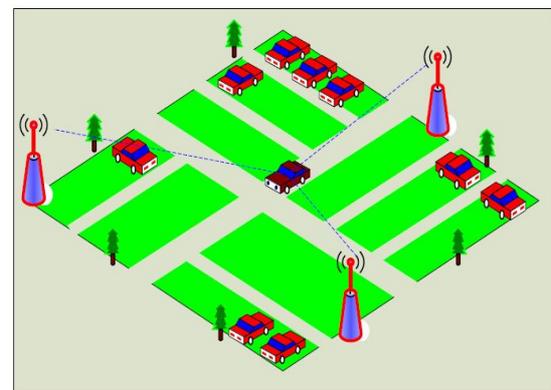
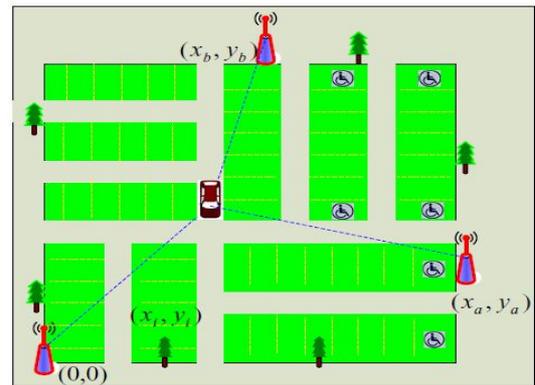


Fig 5.1 Parking lot model under consideration

Fig 5.2 A typical Efficient parking lot

RSUs are important components for smart parking lots. As shown in Fig.5.1, three RSUs, i.e., RSU₀ at position (0, 0), RSU_a at position (x_a, y_a) and RSU_b at position (x_b, y_b), are erected in the parking lot. With this deployment, the whole parking lot (including the parking spaces, in reality, there may exist more than three RSUs in a parking lot to coordinate the tracking of the vehicle if the parking lot is extremely large.)

5.1 Initialization

When a large parking lot with identifier ID_j is set up, each parking space is designated a location (x_i, y_i), and three parking lot RSUs of the same height h are erected at the locations (0, 0), (x_a, y_a) and (x_b, y_b), respectively. Then, the whole parking lot will be under surveillance of these three RSUs, as shown in Fig.7. After TA inspects the parking lot, TA generates the private key sk_j = sH(ID_j) and stores the same private keys sk_j into the three RSUs. With these settings, a large smart parking lot is established.

Fig 5.2 shows the placement of RSU in parking lot and Fig 5.3 shows the steps in the initialization process.

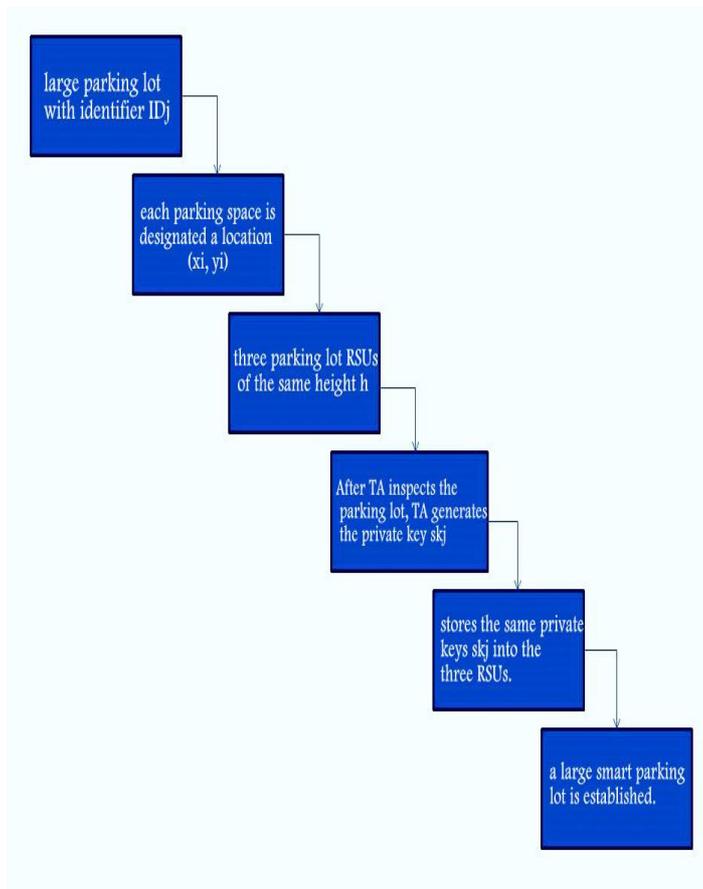


Fig 5.3: Initialization process

5.2 Parking space records

Parking space is a spatio-temporal resource recorded by the RSUs in a smart parking lot. Each parking space record, as shown in Fig 5.4, has the following attributes.

Parking Space Record

POS	RES	OCC	Uid	Tstart	COUNT
-----	-----	-----	-----	--------	-------

Fig 5.4: Parking space record.

The meaning of each attribute is given below.

Position (POS): Each parking space can derive its position (xi, yi) on the unique Euclidean plane determined by the three parking lot RSUs, as shown in Fig.5.1.

Reservation (RES): This field denotes the reservation status of the parking space. If the parking space is reserved, RES = 1, otherwise, RES = 0.

Occupancy (OCC): The field denotes the occupancy status of the parking space. If the parking space is occupied, OCC = 1. Else if the parking space is vacant, OCC = 0.

Unique Id (Uid): this is the unique id of an OBU which give the identification of that specific OBU. This Uid use to recognize the vehicle in large parking lot.

Starting time (Tstart): This field records the OBU's start parking time at the parking space.

Counter (COUNT): This field record the time after the reservation of the parking space by an OBU till the space is occupied.

In a smart parking lot, since all parking space records are stored at the parking lot RSUs, the parking lot's RSUs can conveniently manage the whole parking lot by using these records.

The algorithm for finding the position of the OBU in large parking lot and the information about the routing protocols is given in next topic.

5.3 Coding and Implementation:

Coding is done using network simulator NS-2 [4]. This consists of following steps- i) Path creation for the simulation. ii)TCL script coding for dynamic nodes (vehicles).iii)TCL script coding for message delivery and response.

All the mobile nodes in NS-2 quickly assume that they are the part of Ad-hoc network and the simulation mobile nodes connected with infrastructure networks are not really possible. For simulating a wireless node the physical layer, the link layer and MAC (media access control) protocol are all included at the same time. But despite this NS-2 is unable to simulate multiple radio interfaces. NS-2 only supports Bi-directional (antenna that radiates or receives most of its energy in two directions) and Omni-directional (radiates signal equally in all direction) antenna for signal propagation and waypoint mobility model for node movement. While simulating wireless networks using NS-2, the nodes need to be programmed manually to sense and transmit data among each other. There is no built-in scanning facility available to sense other nodes that are floating around. Another constraint associated with NS-2 is that it cannot be extended to simulate a large mobile network. In order to determine whether the frame has been transmitted successfully or not NS-2 relies on signal's strength. The Signal to Noise interference Ratio (SNR) is determined through the difference in strength of the two signals. The current distribution of NS-2 has limited scalability and does not provide any support for distributed and federated simulation

The existing traffic library and protocol suite are outdated and lack complete support for IEEE 802.11 standards. The newly added modules cannot find their place in the outdated documentation.

5.4 Flow chart:

The flow chart of the working of the designed and developed parking system is as shown in fig 5.4.

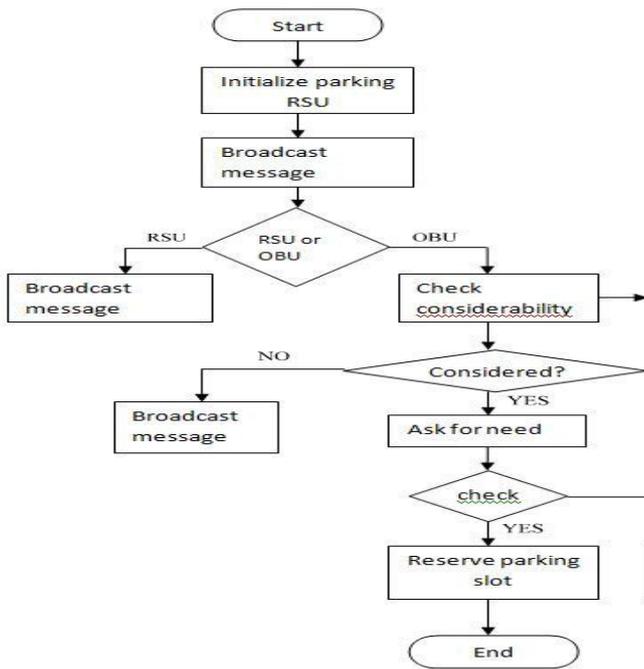


Fig 5.4 Flow Chart

VI. TESTING

Testing is done for finding the defects and fixing them and verifying system according to requirements.

6.1 Snapshots of simulation

Initial position of vehicles is as shown in fig 6.1.



Fig 6.1: Initial position of vehicles. message by RSU1 and RSU2.

Parking available message passed by RSU1 and parking not available message passed by RSU2 as shown in fig 6.2.



Fig 6.3: message by RSU1 parking full.

Fig 6.4: vehicles moving towards RSU2

Two vehicles are parked at RSU1 occupies all parking slots. RSU1 sends message parking not available. At same instance RSU2 sends message parking is available. All vehicles start moving towards RSU2.

Graphs of Throughput and an Average Throughput for AODV is as shown in fig.6.5 and fig 6.6

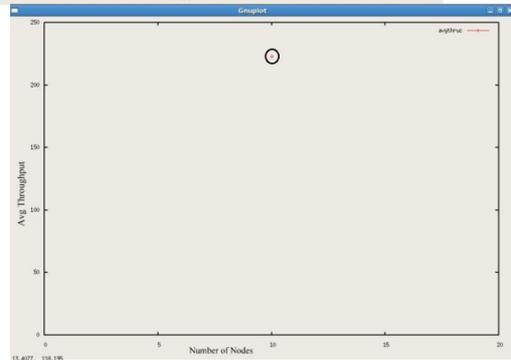
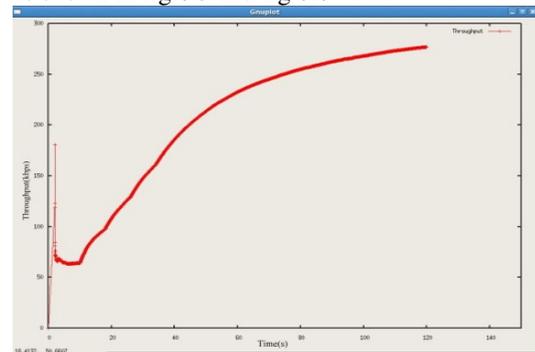


Fig 6.2:

Fig 6.5: Throughput of AODV

Fig 6.6: Average throughput vs number of nodes

6.2 Test cases

A test case normally consists of a unique identifier, requirement references from a design specification, preconditions, events, a series of steps (also known as actions) to follow, input, output, expected result, and actual result. Clinically defined a test case is an input and an expected result. This can be as pragmatic as 'for condition x your derived result is y', whereas other test cases described in more detail the input scenario and what results might be expected. It can occasionally be a series of steps.

In this project following test cases are used for testing purpose.

Test case 1: On accepting "Available" message from RSU; vehicles should move towards that RSU.

In this test RSU placed in the parking lot who manages the empty parking slots information send the message "Available". It indicates that parking space is available in that parking lot and hence those vehicles having need of parking space; start moving towards that RSU i.e. parking lot. In snapshot given below red arrows show the direction of vehicles.

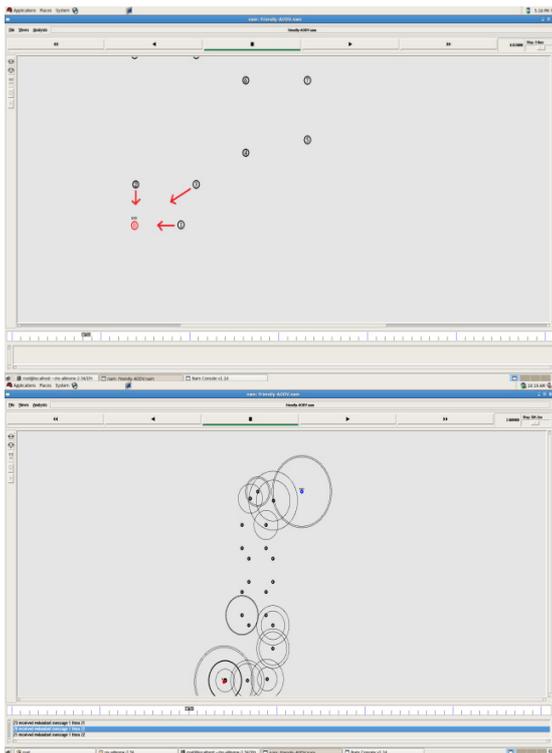


Fig 6.7: Test case1

Fig 6.8: Test case2

Test case 2: If parking lot is full with vehicles RSU will send message "Not Available".

On accepting Available signal form RSU vehicles start moving towards that RSU. Each parking lot having finite number of parking spaces. Vehicles will occupy the spaces as the reach the parking lot. After some time no vacant space is remaining and at

that instance parking lot RSU sends "Not Available" message. Snapshot given below give the idea about this test case.

Test Case 3: On accepting "Not Available" message from RSU; vehicles should move away from that RSU.

On unavailability of parking space message "Not Available" is send by RSU. On receiving that message vehicles willing the parking lot can change their direction towards different parking lot instead of waiting at one place for parking availability. In the snapshot given below we can visualize the scenario. The red arrow indicates the direction of the vehicle.

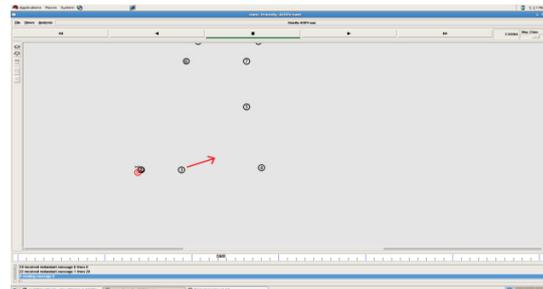


Fig 6.9: Test case3

VII. CONCLUSION

In this paper, a new VANET-based friendly and efficient parking scheme for large parking lots is designed, developed and tested using network simulator NS-2. With friendly parking scheme, RSUs installed across a parking lot can survey the whole parking lot, and provide two convenient services for drivers: 1) real-time parking navigation, 2) friendly parking information dissemination. Extensive simulations have also been conducted to demonstrate that the proposed scheme can efficiently reduce the searching time delay for an available parking space, and subsequently save the fuels and driver's parking time. In this paper simulation of Vehicular Ad-Hoc Network used for friendly parking system is implemented and tested satisfactory. Different test cases are generated to test the system and performance of AODV protocol for its throughput is also tested for efficiency of the system. With the help of this simulation we can conclude behavior of friendly parking system in different situations.

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Assessment of Groundwater Quality Parameters in and around Jawaharnagar, Hyderabad

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Abstract- The water and environment has become an emotive issue with the people and policy makers. The chief causes for the pollution of water and environment are anthropogenic activities of human beings. The primary objective of this paper is to study the groundwater quality parameters in the surrounding wells of Jawaharnagar, in upper Musi catchment area of Ranga Reddy district in Andhra Pradesh. The bore wells data is collected from the study area for two seasons i.e., post monsoon and pre monsoon in December 2007 and June 2008. The groundwater contour analysis is done by using Arc GIS software. The study reveals that the concentration of major constituents are well within the permissible limits of IS (10500-1994), except in few cases where total hardness and fluoride concentrations are high. From the analysis it has been observed that the groundwater is polluted in the entire study area. Due to this reason during the monsoon seasons the rainwater drains into the solid waste polluting the land leachate existing in the surrounding areas and in the low lying areas. During last few years, the utilization of surface and groundwater for drinking, industrial and agricultural purposes has increased manifolds but consequently it is observed that the water is polluted and affecting the human health, soil nutrients, livestock, biomass and environment in certain areas. Hence a study has been carried out for the quality of the available groundwater.

Index Terms- Groundwater, pollution, leachate, soil nutrients, human health.

I. INTRODUCTION

India is a tropical country with a vast diversity of climate, topography and vegetation. Though blessed with fairly high annual rainfall, it is not uniformly distributed in time and space resulting in bulk of the rainfall escaping as runoff. This results in incomplete utilization of available surface water. The scarcity of surface water especially in the lean season in most parts of the country means that groundwater plays a decisive role. India has diversified geological, climatological and topographic set up giving rise to divergent groundwater situations in different parts of the country. Groundwater may be considered as one of the most precious and one of the basic requirements for human existence and the survival of mankind providing him the luxuries and comforts in addition to fulfilling his basic necessities of life and also for industrial and agricultural development thus being a very important constituent of our eco-system.

Telangana region of Andhra Pradesh is classified as hard rock area where surface water resources are limited, with the

result, groundwater has become a major source of supply to the village population. The problem connected with supply of safe water to rural communities from individual wells is often neglected. Added to this with rapid solid waste leachate pollution of groundwater due to rapid increasing of population, urbanization and industrialization, the available groundwater is rapidly getting polluted. Unfortunately the surrounding villages and catchment area aquifers affecting from this pollution has resulted mostly from urban human activities.

II. LOCATION AND EXTENT

The study area is the upper part of the Musi basin a tributary of river Krishna of Andhra Pradesh in India. The area falls in the Survey of India Topographic map number 56K/10 to a scale of 1:50,000. The area lies between 17030'01" N to 17032'03" N latitude and 78034'13" E to 78037'47" E longitude. The total aerial extent of the study area is 31.63 Km². The study area has an average altitude of 535.57 m in western part and gradually decreases towards the east. The area is located at Jawaharnagar near Dammaiguda village and lies between Shameerpet and Kesara Mandals of Ranga Reddy district, Andhra Pradesh. There is a Greater Hyderabad Municipal Corporation solid waste dumping site in the study area. Groundwater in the study area occurs under water table to semi-confined conditions restricted to weathered and fractured formation. The study area contains granite rock formations. The groundwater quality analysis has been carried out for the water samples collected from the seven bore wells for both the seasons located in Dammaiguda, Balaji Nagar, Rajiv Gandhi Karmika Nagar, Ambedkar Nagar, Malkaram, Haridaspally, Bandlaguda Villages. In the present work attempts have been made to detect groundwater quality by using conventional hydro geochemical methods and also to prepare the contour maps for the various water quality parameters by using Arc GIS software. The location map of the study area is shown in figure1.

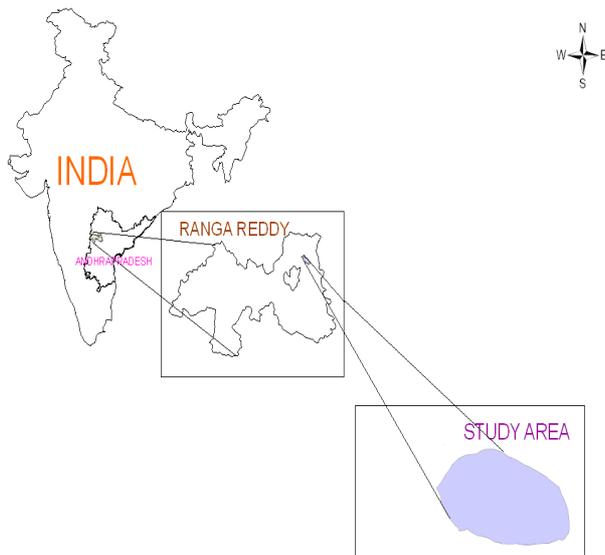


Figure 1: Location Map of the Study Area

III. RESEARCH METHODOLOGY

The groundwater samples are collected during the post monsoon period i.e., December 2007 and pre monsoon period i.e., June 2008 from the seven bore wells located in the study area. The well locations in the study area are represented in figure 2. The quality analysis has been carried out for the parameters like pH, total alkalinity, electrical conductivity, total dissolved solids, total hardness, calcium hardness, magnesium hardness, nitrites, nitrates, sulphates, chlorides and fluorides by following the standard methods prescribed as per IS: 10500-1994 codes.

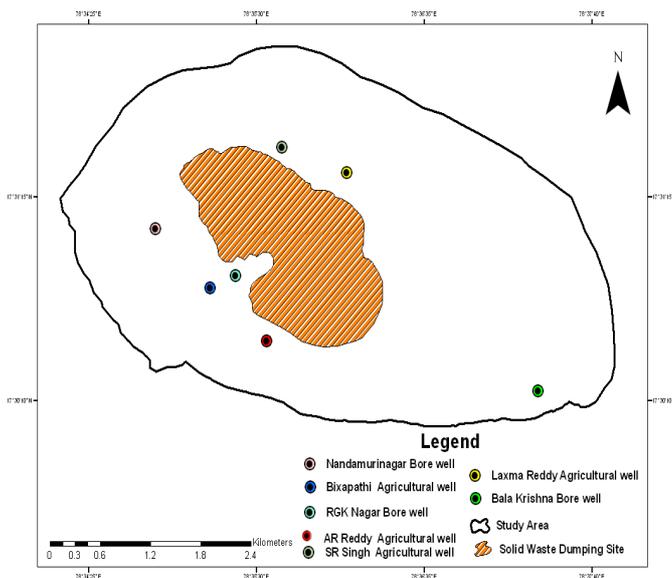


Figure 2: Bore Well Locations in the Study Area

IV. RESULTS

Physicochemical Parameters of Groundwater: The Seasonal wise concentration of ions in groundwater samples is given in Table 1.

Table 1: Seasonal Wise Concentrations of Water Quality Parameters in Groundwater Samples

S.No	Name of the Water Quality Parameter	Bureau of Indian Standard (IS-10500:1994)	Post Monsoon December 2007 (Parameters Range)	Pre Monsoon June 2008 (Parameters Range)
1	pH	6.5 - 8.5	6.76 - 7.81	6.65 - 7.62
2	Total Alkalinity (mg/l)	200-600	240-480	230-460
3	Electrical conductivity(μ mhos/cm)	700-3000	615-1950	583-1898
4	Total Dissolved Solids(mg/l)	500-2000	394- 1248	199-1214
5	Total Hardness (mg/l)	300-600	240-652	230-702
6	Calcium Hardness (mg/l)	75-200	176-376	166-426
7	Magnesium Hardness (mg/l)	30-100	66-280	64-278
8	Nitrites (mg/l)	0.05-5	0.0005-0.1	0.0005-0.15
9	Nitrates (mg/l)	45-100	0.3-14.6	0.5-12.2
10	Sulphates (mg/l)	200-400	25-100	23-123
11	Chlorides (mg/l)	250-1000	40-230	38-358
12	Fluorides (mg/l)	1.0-1.5	1-1.8	0.8-1.4

The pH indicates the acidic or alkaline material present in the water. The pH of the groundwater samples in the study area ranges from 6.76 - 7.81 and 6.65 - 7.62 during post and pre-monsoon respectively. The groundwater in this area is generally acidic in nature due to granitic rock formation. The total alkalinity values in the study area are within the permissible limit and are ranging from 240-480 mg/l during post monsoon period and 230-460mg/l in pre-monsoon period. The high alkalinity of groundwater in certain locations in the study area may be due to the presence of bicarbonate and some salts. The alkaline water may decrease the solubility of metals. The spatial distribution map for Total Alkalinity is represented in figure 3.

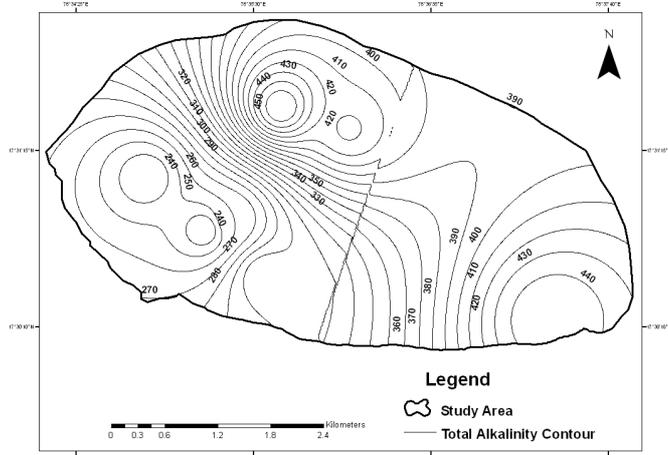


Figure 3: Spatial Distribution Map of Total Alkalinity in the Study Area

The salt concentration is generally measured by determining the electrical conductivity of water. Excess salt increases the osmotic pressure of the soil solutions that can result in physiological drought conditions. The Electrical conductivity values varied from 615-1950 μ mhos/cm and 583-1898 μ mhos/cm during post and pre-monsoon respectively. The highest value of conductivity may be due to high concentration of ionic constituents present in the water bodies. The spatial distribution map for Electrical Conductivity is shown in figure 4 for pre monsoon period.

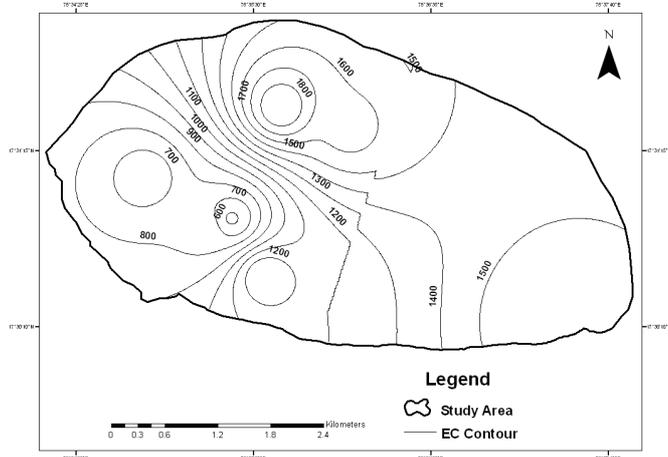


Figure 4: Spatial Distribution Map of Electrical Conductivity in the Study Area

The Total dissolved solids observed in this area is ranging between 394- 1248 mg/l and 199-1214 mg/l in post and pre-monsoon periods. Generally, the higher Total Dissolved Solids causes gastro-intestinal irritation to the human beings, but the prolonged intake of water with the higher Total Dissolved Solids can cause kidney stones and heart diseases. The presence of high values of Total Dissolved Solids in certain locations of the study

area may be due to the influence of anthropogenic sources such as domestic sewage, solid waste dumping, agricultural activities and influence of rock-water interaction. The spatial distribution map for Total Dissolved Solids during the pre monsoon period for the study area is shown in figure 5.

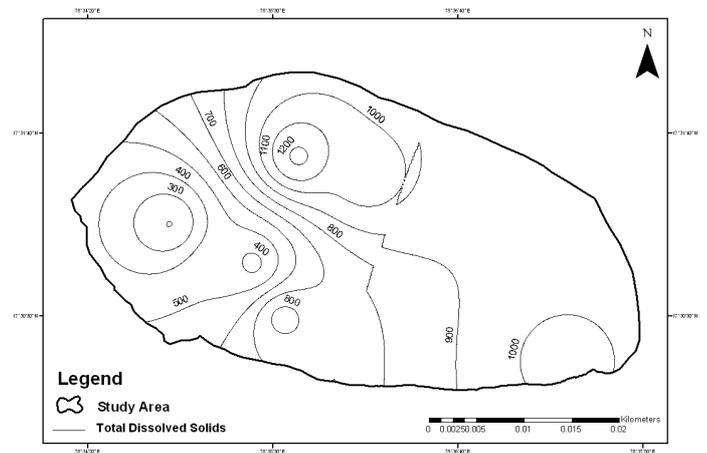


Figure 5: Spatial Distribution Map of Total Dissolved Solids in the Study Area

Total hardness is caused primarily by the presence of cations such as calcium and magnesium and anions such as carbonate, bicarbonate, chloride and sulphate in water. Water hardness has no known adverse effects; however, some evidence indicates its role in heart diseases and hardness of 150-300 mg/l and above may cause kidney problems and kidney stone formation, as it causes unpleasant taste and reduce ability of soap to produce lather. Hard water is unsuitable for domestic use. In this region, the total hardness varies between 240-652 mg/l and 230-702 mg/l during post and pre monsoons. The maximum allowable limit for drinking purpose is 600 mg/l and the most desirable limit is 300 mg/l as per BIS standards. The total hardness is relatively high in all samples due to the presence of calcium, magnesium, chloride and sulphate ions. Values are slightly higher in pre monsoon than post monsoon season. The spatial distribution of Total Hardness in groundwater of the study area is illustrated in Figure 6. Groundwater in the area exceeding the limit of 300 mg/l as CaCO_3 is considered to be hard and this may be due to solid waste leachate, and geology of the rocks.

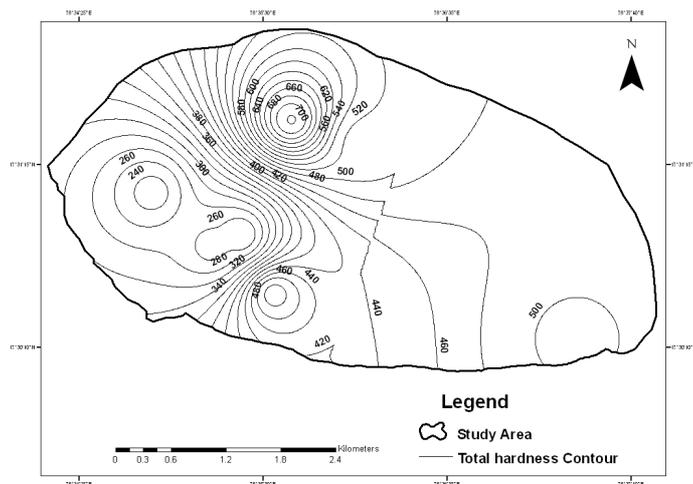


Figure 6: Spatial Distribution Map of Total Hardness in the Study Area

Calcium, magnesium and total hardness in the groundwater are inter-related. Calcium is an important element to develop proper bone growth. It is found alkaline in nature. The presence of calcium in the groundwater is from silicate mineral group, such as pyroxene and amphibole in the igneous rocks. In addition, the shales, sandstone also contain calcium in the form of carbonate. Calcium content is very common in groundwater, because they are available in most of the rocks, abundantly and also due to its higher solubility. However, the range of its availability depends on the solubility of calcium carbonate and sulphate. The permissible limit of calcium in drinking water is 75 mg/l. The calcium concentration in water samples collected from the study area ranged from 176-376 mg/l and 166-426 mg/l in post and pre monsoon seasons. So, all the samples exceeded the permissible limit. The rapid industrialization and urbanization in the area contributed to the high concentration of calcium in the groundwater of the region. The spatial distribution of Calcium Hardness in the groundwater of the study area is illustrated in Figure 7.

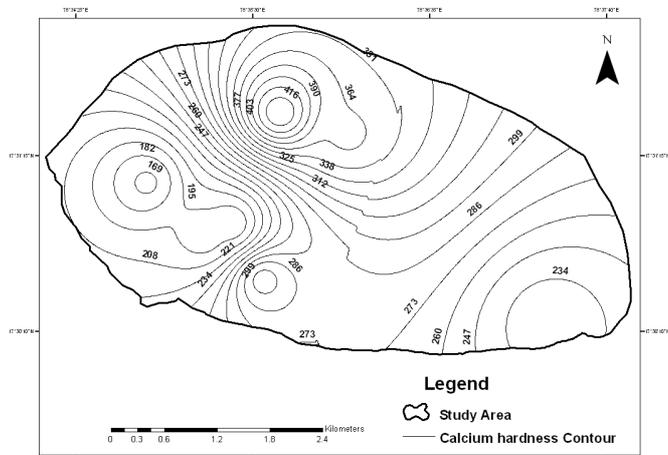


Figure 7: Spatial Distribution Map of Calcium Hardness in the Study Area

Magnesium usually occurs in lesser concentration than calcium due to the fact that the dissolution of magnesium rich minerals is slow process and that of calcium is more abundant in the earth's crust. If the concentration of magnesium in drinking water is more than the permissible limit, it causes unpleasant taste to the water. The magnesium derived from dissolution of magnesium calcite, gypsum and dolomite from source rocks. Magnesium is an essential ion for functioning of cells in enzyme activation, but at higher concentration, it is considered as laxative agent, while deficiency may cause structural and functional changes in human beings. The acceptable limit is 30 mg/l as per BIS standards. In the study area the magnesium level in the water samples ranged from 66-280 mg/l and 64-278 mg/l in post and pre monsoon seasons. Most of the locations exceeded the permissible limit. Anomalously high concentrations are observed in the groundwater samples collected very nearer to the solid waste dumping site. The spatial distribution map of the magnesium hardness is shown in figure 8.

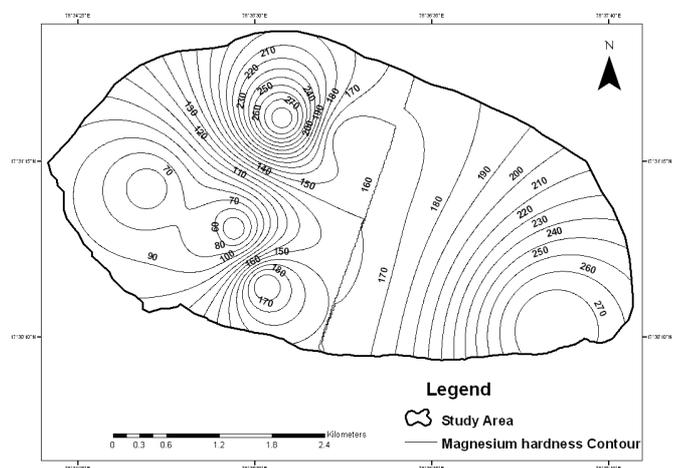


Figure 8: Spatial Distribution Map of Magnesium Hardness in the Study Area

The concentration of nitrite content in all the samples is ranging from 0.0005-0.1mg/l and 0.0005-0.15 mg/l during post and pre monsoon seasons. In some samples, nitrite content has not been traced. The results indicate that the nitrite concentration is low in all the regions of groundwater sources. The values are well below the permissible limit. The results also indicate that the distribution of nitrite is not uniform in the groundwater samples. Nitrates generally occur in trace quantities in surface water but may attain high levels in groundwater. It is well known that the nitrogenous fertilizers are one of the important sources for groundwater nitrate for the past two decades. Further, nitrogenous materials are rare in geological system. In excessive limits, it contributes to the illness known as methenglobinemia in infants. The permissible limit of nitrate is 45 mg/l prescribed by BIS standards. The nitrate concentration in groundwater collected from the study area ranged between 0.3-14.6 mg/l and 0.5-12.2 mg/l in post and pre monsoon seasons. Hence, all the groundwater samples collected in the study area are well within the permissible limit. The spatial distribution map for nitrates

concentration during the premonsoon period for the study area is shown in figure 9.

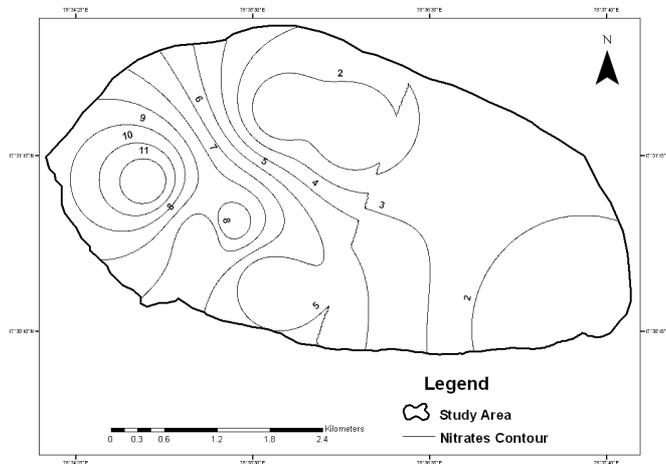


Figure 9: Spatial Distribution Map of Nitrates in the Study Area

The sulphate ion is one of the important anion present in natural water which produces catharsis, dehydration and gastrointestinal irritation effect upon human beings when it is present in excess of 150 mg/l. It is mainly derived from gypsum on oxidation of pyrites. The sulphide minerals add the soluble sulphate into the groundwater through oxidation process. In present investigation sulphate concentration was ranged from 25-100 mg/l and 23-123 mg/l during post and pre monsoon seasons. In the study area the sulphate levels are within the permissible limit of 200 mg/l. The spatial distribution map for sulphates concentration during the pre monsoon period for the study area is shown in figure 10.

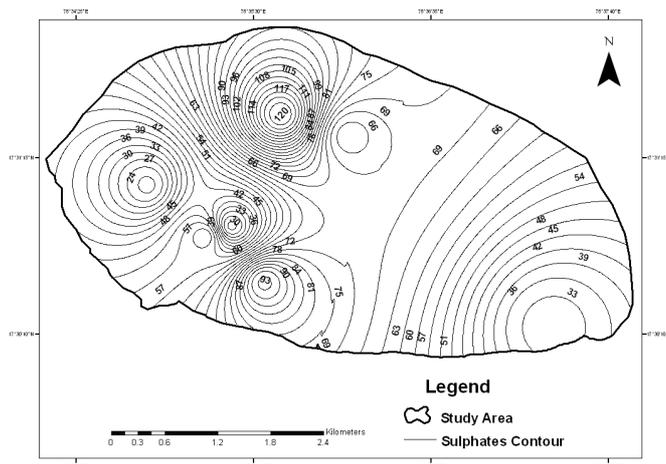


Figure 10: Spatial Distribution Map of Sulphates in the Study Area

Chloride is a widely distributed element in all types of rocks in one or the other form. Therefore, its concentration is high in groundwater, where the temperature is high and rainfall is

less. Mostly, the chlorides are found in the form of sodium chloride in the groundwater. Soil porosity and permeability also has a key role in building up the chloride concentration. Chloride imparts a salty taste and some times higher consumption causes for the development of essential hypertension, risk for stroke, left ventricular hypertension, osteoporosis, renal stones and asthma in human beings. Although, the chloride plays an important role in balancing level of electrolyte in blood plasma, but higher concentration can produce some physical disorders. The chloride concentration in the study area varied from 40-230 mg/l and 38-358 mg/l during post and pre monsoon periods. In the study area the chloride concentration has exceeded the permissible limit in certain locations which could be dangerous from health point of view. The high chloride concentration may be attributed due to solid waste dumping which in turn is leaching from upper soil layers in dry climates and natural geochemical activities in the area. The spatial distribution map for chlorides concentration during the premonsoon period for the study area is shown in figure 11.

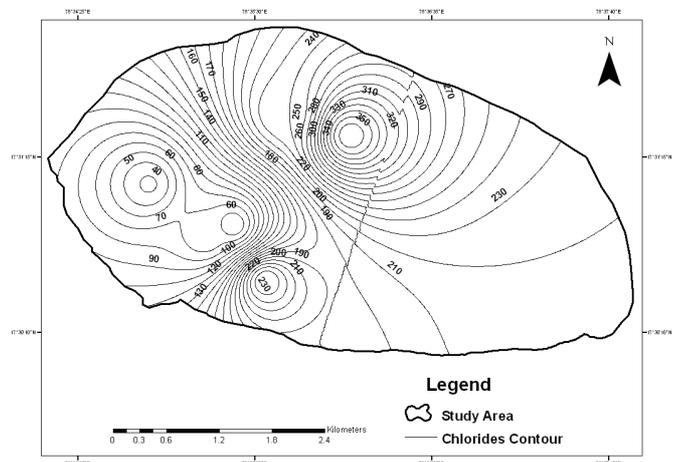


Figure 11: Spatial Distribution Map of Chlorides in the Study Area

One of the main trace elements in groundwater is fluoride which generally occurs as a natural constituent. Bedrock containing fluoride minerals is generally responsible for high concentration of this ion in groundwater. Fluoride normally accumulates in the bones, teeth and other calcified tissues of the human body. Excess of fluoride in water causes serious damage to the teeth and bones of the human body, which shows the symptoms of disintegration and decay, diseases called dental fluorosis, muscular fluorosis and skeletal fluorosis. Higher intake of fluoride may change the metabolic activities of soft tissues (brain, liver, kidney, thyroid and reproductive organs). The permissible limit of fluoride in drinking water is 1.5 mg/l as per BIS standards. The fluoride concentration in the study area varies from 1-1.8 mg/l in post monsoon and 0.8-1.4 mg/l in pre monsoon season. The concentration is higher than 1.5 mg/l in 02 locations. According to UNESCO specifications, water containing more than 1.5 mg/l of fluoride cause mottled tooth enamel in children and are not suitable for drinking purpose. Clinical report indicate that adequate calcium intake is directly

associated with reduced risk of dental fluorosis. Vitamin C also safeguards against the risk. The spatial distribution map of fluoride ion concentration in groundwater for the post monsoon period is shown in Figure 12. In this area fluoride is higher due to the leaching from solid waste dumping, long term irrigation processes, semi-arid climate.

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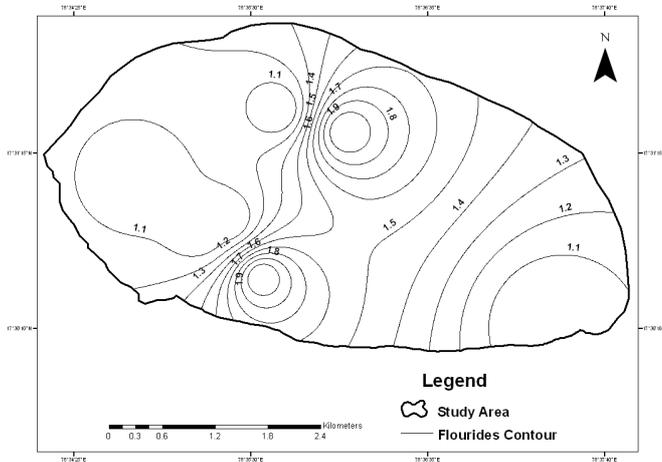


Figure 12: Spatial Distribution Map of Fluorides in the Study Area

V. CONCLUSIONS

Groundwater quality in and around Jawaharnagar, Hyderabad has been analysed in the present work. The groundwater is acidic in nature and total hardness observed in all samples fall under hard to very hard category. The total dissolved solids falls under fresh water to saline categories. The fluoride concentration in the northern and southern region exceeded the permissible limit. The concentration of physiochemical constituents in the water samples were compared with the Bureau of Indian Standards to know the suitability of water for drinking. Based on the analysis, most of the area at many locations near the solid waste dumping site falls in moderately polluted to severely polluted category indicating that the water is unsuitable for drinking purpose. The influences of solid waste dumping site, aquifer material mineralogy together with semiarid climate, other anthropogenic activities and increased human interventions have adversely affected the groundwater quality in the study area.

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Video Compression Using EZW and FSBM

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Abstract- In this paper video compression is done using EZW as intra compression and seven different algorithms of the block matching algorithms used for motion estimation in video compression. It implements and compares 7 different types of block matching algorithms that range from the very basic Exhaustive Search to fast adaptive algorithms like Adaptive Rood Pattern Search. The algorithms that are evaluated in this paper are widely accepted by the video compressing community and have been used in implementing various standards, ranging from MPEG1 / H.261 to MPEG4 / H.263. The paper also presents a very brief introduction to the entire flow of video compression.

Index Terms- Block matching, motion estimation, video compression, MPEG, H.261, H.263, H.264, EZW.

I. INTRODUCTION

WITH the advent of the multimedia age and the spread of Internet, video storage on CD/DVD and streaming video has been gaining a lot of popularity. The ISO Moving Picture Experts Group (MPEG) video coding standards pertain towards compressed video storage on physical media like CD/DVD, where as the International Telecommunications Union (ITU) addresses real-time point-to-point or multi-point communications over a network. The former has the advantage of having higher bandwidth for data transmission. In either standard the basic flow of the entire compression decompression process is largely the same and is depicted in Fig. 1 shows the block diagram for video compression process. The most computationally expensive part in the compression process is the Motion Estimation[9]. Motion Estimation examines the movement of objects in sequence to try to obtain the vectors representing the estimated motion. Encoder side estimates the motion of the current frame with respect to previous frame. A motion compensated image of the current frame is then created. Motion vector is then transmitted to decoder. Decoder reverses the whole process and creates a full frame. This way motion compensation uses the knowledge of object motion to achieve data compression.

The encoding side estimates the motion in the current frame with respect to a previous frame. A motion compensated image for the current frame is then created that is built of blocks of image from the previous frame.

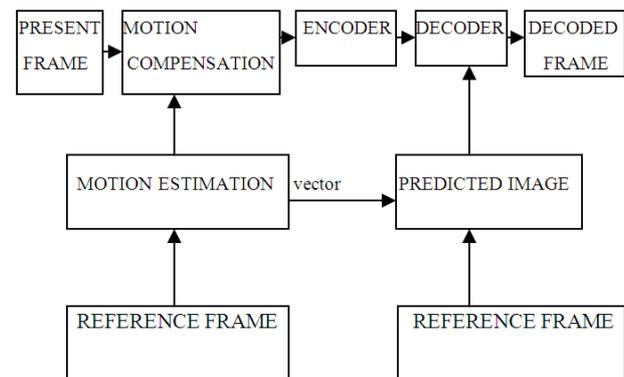


Fig. 1: Block Diagram for Video Compression process flow.

The motion vectors for blocks used for motion estimation are transmitted, as well as the difference of the compensated image with the current frame is also EZW encoded and sent. The encoded image that is sent is then decoded at the encoder and used as a reference frame for the subsequent frames. The decoder reverses the process and creates a full frame. The whole idea behind motion estimation based video compression is to save on bits by sending EZW encoded difference images which inherently have less energy and can be highly compressed as compared to sending a full frame that is EZW encoded.

This paper implements and evaluates the fundamental block matching algorithms along with EZW. The algorithms that have been implemented are Exhaustive Search (ES), Three Step Search (TSS), New Three Step Search (NTSS), Simple and Efficient TSS (SES), Four Step Search (4SS), Diamond Search (DS), and Adaptive Rood Pattern Search (ARPS). About EZW (Embedded Zerotrees of Wavelet Transforms) ,it is a lossy image compression algorithm. At low bit rates (i.e. high compression ratios) most of the coefficients produced by a subband transform (such as the wavelet transform) will be zero, or very close to zero. This occurs because "real world" images tend to contain mostly low frequency information (highly correlated). However where high frequency information does occur (such as edges in the image) this is particularly important in terms of human perception of the image quality, and thus must be represented accurately in any high quality coding scheme.

II. EZW

The embedded zerotree wavelet algorithm (EZW) is a simple, yet remarkably effective, image compression algorithm, having the property that the bits in the bit stream are generated in order of importance, yielding a fully embedded code. The

embedded code represents a sequence of binary decisions that distinguish an image from the “null” image[10]. Using an embedded coding algorithm, an encoder can terminate the encoding at any point thereby allowing a target rate or target distortion metric to be met exactly. Also, given a bit stream, the decoder can cease decoding at any point in the bit stream and still produce exactly the same image that would have been encoded at the bit rate corresponding to the truncated bit stream. In addition to producing a fully embedded bit stream, EZW consistently produces compression results that are competitive with virtually all known compression algorithms on standard test images. Yet this performance is achieved with a technique that requires absolutely no training, no pre-stored tables or codebooks, and requires no prior knowledge of the image source.

III. THE EZW ALGORITHM

The EZW coding algorithm is based on following concepts:

- i) A discrete wavelet transform or hierarchical subband decomposition.
- ii) Prediction of the absence of significant information across scales by exploiting the self-similarity inherent in images.
- iii) Entropy-coded successive-approximation quantization.
- iv) Universal lossless data compression, which is achieved via adaptive arithmetic coding.

An EZW encoder was specially designed by J. M. Shapiro to use with wavelet transform[11]. EZW coding is more like a quantization method. It was originally designed to operate on images but it can also be used on other dimensional signals. The EZW encoder is based on progressive encoding to compress an image into a bitstream with increasing accuracy. This means that when more bits are added to the stream, the decoded image contain more detail, a property similar to JPEG encoded image. Progressive encoding is also called as embedded encoding which explains the ‘E’ letter in EZW. Coding an image using the EZW method together with some optimizations, results in a remarkably effective image compressor with the property that the compressed data stream can have any bit rate desired. Any bit rate is only possible if there is information loss somewhere so that the compressor is lossy. However lossless compression is also possible with EZW encoder with less spectacular results.

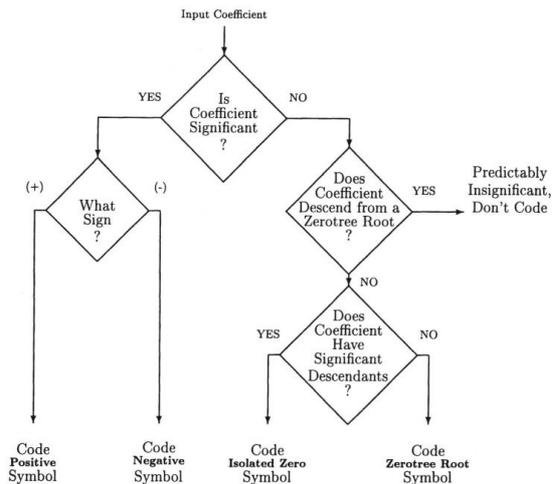


Fig. 2 EZW flowchart to encode of DWT coefficients

In this method only four symbols are used to code the DWT coefficients, namely P, N, T and Z. The coding rules are as follows:

- i) If the coefficient is larger than the threshold, P (positive significant) is coded.
- ii) Else if the coefficient is smaller than threshold, N (negative significant) is coded.
- iii) Else if the coefficient is the root of a zerotree, T (zerotree) is coded.

IV. BLOCK MATCHING ALGORITHMS

In BMA it is assumed that every pixel within a macro block has same motion activity and produce one motion vector for each macro block. The main idea behind block matching is to divide the current frame into number of macro blocks of fixed size and create a motion vector which comprises the location of the macro block of the current frame in the previous frame. Usually the macro block is taken as a sequence of 16 pixels and search area is up to 7 pixels on all four sides of the corresponding macro block in previous frame[12]. The matching of one macro block with another is based on the output of a cost function. The macro block that results in the least cost is the one that matches the closest to current block. There are various cost functions, of which the most popular and less computationally expensive is Mean Absolute Difference (MAD) [9] given by equation (1). Another cost function is Mean Squared Error (MSE) [9] given by equation (2).

The underlying supposition behind motion estimation is that the patterns corresponding to objects and background in a frame of video sequence move within the frame to form corresponding objects on the subsequent frame. The idea behind block matching is to divide the current frame into a matrix of ‘macro blocks’ that are then compared with corresponding block and its adjacent neighbors in the previous frame to create a vector that stipulates the movement of a macro block from one location to another in the previous frame. This movement calculated for all the macro blocks comprising a frame, constitutes the motion estimated in the current frame. The search area for a good macro block match is constrained up to p pixels

on all four sides of the corresponding macro block in previous frame. This 'p' is called as the search parameter. Larger motions require a larger p, and the larger the search parameter the more computationally expensive the process of motion estimation becomes. Usually the macro block is taken as a square of side 16 pixels, and the search parameter p is 7 pixels. The idea is represented in Fig 3. The matching of one macro block with another is based on the output of a cost function. The macro block that results in the least cost is the one that matches the closest to current block. There are various cost functions, of which the most popular and less computationally expensive is Mean Absolute Difference (MAD) given by equation (i). Another cost function is Mean Squared Error (MSE) given by equation (ii).

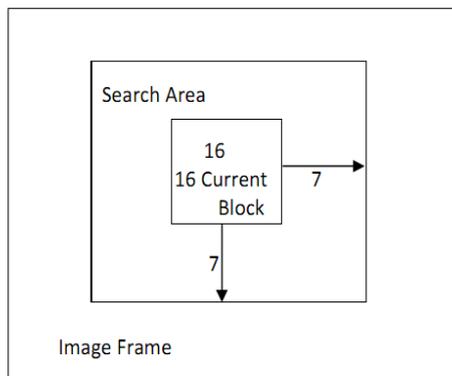


Fig 3: Block Matching of a 16x16 macro Block within a search area of 7 pixels

$$MAD = \frac{1}{N^2} \sum_{i=0}^{N-1} \sum_{j=0}^{N-1} |C_{ij} - R_{ij}| \quad (i)$$

$$MSE = \frac{1}{N^2} \sum_{i=0}^{N-1} \sum_{j=0}^{N-1} (C_{ij} - R_{ij})^2 \quad (ii)$$

where N is the side of the macro block, C_{ij} and R_{ij} are the pixels being compared in current macro block and reference macro block, respectively.

Peak-Signal-to-Noise-Ratio (PSNR) given by equation (iii) characterizes the motion compensated image that is created by using motion vectors and macro blocks from the reference frame.

$$PSNR = 10 \log_{10} \left[\frac{(\text{Peak to peak value of original data})^2}{MSE} \right] \quad (iii)$$

A. Exhaustive Search (ES)

This algorithm, also known as Full Search, is the most computationally expensive block matching algorithm of all.

This algorithm calculates the cost function at each possible location in the search window. As a result of which it finds the best possible match and gives the highest PSNR amongst any block matching algorithm. Fast block matching algorithms try to achieve the same PSNR doing as little computation as possible.

The disadvantage to ES is that the larger the search window gets the more computations it requires.

B. Three Step Search (TSS)

This is one of the earliest attempts at fast block matching algorithms and dates back to mid 1980s. It starts with the search location at the center and sets the 'step size' S = 4, for a usual search parameter value of 7. It then searches at eight locations +/- S pixels around location (0,0). From these nine locations searched so far it picks the one giving least cost and makes it the new search origin. It then sets the new step size S = S/2, and repeats similar search for two more iterations until S = 1.

C. New Three Step Search (NTSS)

NTSS [4] improves on TSS results by providing a center biased searching scheme and having provisions for half way stop to reduce computational cost. It was one of the first widely accepted fast algorithms and frequently used for implementing earlier standards like MPEG 1 and H.261. The TSS uses a uniformly allocated checking pattern for motion detection and is prone to missing small motions. In the first step 16 points are checked in addition to the search origin for lowest weight using a cost function. Of these additional search locations, 8 are a distance of S = 4 away (similar to TSS) and the other 8 are at S = 1 away from the search origin. If the lowest cost is at the origin then the search is stopped right here and the motion vector is set as (0, 0). If the lowest weight is at any one of the 8 locations at S = 1, then we change the origin of the search to that point and check for weights adjacent to it.

D. Simple and Efficient Search (SES)

SES [5] is another extension to TSS and exploits the assumption of unimodal error surface. The main idea behind the algorithm is that for a unimodal surface there cannot be two minimums in opposite directions and hence the 8 point fixed pattern search of TSS can be changed to incorporate this and save on computations. The algorithm still has three steps like TSS, but the innovation is that each step has further two phases.

E. Four Step Search (4SS)

Similar to NTSS, 4SS [6] also employs center biased searching and has a halfway stop provision. 4SS sets a fixed pattern size of S = 2 for the first step, no matter what the search parameter p value is. Thus it looks at 9 locations in a 5x5 window. If the least weight is found at the center of search window the search jumps to fourth step. If the least weight is at one of the eight locations except the center, then we make it the search origin and move to the second step. The search window is still maintained as 5x5 pixels wide. Depending on where the least weight location was, we might end up checking weights at 3 locations or 5 locations. Once again if the least weight location is at the center of the 5x5 search window we jump to fourth step or else we move on to third step. The third is exactly the same as the second step. In the fourth step the window size is dropped to 3x3, i.e. S = 1. The location with the least weight is the best matching macro block and the motion vector is set to point o that location.

F. Diamond Search (DS)

DS [7] algorithm is exactly the same as 4SS, but the search point pattern is changed from a square to a diamond, and there is no limit on the number of steps that the algorithm can take. DS uses two different types of fixed patterns, one is Large Diamond Search Pattern (LDSP) and the other is Small Diamond Search Pattern (SDSP). Just like in FSS, the first step uses LDSP and if the least weight is at the center location we jump to fourth step. The last step uses SDSP around the new search origin and the location with the least weight is the best match. As the search pattern is neither too small nor too big and the fact that there is no limit to the number of steps, this algorithm can find global minimum very accurately. The end result should see a PSNR close to that of ES while computational expense should be significantly less.

G. Adaptive Rood Pattern Search (ARPS)

ARPS [8] algorithm makes use of the fact that the general motion in a frame is usually coherent, i.e. if the macro blocks around the current macro block moved in a particular direction then there is a high probability that the current macro block will also have a similar motion vector. This algorithm uses the motion vector of the macro block to its immediate left to predict its own motion vector. The predicted motion vector points to (3, -2). In addition to checking the location pointed by the predicted motion vector, it also checks at a rood pattern distributed points, where they are at a step size of $S = \text{Max}(|X|, |Y|)$. X and Y are the x-coordinate and y-coordinate of the predicted motion vector.

V. SIMULATION RESULTS

During the course of this project all of the above 7 algorithms have been implemented. 'resi_gd' video sequence with a distance of 2 between current frame and reference frame was used to generate the frame-by-frame results of the algorithms. Fig. 4 shows one of the original frame. Fig. 5 shows the compressed image using EZW. Fig.6 shows the Reconstructed image using artificial colors. The original size of the video is 25MB and the reconstructed video is of size 21.3MB. The PSNR comparison of the compensated images generated using the algorithms is shown in Fig 7.



Fig. 4 Original Frame



Fig. 5 Compressed Frame using EZW



Fig.6 Reconstructed Frame (using artificial color)

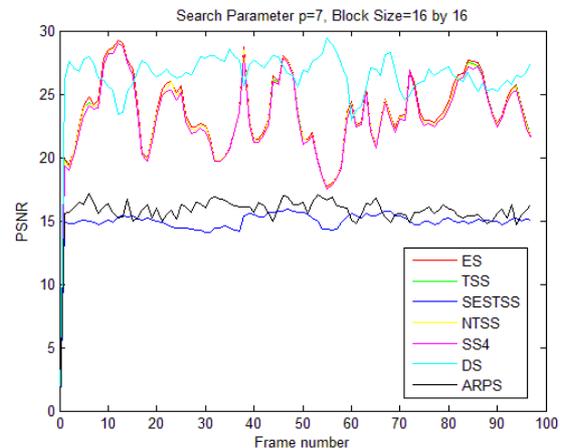


Fig.7 Plot of PSNR and Frame Number

As is shown by Fig. 7, SS4, ES, NTSS and TSS come pretty close to the PSNR results of ES. While the ES takes on an

average around ~200 searches per macro block, DS and 4SS drop that number by more than an order of magnitude. ARPS further drops by a factor of 2 compared to DS. NTSS and TSS although do not come close in PSNR performance to the results of ES, but even they drop down the number of computations required per macro block by almost an order of magnitude. SES takes up less number of search point computations amongst all but ARPS. The computations for different algorithms are mentioned

TSS→23.046875, ES→199.515625, SS4→24.359375,
ARPS→17.15234375, DS→27.90625, NTSS→30.2265625
SESTSS→15.91796875

VI. V. CONCLUSION & FUTURE WORK

As from the results it is clear that the clarity of the image is poor and if the color used were from the original image then quality can be improved. The results are much better if instead of EZW, SPIHT algorithm is used. Before compression the size of the clip was 25MB and after compression the size is reduced to 21.3MB. So the compression is achieved with a good compression ratio and compression factor.

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Production of Milk Clotting Enzyme from *Aspergillus oryzae* under Solid-State Fermentation using Mixture of Wheat Bran and Rice Bran

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Abstract- Microbial rennet-like milk-clotting enzymes are aspartic proteinases that catalyze milk coagulation, substituting calf rennet. Crude enzymatic extract produced by the *Aspergillus oryzae* NCIM 1032, on solid state fermentation (SSF) using mixture of wheat bran and rice bran (7:3), exhibited high milk-clotting activity (MCA) and low proteolytic activity (PA) after 120 h of fermentation. Highest milk-clotting activity was at pH 7.5, at 30 °C. Glycerol (5%) was found to be best solvent for leaching out milk clotting enzyme. The yield of enzyme was improved with the supplementation of glucose and beef extract as a carbon and nitrogen source respectively. Metabolic heat generated due to fermentation was equally distributed throughout the substrate bed by agitation in rotating drum bioreactor and enzyme production increased at speed of 25 rpm and at intermittent agitation (1 min/day). High ratio of milk clotting to proteolytic activity strengthens the potential usefulness of milk-clotting enzyme of *Aspergillus oryzae* NCIM 1032 as a substitute for calf rennet in cheese manufacturing

Index Terms- Solid state fermentation, Milk Clotting activity, Proteolytic activity, *Aspergillus oryzae*, Rotating drum bioreactor, Calf rennet

I. INTRODUCTION

Rennet (EC 3.4.23.4), an aspartate protease, is the main enzyme employed in cheese production. Rennet not only clots the milk but also plays an important role during cheese maturation, which is a vital and complex process for the balanced development of flavor and texture^[1]. Traditionally natural calf rennet is used for the production of cheese which is extracted from the inner mucosa of the fourth stomach chamber (The abomasum) of slaughtered young, unweaned calves. These stomachs are the by product of veal production. Rennet is a complex enzyme and contains mixture of enzymes, including a proteolytic enzyme (Protease) that coagulates the milk. The active enzyme in rennet is called chymosin or rennin. For developing country like India slaughtering of unweaned calves or even young calves to get abomosa solely for rennet extraction is seen as a very expensive means. As a cheaper alternative if rennet is extracted from older calves the rennet contains less or no chymosin but a high level of pepsin. High pepsin content in animal rennet hydrolyses proteins which weakens the protein network in the milk. This results in lower cheese yield with reduced protein and fat content and bitter flavor.

A worldwide shortage of aspartate protease-chymosin, (EC 3.4.23.4), a natural calf rennet, traditionally used in the production of cheese, has prompted a search for an adequate substitute. Microbial enzymes are especially favored since they can be mass cultured and offer a variety of properties permitting selection of those most suitable in cheese production. Fungal and bacterial sources are widely used for cheese production. In the USA alone, about 60% of the cheese is manufactured using fungal enzymes^[2]. Comprehensive studies that have been carried out on rennin like enzymes of microbial origin, aimed at their utilization as rennin substitutes for cheese making^[3]. The production of a milk-clotting enzyme was reported in *Penicillium oxalicum*^[4] and *Nocardopsis* sp^[5]. In the case of microbial rennets from *Mucor* sp., none of the available reports contains any indication that the use of the enzyme in cheese manufacture is unsafe^[6]. An adequate substitute must have intense milk clotting and low proteolytic activities to minimize dissolution of the clot^[7].

Solid substrate fermentation (SSF) has been known for centuries and used successfully for the production of oriental foods^[8]. In recent years, SSF has shown much promise in the development of bioprocesses and products^[9,10]. More recently, it has gained importance in the production of microbial enzymes due to several economic advantages over conventional submerged fermentation (SmF). Several reports on SSF have been published on the production of fine chemicals^[11-13], enzymes^[14,15], antibiotics^[16,17], and immunosuppressant^[18,19]. SSF processes are therefore of special economic interest for countries with abundance of biomass and agro-industrial residues, as they can be used as cheap raw materials. In this process, the solid substrate not only supplies the nutrient to the culture but also serves as an anchorage for microbial cells. Cost and availability are important considerations, and therefore the selection of an appropriate solid substrate plays an important role in the development of efficient SSF processes. SSF has generated much interest because it offers lower manufacturing costs by utilizing unprocessed or moderately processed materials. SSF is generally a simpler process and requires less preprocessing energy than SmF (Submerged fermentation). Further, the initial capital costs are less for SSF. Other advantages are superior productivity, low waste water output, and improved product recovery^[20]. However this technique shows several disadvantages over submerged fermentation, which have discouraged its use for industrial production^[21]. The low moisture and poor thermal conductivity of the substrate make heat transfer and temperature control difficult in SSF^[22]. Many bioreactors

have been traditionally used in SSF processes. These can be mainly classified in two groups: the ones which show an agitation system and the ones which work in static conditions. The first category comprises rotating drums, gas-solid fluidized beds, rocking drums, horizontal paddle mixer, etc, while the second one includes the packed-bed and the trays bioreactor. Static beds are required when the substrate bed must remain static throughout the growth phase or when the substrate particles have to be knitted together by the fungal mycelium^[23]. On the other hand, the use of mixed bioreactors improves the homogeneity of the bed and ensures an effective heat and mass transfer^[35]. However, the shear forces caused by rotation and agitation damage or disrupt fungal mycelia and reduce the porosity of the substrates^[24].

II. RESEARCH ELABORATIONS

2.1) Micro organism and growth:

Fungal strain *Aspergillus oryzae* was purchased from NCL and maintained on potato dextrose agar slants at 4°C.

2.2) Raw Material:

Rice bran, Wheat bran, Jowar Bran, pigeon pea husk, chickpea husk, groundnut meal was purchased from local market. Raw material were properly dried at 60°C.

2.3) Inoculum preparation:

Sporulated culture lawn of the *Aspergillus oryzae* was picked up and mixed well in sterilized distilled water. The spore suspension will be diluted to a concentration of 10⁸ spores/ml and used in inoculum.

2.4) Milk clotting enzyme assays:

2.4.1) Assay for milk clotting activity:

Milk-clotting activity (MC) will be assayed by a modified procedure of Arima et al. (1970)^[25]: 1 ml substrate (8.4% Skim milk powder in 0.05 M sodium acetate buffer, pH 5.3, containing 0.01M CaCl₂) will be mixed with 0.1 ml enzyme and the clotting time will be measured and expressed in **Soxhlet units**. **One Soxhlet unit is defined as the quantity of enzyme required to clot one ml of substrate in 40 min at 37°C.** and was calculated according to Shata^[26]: unit of milk-clotting activity (U) = 2400/T * S/E, where

T is the time necessary for clot formation,

S is the milk volume and E is the enzyme volume.

2.4.2) Assay for Proteolytic activity (PA):

The substrate employed for the assay of proteolytic activity will be soluble casein. The casein solution will be prepared by the method of Kunitz (1947)^[27]:

a) 1 ml of diluted enzyme solution will be added to 2 ml of casein solution (pH

6.0) and 1 ml of 1.0 M phosphate buffer (pH 6.0); the resultant solution will be mixed well and kept at 40°C for 20 min.

b) Then, 5 ml of 5 % trichloroacetic acid will be added, and the mixture allowed to stand for 30 min at room temperature.

c) The resultant precipitate will be removed by filtering the solution through Whatman no. 4 filter paper. The concentration of split products in the filtrate will be determined essentially by the method of Layne (1957)^[28].

d) To 2 ml of filtrate, 4 ml of alkaline copper sulfate solution and 0.4 ml of distilled water will be added.

e) After 10 min, 0.1 ml of diluted Folin's reagent will be added, and the mixture will be held for 30 min or longer for development of color.

f) The optical density will be read at 750 nm in a spectrophotometer. Optical density expresses enzyme activity.

2.5) Production of MCE under SSF:

Wheat bran (10 gm) were taken in 250 ml conical flasks and moistened with 10 ml of mineral salt solution (g/l : 2.0, KNO₃; 0.5, MgSO₄·7H₂O; 1.0, K₂HPO₄; 0.439, ZnSO₄·7H₂O; 1.116, FeSO₄·7H₂O; 0.203, MnSO₄·7H₂O; and pH 7.0). the medium were autoclaved at 121.5°C for 20 min and after cooling inoculated with 1 ml of spores suspension and incubated at 30°C for a week. Same procedure was follow for all other substrates.

2.6) Enzyme extraction:

After 120 hr of incubation a known quantity (2 gm) of solid medium was extracted with distilled water by shaking on a rotary shaker (220 rpm, 1hr, 30°C). The filtrate obtained was centrifuged at 10,000 g for 10 min at 4°C. The supernatant was used as crude enzyme source for milk clotting protease activity.

2.7) Effect of substrates:

Different substrates like wheat bran, rice bran etc were tried for enzyme production. Then two highest enzyme producing substrates were selected from above mentioned substrates and were mixed in different combinations such as 1 gm Wheat bran and 9 gm Rice bran, 2 gm Wheat bran and 8gm of Rice bran up to 9 gm Wheat bran and 1gm Rice bran. Enzyme activity was monitored at 24 hrs interval up to 168 hrs. The highest enzyme producing combination of substrates were used in SSF for further optimization.

2.8) Effect of incubation time:

After inoculation, the flasks were incubated at 30°C for different time periods ranging from 24 hrs to 168 hrs and enzyme activity was monitored.

2.9) Effect of incubation temperature:

The SSF was carried out at different temperatures such as 30 °C,40 °C,50 °C,60 °C and70 °C for 120 hrs and the enzyme activity was assayed.

2.10) Effect of pH of moisturizing agent:

SSF was carried out using moisturizing agent with different pH ranging from 3.5 to 8.5. the flasks were incubated at 30 °C for 120 hrs and the enzyme production was measured as described earlier.

2.11) Effect of initial moisture content:

The substrate was moistened using D/W in different ratios (w/v) starting from 1:1, 1:2, 1:3, 1:4 to find out the best ratio for enzyme production under SSF.

2.12) Effect of carbon and nitrogen source supplementation:

The SSF production medium was supplemented with different C and N sources like Glucose, sucrose etc supplemented and the flasks were incubated at 30 °C for 120 hrs.

2.13) Effect of organic solvent on extraction:

After cultivation, a known quantity of solid medium were extracted with distilled water and various organic solvents like Glycerol, Sorbitol, ethanol, methanol in concentration of 5% (1:10 v/w) by shaking on a rotary shaker (220 rpm, 1 h, 30°C). The filtrate obtained was centrifuged at 10,000 g for 10 min at 4°C. The supernatant was used as crude enzyme source for milk-clotting protease activity.

2.14) Effect of agitation :

Rotating drum Bioreactor:

The lab scale fermentor consist of 250 ml glass roller bottle. For the experiment carried out in agitation the bottle was place in roller system composed of two cylinders which rotates continuously in this way the media of fermentor was mixed as a consequence of the movement of the bottle.

2.14.1) Agitation speed: For the fermentation 10 gm of preinoculated solid substrate were added to bottle . the substrate bed leaving enough space to obtain good agitation. The system was incubated at 30 °C for 120 hr. the effect of agitation time and agitation speed in the production of milk clotting enzyme were evaluated in rotating drum bioreactor. For this purpose intermittent agitation (one agitation of 2 min/ day) were carried out at different speeds such as 25 rpm,50 rpm ,75 rpm, 100 rpm,125 rpm.

2.14.2) Agitation time: to optimized agitation time the bottles were agitated at constant optimized speed from 1 min/day up to 5 min/day. The milk clotting enzyme production was monitored at the end of 120 hr.

III. RESULTS

3.1) Substrate

Milk clotting enzyme activity of each substrate was calculated according to Shata ^[26]. Maximum milk clotting enzyme was observed in wheat bran (333.3 U/gm)followed by rice bran (322.6 U/gm)and other substrates showing less productivity. On the other hand these two substrates showing less proteolytic activity (Figure 2). So these two substrates were selected for combination.

3.2) Substrate combination:

Above two best selected substrates were mixed in different combination and flasks were incubated at 30 °C and the enzyme activity was measured after different time periods. The enzyme production was maximum for combination of wheat bran and rice bran in the ratio of 7:3 (Figure 3). This combination was shows maximum milk clotting activity (513.1 U/gm) and less proteolytic activity (0.147). This combination was used for further optimization.

3.3) Incubation time:

After inoculation, the flasks were incubated at 30 °C and the enzyme activity measured after different time periods. The Figure 4 shows enzyme production started after 24 hr of incubation and increased with time peaking at 120 hr (487.0 U/gm) there after , the enzyme production started decreasing and proteolytic activity was decreased up to 120 hr (0.163) and thereafter it started increasing.

3.4) Incubation temperature:

The SSF was carried out by incubating the flasks for 120 hr at different temperatures such as 30 °C,40 °C,50 °C,60 °C,70 °C. The Figure 5 shows maximum enzyme production was observed at 30 °C (532.5 U/gm) and proteolytic activity was 0.198 . Above 30 °C there was decrease in the enzyme production.

3.5) Effect of pH :

SSF was carried out using nutrient solution as moisturizing agent with different pH ranging from 3.5 to 8.5 . Figure 6 shows maximum production of enzyme was observed at pH 7.5 (MCA : 516.4 U/gm and P.A: 0.156)

3.6) Initial moisture content:

Substrate was moistened using distilled water in different ratios (w/v) starting from 1:1, 1:2, 1:3 to 1:4. Figure 7 shows a ratio of 1:1 was found to be the best ((MCA : 532.5 U/gm and P.A: 0.142).

3.7) Effect of external Carbon and Nitrogen source:

The SSF production medium was supplemented with different Carbon and Nitrogen sources separately. Glucose and beef extract having positive results for production of enzyme (Table 1 &2). These sources was further studied to determine optimum concentration. 0.4% glucose and 0.8 % beef extract with supplementation of the medium there was a slight increase in enzyme production with carbon (546.3 U/gm)and nitrogen source 541.3(U/gm) (Figure 8 & Figure 9).

3.8) Effect of extractant:

5 % of glycerol solution shows approximate 96 % increase (1194.4 U/gm) in extraction than extraction by distilled water (Figure 10).

3.9) Effect of agitation speed:

The highest enzyme activities, obtained with speed of 25 rpm (612.7 U/gm) were assayed when the system was agitated 2 min/day (Figure 11). A high speed could damage fungal cultures as a consequence of the shear forces during mixing. Optimized agitation speed was 25 rpm.

3.10) Effect of agitation time:

The highest enzyme activities, obtained with agitation time of 1 min/day with the speed of 25 rpm (698.3 U/gm) (Figure 12). Agitation shows approximately 20 % of increase in production.

IV. DISCUSSION

The selection of an ideal agroindustrial residues for enzyme production in SSF process depends upon several factors, mainly related with cost and availability of substrate material , and thus may involve screening of several agro industrial residue ^[29]. Various agroindustrial substrates were screened for the study. It was interesting to note that in SSF by *Aspergillus oryzae* NCIM 1032 all the tested substrate showed enzyme production. Fermentation of wheat bran and rice bran showed maximum production of milk clotting enzyme among all substrates. There are several reports describing wheat bran as potent substrate for milk clotting enzyme production by *A. oryzae* ^[30], *Rhizomucor* ^[31], *Absedia ramose* ^[29] and *M. miehei* ^[32] in SSF. In another report mixture of rice bran , rice husk, and gram hull in the ratio of 5:3:2 was found to be suitable for protease production ^[33]. In this study maximum enzyme production (51.31 U/gm) was observed with mixture of wheat bran and rice bran in the ratio of 7:3. It may because of wheat barn is rich in proteins. It contains gluten , a viscoelastic protein. On the other hand rice bran has considerably lower protein content as compared with wheat barn and and is rich in tocopherols. It contains about 20 % of oil. So the mixture of wheat bran and rice bran satisfies more nutritional requirements than single substrate.it was interesting to note that , none of the reports was evidenced on the production of milk clotting enzyme using mixture of wheat bran and rice bran in the ratio of 7:3 as a substrate. In another study pigeon pea husk i.e dhal husk shows maximum production ^[34].

Maximum yield of milk clotting enzyme was obtained after 120 hr of incubation at 30 °C. Decrease in production after 120 hr

of incubation may be due to the accumulation of end products which hampers milk clotting enzyme production or may be due to the accumulation of toxic metabolites secreted during fermentation^[35,36] or may be because of depletion of nutrients available to microorganisms. Similar findings shown by other workers^[37,38].

The pH of the medium strongly affects many enzyme processes and transport of various compounds across the cell membrane^[39]. In present study optimum pH for enzyme production was 7.5. Similar results were reported by Yu and Chou^[40] according to their results maximum enzyme production was at pH 7 by *Amylomyces rouxii*. D'souza and Perreira^[41] have observed that milk clotting enzyme production by *Bacillus licheniformis* showed maximum production at pH 7.0.

R. Sathya and co-workers reported that optimum temperature of 30 °C for milk clotting enzyme production by local isolate of *Mucor circinelloides* under SSF using dhal husk as substrate. With increase in temperature, sporulation is induced thereby hampering mycelia growth.

Milk clotting enzyme yield was maximum when substrate to water ratio was 1:1 (w/v) above this the enzyme production was found to be decreased. This could be explained by the fact that lower moisture levels lead to reduced solubility of the nutrients in the solid substrates a lower degree of substrate swelling and higher water tension. Similarly, higher moisture content were reported to cause decreased porosity, loss of particulate structure, development of stickiness, reduction in gas volume, decreased gas exchange and enhanced formation of aerial mycelium^[28]. Similar findings have been reported by other workers^[42,43].

Among the various carbon sources tested glucose was found to be the best source for milk clotting enzyme production followed by maltose. Abdel-Fattah and Saleh^[44] found that sucrose was optimum for the production of milk clotting enzyme from *Aspergillus versicolor*.

Supplementation of beef extract as a nitrogen source resulted in increase in enzyme production followed by peptone.

The effect of specific nitrogen supplement on milk clotting enzyme production differs from organism to organism, although the complex nitrogen sources are usually used for milk clotting enzyme production.

Agitation (1 min/day) shows approximate 20% increase in production of enzyme. This may be because of metabolic heat produced within bed is regulated by agitation. Low moisture, poor thermal conductivity of the substrate result in poor heat transfer in SSF. Hence it is very difficult to maintain favorable temperature in the reactor. Thus water addition with intermittent mixing is favorable in SSF, which can be achieved in rotating drum bioreactor. Water activity could also drop due to build up of solutes such as glucose, amino acids etc. this could be prevented by spraying water on to the solid substrate coupled with mixing. The importance of evaporative cooling and moisture content of the substrate on the performance of SSF bioreactor has been highlighted in the literature of Nagal and Lonsane^[45,46] to control the rising temperature.

As speed of agitation increases production of enzyme decreases because more speed could damage fungal cultures as a consequence of the shear forces during mixing.

V. CONCLUSION

High milk clotting and lower proteolytic activities were found in the enzymatic extract obtained after 120 hr of solid state fermentation by *A. oryzae* NCIM 1032 using mixture of wheat bran and rice bran in the ratio of 7:3 as substrate. In present study laboratory rotating drum bioreactor was designed and operated, the maximum enzyme activities were obtained in agitated condition at speed of 25 rpm (1 min/day). Best results were reached in low agitation speed and minimum duration. This agitation shows approximate 20% of increase in production.

VI. FIGURES

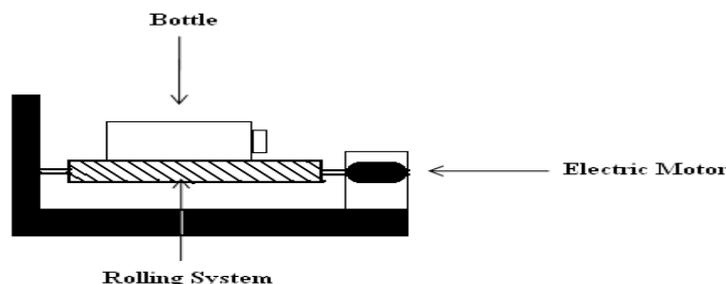


Figure 1: Laboratory scale rotating drum bioreactor.

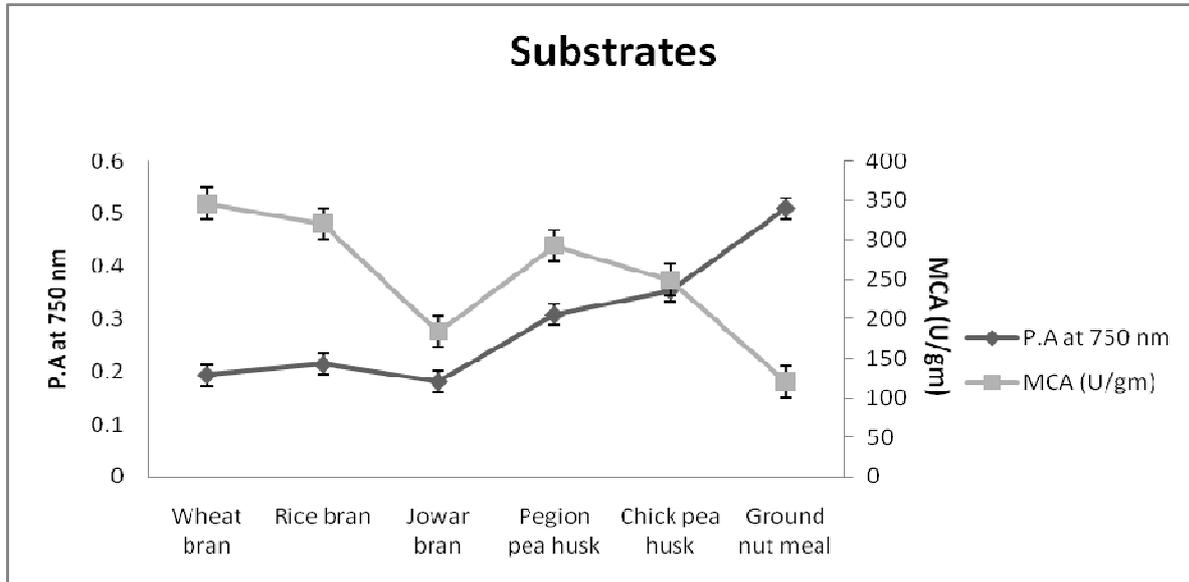


Figure 2: Production of milk clotting enzyme under SSF using different agri industrial wastes (Error bars represent standard deviations of three replicates.)

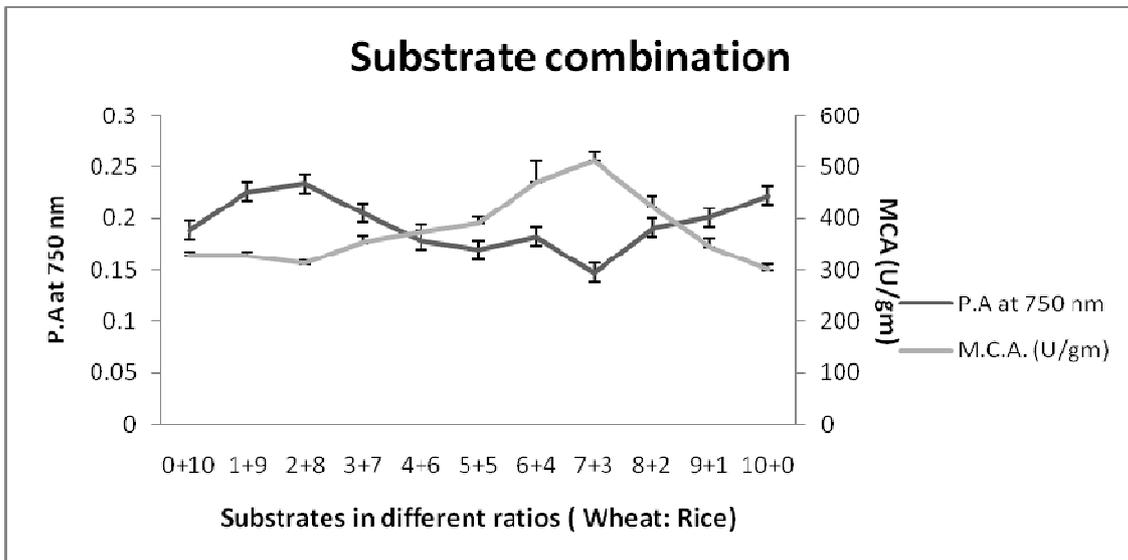


Figure 3 : Effect of substrate combination on milk clotting enzyme production under SSF. (Error bars represent standard deviations of three replicates.)

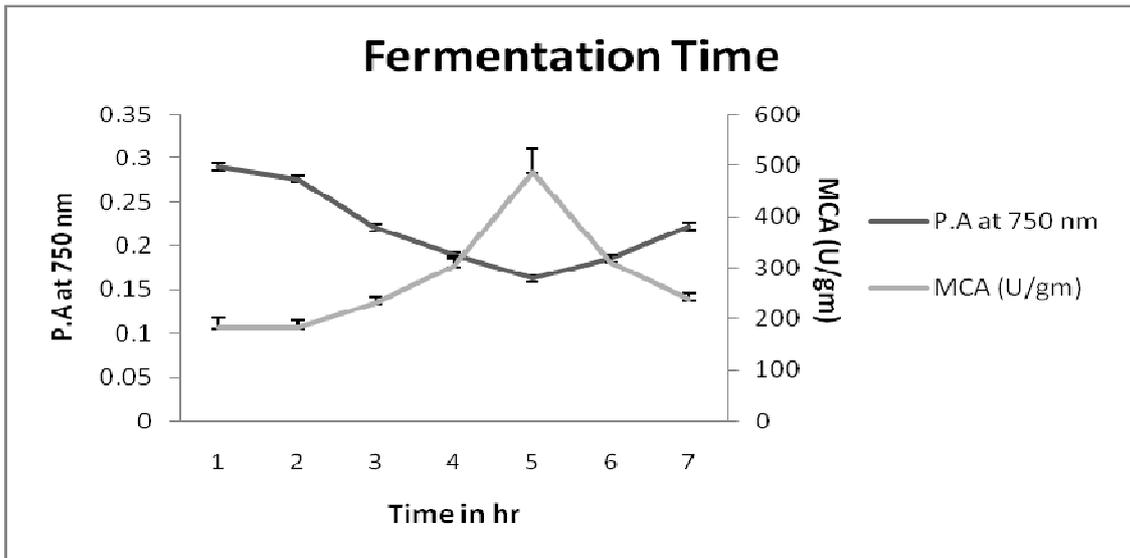


Figure 4 : Production of milk clotting enzyme under SSF at different intervals of time. (Error bars represent standard deviations of three replicates.)

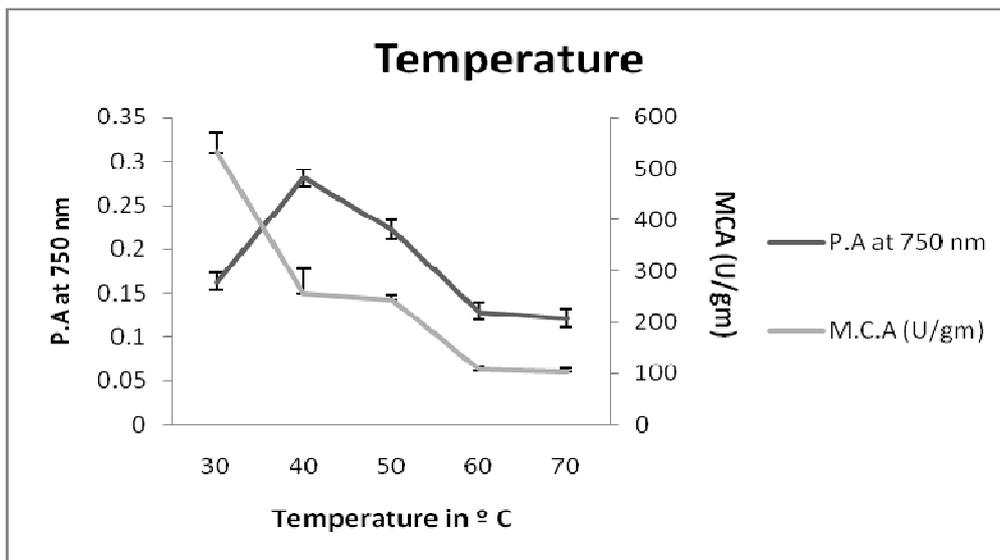


Figure 5: Effect of temperature on milk clotting enzyme production under SSF. (Error bars represent standard deviations of three replicates.)

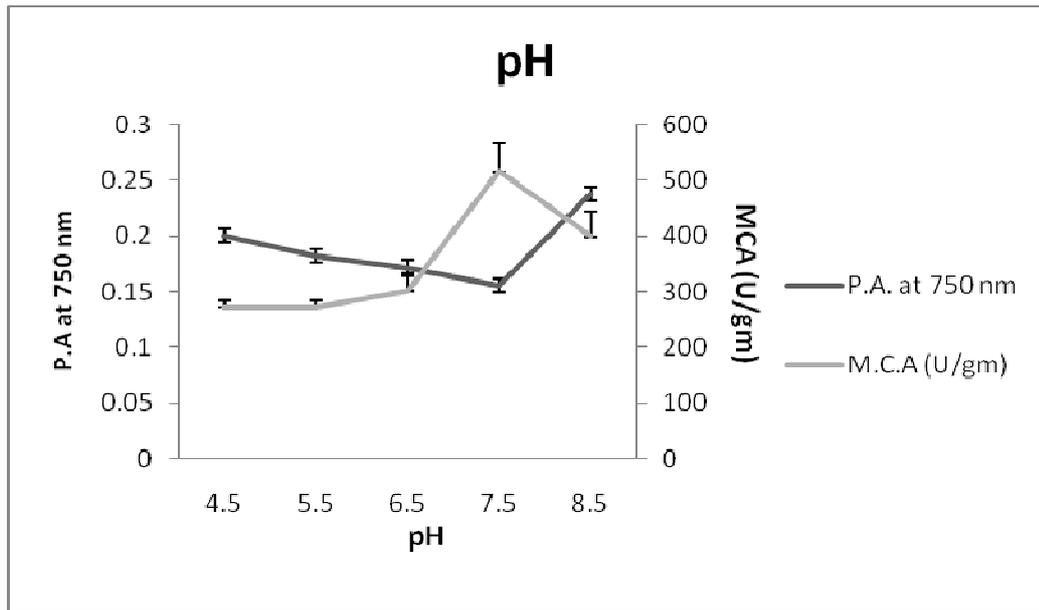


Figure 6: Effect of pH on milk clotting enzyme production under SSF
(Error bars represent standard deviations of three replicates.)

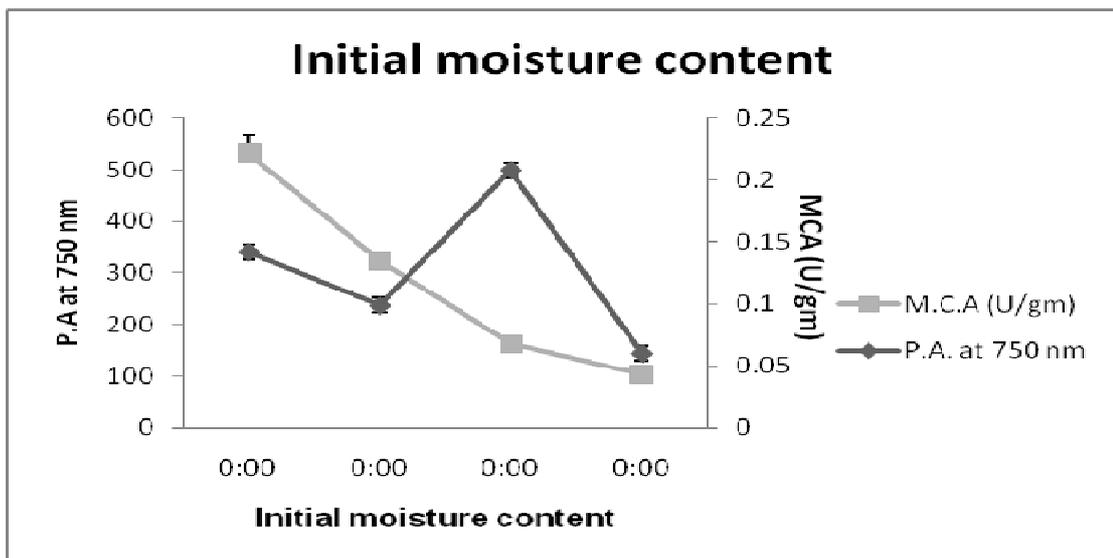


Figure 7: Effect of initial moisture content on milk clotting enzyme production under SSF.
(Error bars represent standard deviations of three replicates.)

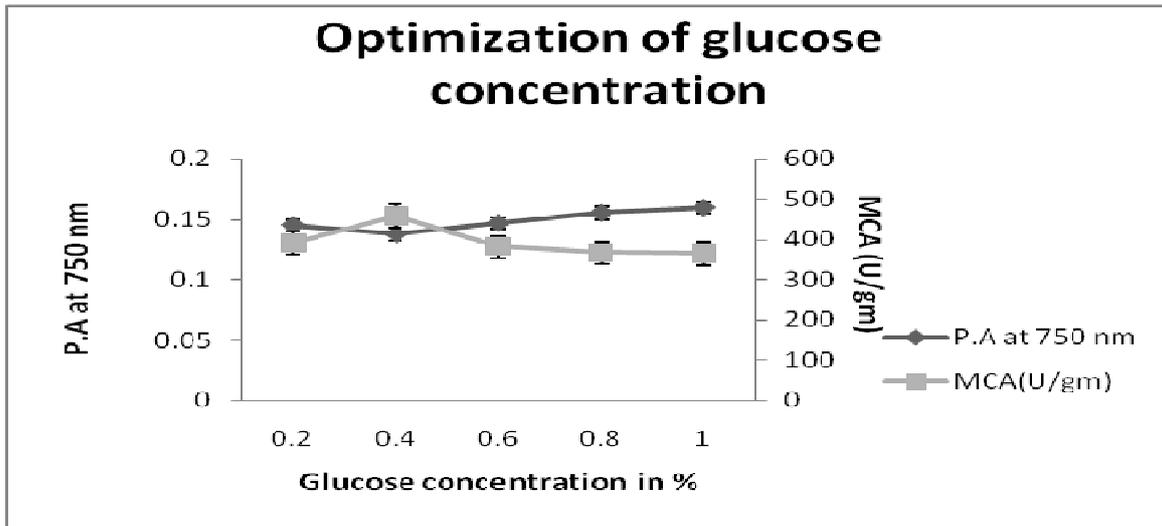


Figure 8: Effect of external Carbon sources on the production of milk clotting enzyme under SSF (Error bars represent standard deviations of three replicates.)

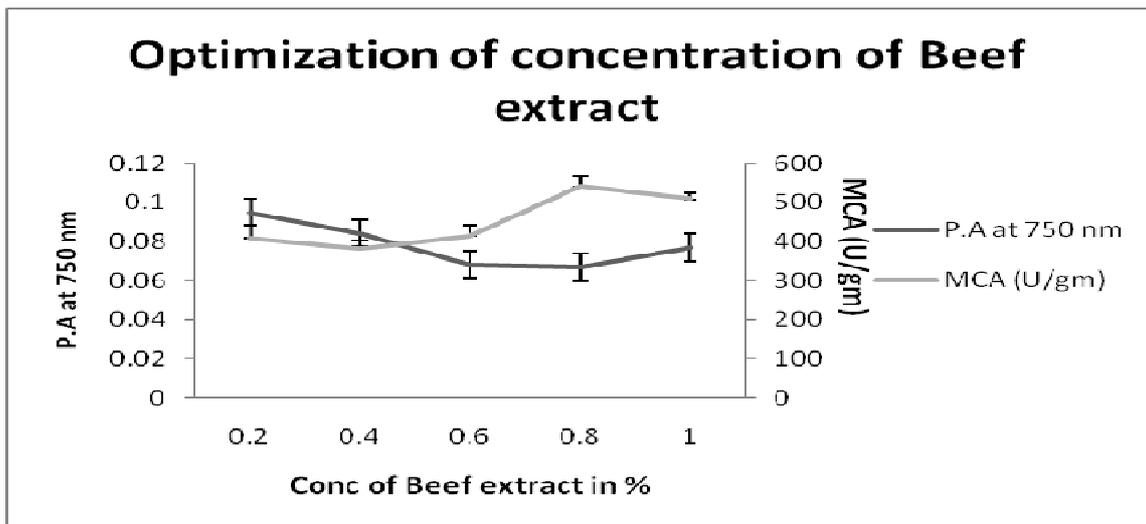


Figure 9: Effect of external Nitrogen sources on the production of milk clotting enzyme under SSF (Error bars represent standard deviations of three replicates.)

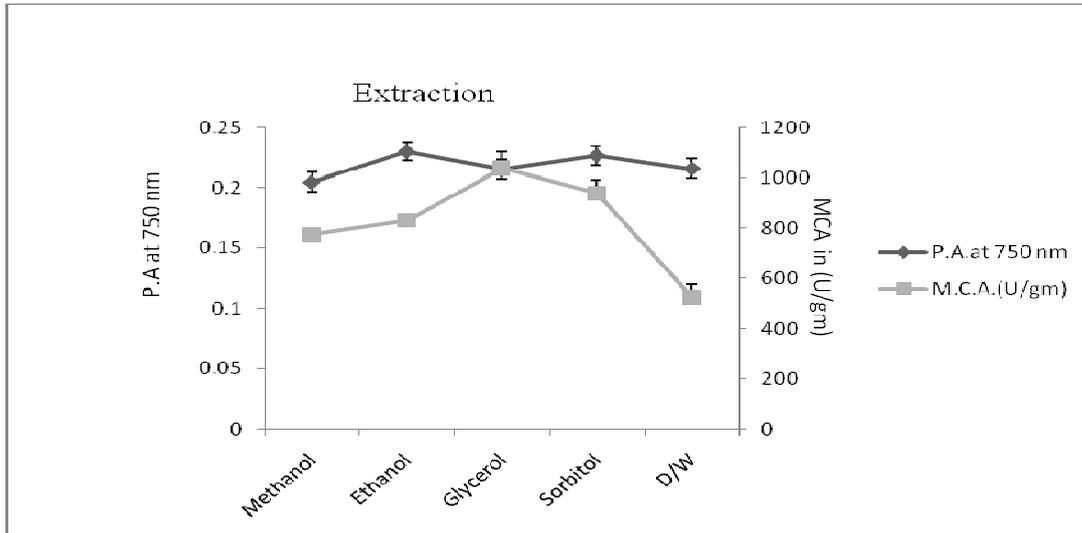


Figure 10: Effect of different organic solvents extraction of milk clotting enzyme under SSF (Error bars represent standard deviations of three replicates.)

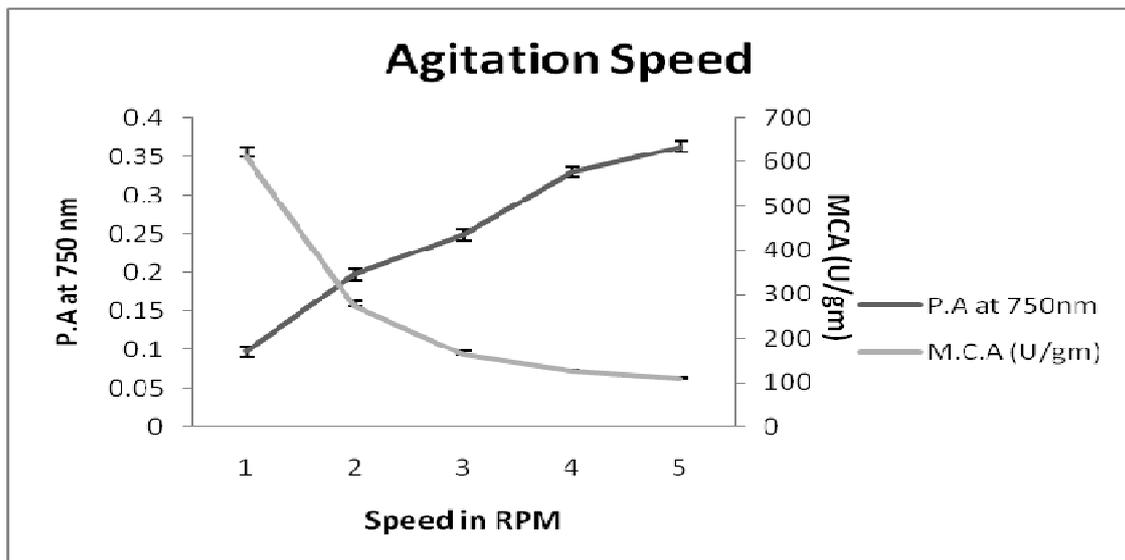


Figure 11: Effect of agitation speed on production of milk clotting enzyme under SSF. (Error bars represent standard deviations of three replicates.)

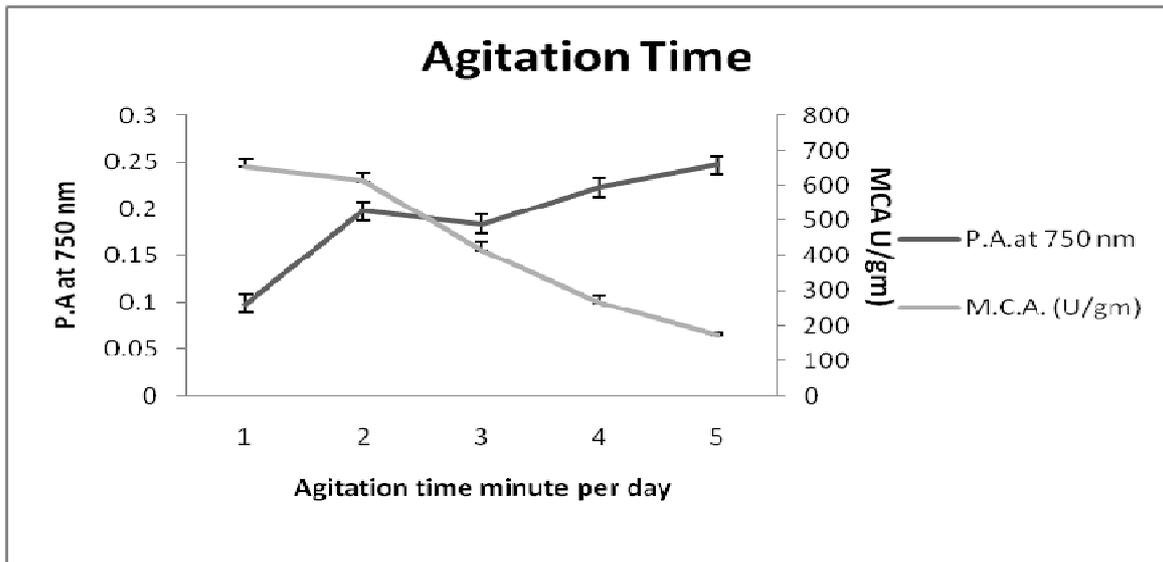


Figure 12: Effect of agitation time on production of milk clotting enzyme under SSF. (Error bars represent standard deviations of three replicates.)

VII. TABLES

**Table no 1:
 Effect of external Carbon sources on the production of milk clotting enzyme under SSF**

C sources	P.A. at 750 nm	M.C.A (U/gm)	Ratio
Maltose	0.147	394.8733 ± 9	2674
Glucose	0.134	435.1567 ± 16	3247
Sucrose	0.185	324.7633 ± 14	1755
Dextrose	0.221	351.3533 ± 16	1585
Starch	0.255	355.77 ± 20	1395

**Table no 2:
 Effect of external Nitrogen sources on the production of milk clotting enzyme under SSF**

N Soures	P.A at 750 nm	M.C.A. (U/gm)	Ratio(MCA/PA)
Beef extract	0.077	556.3933 ± 26	7163
Pepton	0.154	435.1567 ± 16	2831
Ammonium Nitrate	0.165	130.5333 ± 5	789
Ammonium Sulphate	0.205	108.74 ± 10	531
Potassium Nitrate	0.195	117.03 ± 6	600

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A Study of Creativity among Delinquent Children at Secondary Level in Meerut

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Abstract- This paper has emphasizes on various types Children specially juvenile delinquent Children often test the limits and boundaries set by their parents and other authority figures. Among adolescents some rebelliousness and experimentation is common. However a few children consistently participate in problematic behaviors that negatively affect their family academic social and personal functioning. This concept is in harmony with the modern democratic ideas which seek optimum development by providing suitable educational facilities to all children - the gifted; the emotionally, socially, educationally, maladjusted and physically & intellectually handicapped. I have taken special issues which are related to Juvenile delinquent children in society .In this study aims to find out difference among Juvenile delinquent children in relation to creativity. I have selected 80 sample of Juvenile delinquent children for Merrut and out of 80 (40 Boys and 40 Girls) were sample for the study The result showed that both Boys and Girls of Juvenile delinquent children having difference in the respect of Creativity, Fluency and Flexibly but author respect of Originality dimension, they don't have difference within groups. It means we can say that Girls Juvenile delinquent children have more Creative level than Boys Juvenile delinquent children of my study .So that we must be improve creative level of Boys Juvenile delinquent children with the help of various activities game and curriculum.

Index Terms- Juvenile Delinquent Children, Creativity

I. INTRODUCTION

Juvenile delinquency, also known as juvenile offending, or youth crime, is participation in illegal behavior by minors (juveniles) (individuals younger than the statutory age of majority).^[1] Most legal systems prescribe specific procedures for dealing with juveniles, such as juvenile detention centers, and courts. A juvenile delinquent is a person who is typically under the age of 18 and commits an act that otherwise would have been charged as a crime if they were an adult. Depending on the type and severity of the offense committed, it is possible for persons under 18 to be charged and tried as adults. In recent years, the average age for first arrest has dropped significantly, and younger boys and girls are committing crimes. Between 60-80% percent of adolescents, and pre-adolescents engage in some form of juvenile offense.^[2] These can range from status offenses (such as underage smoking), to property crimes and violent crimes. The percent of teens who offend is so high that it would seem to be a cause for worry. However, juvenile offending can be considered normative adolescent behavior.^[2] This is because

most teens tend to offend by committing non-violent crimes, only once or a few times, and only during adolescence. It is when adolescents offend repeatedly or violently that their offending is likely to continue beyond adolescence, and become increasingly violent. It is also likely that if this is the case, they began offending and displaying antisocial behavior even before reaching adolescence Juvenile delinquency, persistent antisocial, illegal, or criminal behavior by children or adolescents to the degree that it cannot be controlled or corrected by the parents. It endangers others in the community, and it becomes the concern of a law enforcement agency. Juvenile delinquency is not necessarily a trait of bipolar disorder, although it is possible for a person with bipolar disorder to act on impulse while experiencing an episode. To use Justins example, shop lifting, an adult in a manic episode may spend all of their money without thought or reason, where a child/youth may not have money to spend which may lead to shop lifting. In a manic episode Justin is right the lines between right and wrong can be blurred, thus the person suffering may make poor decisions and can find themselves in trouble with the law.

1.2-Justification of Study:- Children with Juvenile delinquency especially those a person who is typically under the age of 18 and commits an act that otherwise would have been charged as a crime if they were an adult. Depending on the type and severity of the offense committed, it is possible for persons under 18 to be charged and tried as adults. In recent years, the average age for first arrest has dropped significantly, and younger boys and girls are committing crimes In this democratic world all students should get equal opportunities for the development of their whole personality. It will be good ploy to provide opportunities to highly creative children because they are the wealth of the nation. Therefore; logically exceptional child should have equal opportunities like his/her normal counterparts. In society they are suffering many problem .So that's why I have selected this topic "A Study of Creativity among Delinquent Children at Secondary Level in Meerut" for the study"

I.3-STATEMENT OF THE PROBLEM:

A Study of Creativity among juvenile delinquent Children at Secondary Level in Meerut

1.3- Operational Definitions of Used Terms

1.3.1-Creativity- Creative is considered to be any writing, fiction, poetry, or non-fiction, that goes outside the bounds of normal professional, journalistic, academic, and technical forms of literature. Works which fall into this category include novels, epics, short stories, and poems. Writing for the screen and stage, screenwriting and playwriting respectively, typically have their

own programs of study, but fit under the creative writing category as well.

1.3.2- juvenile delinquent ‘Delinquency’ is a kind of abnormality. When an individual deviates from the course of normal social life, his behaviour is called "delinquency When a juvenile, below an age specified under a statute exhibits behaviour which may prove to be dangerous to society and/or to him he may be called a 'Juvenile delinquent' it means others word we can say Juvenile delinquents are those offenders including boys and girls who are normally under 16 years of age. A juvenile delinquent is a young person incorrigible, or habitually disobedient

1.3.3- Secondary Level The Secondary level education is like a bridge between elementary and higher education. It prepares young students between the age group of 14 and 18 for entry into higher education.

1.4-OBJECTIVES:

1. To compare the creativity of Boys and Girls juvenile delinquent Children at secondary level
2. To compare the Fluency of Boys and Girls juvenile delinquent Children at secondary level
3. To compare the Flexibility of Boys and Girls juvenile delinquent Children at secondary level
4. To compare the Originality of Boys and Girls juvenile delinquent Children at secondary level

1.5-HYPOTHESIS:

1. There is no significant difference between creativity of Boys and Girls juvenile delinquent Children at secondary level
2. There is no significant difference between Fluency of Boys and Girls juvenile delinquent Children at secondary level
3. There is no significant difference between the Flexibility of Boys and Girls juvenile delinquent Children at secondary level
4. There is no significant difference between Originality of Boys and Girls juvenile delinquent Children at secondary level

1.6-DELIMITATION OF THE STUDY:

1. This research work is limited to only up delinquent Children
2. The area of research was Meerut City
3. Only Secondary level has been selected for the study.

II. METHODS OF THE STUDY

In this study, to collect data the point to point contact survey method was employed. The detailed description of survey method has been below –

2.1.1-SAMPLE:

Sampling is the process by which a relatively small number of individuals or measures of individual’s objects or events is selected and analyzed in order to make some generalization

about the entire population from which it was selected. In this study random sampling technique is adopted for the selection of sample. Total 80 delinquent Children as sample has been collected for the study and 40 Boys and 40 Girls Delinquent Children were sample of the study.

III. ANALYSIS AND INTERPRETATION OF THE DATA

1. Comparison between Girls and Boys Delinquent children in relation to Creativity:

Table no 1

Delinquent Students	Number	Mean	SD	D/F	t- Value
Girls	40	44.6	21.1		2.48
Boys	40	35.4	10.5	78	

In table no 1, the values of Mean and SD of Creativity of Delinquent Children are given. These values are 44.6 & 35.4 and 21.1 & 10.5 respectively. The calculated value of ‘t’ is 2.48 which is greater than the table value of ‘t’ for degree of freedom 78 at .05 level of significance . On the basis of calculated and table value of ‘t’ the formulated null hypothesis has been rejected on 0.05 level of significance and concluded that significant difference is exists between the mean scores of creativity of Boys and Girls Delinquent Children. It means they have some differences within group.

2. A comparison between Girls and Boys Delinquent children in relation to Fluency

Table no-2

Delinquent Students	Number	Mean	SD	D/F	t- Value
Girls	40	18.9	8.08	78	2.62
Boys	40	15.00	4.55		

Table no. 2 indicate the values of Mean and SD towards fluency of Delinquent children. These values are 18.9, 15.0 and 8.08, 4.55 respectively. The calculated value of ‘t’ is 2.68 which is greater than the table value of ‘t’ for degree of freedom 78 at .05 and .01 both level of significance. In this way formulated null hypothesis has been rejected on .05 and .01 level of significance and concluded that significant difference has been existed between the mean scores of fluency of Boys and Girls Delinquent Children, which means they have some differences within the group.

3. A comparison between Girls and Boys Delinquent children in relation to THEIR Flexibility:

Table no-3

Delinquent Students	Number	Mean	SD	D/F	t- Value
Girls	40	17.1	7.34	78	2.88
Boys	40	13.3	4.07		

Table no. 3rd justify the Mean and SD of Flexibility of Delinquent children. The values of Mean of Girls and Boys children are 17.1 and 13.3 while the values of SD are 7.34 and 4.07 respectively. The calculated value of 't' is 2.88 which is greater than the table value of 't' for degree of freedom 78 at .05 and .01 both level of significance . On the basis of calculated and table value of 't' the formulated null hypothesis has been rejected on 0.05 and .01 level of significance and concluded that significant difference is exists between the mean scores of Flexibility of Boys and Girls Delinquent Children. It means that there are some differences between the flexibility of Girls and Boys Delinquent children.

4. A comparison between Girls and Boys Delinquent children in relation to Originality:

Table no-4

Delinquent Students	Number	Mean	SD	D/F	t-Value
Girls	40	8.68	6.66	78	1.37
Boys	40	7.10	2.98		

In table no 4th the values of Mean and SD of Originality of Delinquent Children are given. These values are 8.68, 7.10 and 6.66, 2.98 respectively. The calculated value of 't' is 1.37 which is lesser than the table value of 't' for degree of freedom 78 at .05 level of significance . So, on the basis of calculated and table value of 't' the formulated null hypothesis has been accepted on 0.05 level of significance and concluded that there is no significant difference between the mean scores of Originality of Boys and Girls Delinquent Children. In this way there is no difference within the group. Means more less they have same values regarding Originality.

IV. FINDINGS AND DISCUSSION

The major findings of the study of entitled **A Study of Creativity among juvenile delinquent Children at Secondary Level in Meerut** are as follows (regarding to formulate hypothesizes respectively):

1. Significant difference was found in the creativity of Boys juvenile delinquent Children were less creative than their Girls juvenile delinquent Children.
2. Significant difference was found in the area of Fluency of Girls juvenile delinquent Children were found more creative than Boys juvenile delinquent Children in this area.
3. Significant difference was found in the area of Flexibility of Girls juvenile delinquent Children were found more creative than Boys juvenile delinquent Children.
4. In the area of Originality, significant difference was not found between Boys juvenile delinquent Children and Girls juvenile delinquent Children. Girls' juvenile delinquent Children and Boys juvenile delinquent Children have more same Originality.

V. CONCLUSIONS AND SUGGESTIONS

In the present study researcher had kept null hypotheses that there will be no significant difference between Boys juvenile delinquent Children and Girls juvenile delinquent Children) with respect to Creativity covering all three dimensions like Fluency, Flexibility and Originality, since Creativity was examined on these three dimensions. From this study it was revealed that significant difference exists between Boys juvenile delinquent Children and Girls juvenile delinquent Children in relation to Creativity covering all three dimensions of it. This significant difference was point out towards the fact that Girls juvenile delinquents Children have more creativity than Boys juvenile delinquent Children.

VI. EDUCATIONAL IMPLICATIONS

Findings of study can help in education of Boys juvenile delinquent Children and Girls juvenile delinquent Children in the following ways:

1. This study throws light on deficit in creative thinking in Boys juvenile delinquent Children and Girls juvenile delinquent Children, so programs like creativity training can be employed to improve creativity of Boys juvenile delinquent Children .
2. This study indicates that lack in creative thinking can be a characteristic of Boys juvenile delinquent Children and Girls juvenile delinquent Children. Teachers must identify them and should take steps to increase their abilities to enhance their level of achievement.
3. Normal student can be given knowledge about their disabled counterparts and training about how to help these children in making them feel easy and improve their thinking.
4. The study will be very applicable for Society as well as family also
5. Without creativity any child nation cannot growth and specially those students associated with special education
6. My study will be applicable for Policy maker, teacher, school and researcher also.

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Population Increase and Deforestation: A Study in Kokrajhar District of Assam, India

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Abstract- Deforestation has emerged as one of the major concerns of the world community as significant environmental impacts are attributed to it. The plainly observed association between population increase and deforestation in most of the developing countries has deepened the concern on deforestation. An analysis on forest cover and population of Kokrajhar district of Assam in India over the period 1977-2007 revealed a strong inverse relationship between the two (correlation co-efficient = -0.99). Population growth rate was steadily decreasing in the district, while deforestation rate was found to fluctuate. During the period, the district lost 38% of its forest cover that existed in the beginning of the period. Despite of declining growth rate of population of the forest area, deforestation was taking place at an alarming rate. Estimation of forest cover of the district by the Forest Area Change Model of Food and Agricultural Organization indicated that if deforestation continues with the recent rate, and population growth rate remains more or less same, the district, in the next three decades, would loss 43.5% of its forest cover that was available in 2007. By the beginning of nineties of the current century, when the population density is expected to be about 492 per sq km, the vegetation of possible deforestable area of the district would be almost completely cleared. The results of the analysis were found to conform to FAO theories of deforestation. However, the association between population and deforestation was found to be weakened towards the last decade.

Index Terms- Deforestation, Deforestable, FAO, Forest area, Forest Area Change Model, Forest cover, Non-forest area, Population density.

I. INTRODUCTION

1.1 A varying relationship between population and deforestation

An assiduous debate on the role of population change in deforestation and forest degradation continues with one group considering population growth as the main cause of deforestation while the other group terming it as inconspicuous. Former group includes scholars like Mather, Needle, Robertson, Williams, Harrison, Palo, Litho and others; while in the later group Agrawal, Lohmann, Barraclough and Ghimire are prominent.

An inverse relationship between population and forest area had been recognized by the forest sector since two centuries or more [1]. From the studies on Scottish Highlands, Robertson opined that human population was adversary to the population of woods [2], an idea that was endorsed by Williams [3]. Allen and

Barnes found from their studies that deforestation was significantly related to the rate of population growth in 39 countries in Africa, Latin America, and Asia over the period 1968-78, and opined that population may be ascribed as a primary driver of deforestation in the developing world [4]. Similar conclusion was drawn by Harrison that population growth was responsible for 79 percent of global deforestation between 1973 and 1988 [5], while Palo and Lehto described population pressure as one of the universal underlying causes of pan-tropical deforestation [6]. Alves and Hogan observed a positive association between population size and deforestation in Ribeira valley [7]; positive correlations between demographic and forest variables was found to exist in parts of East Africa too [8, 8a]. Studies conducted by Cropper and Griffiths [9], Geist and Lambin [10], Carr *et al.* [11] were also led to the same conclusion. Hartwick opined that deforestation was not a consequence of population growth in some cases, but rather it had been a principle ingredient of population growth [12].

On the other hand, the other group opined that though association between population growth and deforestation was credible, there remained many understated questions pertaining to the pace of deforestation relative to population growth. Lohmann contended that the amount of land cleared in Thailand increased by around threefold, but its population only doubled over the period 1960-1985, and as such, forest colonization could not be convincingly explained by population growth [13]. Agrawal opined that the conclusion that population increase results in forest degradation would be an over-simplified only [14]. Barraclough and Ghimire also reached at the similar conclusion for situation in Tanzania [15].

Despite the fact that there exists an inverse relationship between population growth and deforestation, review of the situations has revealed that this relationship had weakened in the recent decades. For deforestation in wider South East Asia during 1970-80, Kummer and Turner obtained a bi-faceted result for the correlation between population and deforestation [16]. They found that coefficient of total population and deforestation in the region was only 0.05, suggesting that population change could not be termed as a major driver of deforestation; while on the other hand, the rural population bore a correlation coefficient of 0.20 to the deforestation, which supported a role for rural population growth in the deforestation process. Mather and Needle had revealed that relationship between population and deforestation underwent reversal in some countries during the later part of nineteenth century and beginning part of twentieth century [1].

During the course of Forest Resource Assessment (FRA) in 1990, an analysis, conducted by Food and Agricultural Organization (FAO) for statistical relationships between

observed forest area change and ancillary variables for tropical areas, demonstrated a significant relationship between forest cover and human population density. That result convinced the FAO to select population density as the independent variable of their algorithm developed to interpolate or project the change in forest cover [17].

Since more people results in more food and other agricultural products requirement, usually an inverse correlation may be expected between population density and forest cover. In order to meet their increased requirement for living, people have either to increase the output of lands currently under cultivation, or to expand the cultivated area. As the first one involves extra inputs such as fertilizer, pesticides etc., people are inclined to choose the second one, which is done at the cost of forests [17].

Still, a strong relationship between the processes of population growth and deforestation sometimes may not exist. Heilig emphasized that together with clearing land for basic food production, other human wants that may also affect upon the forest should also be taken into account [18]. Some of the human activities such as changing lifestyles, the use of the forest as a major revenue earner, etc. have a little or no concern with local population growth, while these may have significant contribution towards loss of forests. Based on this fact Marcoux (2000) opined that a given population density can cause different degrees of 'demographic pressure', and as such increases in population density and deforestation may not be proportional.

Thus, deforestation is a complex process, which is not governed by specific theory. Neither neo-Malthusian nor Boserupian theory has been able to explain it in a convincing way. It occurs on a local or regional level, but effects are global [18a]. Some studies at country or continent levels had established correlations between environment and demographic data, but their conclusions came with a recommendation that in order to explain such correlations it was important to work on a local level [19].

1.2 Quantification of deforestation

Deforestation has been defined in different senses by different organizations and researchers. According to Fearnside, it is the loss of original forest for temporary or permanent clearance of forest for other purposes [20], while Kaimowitz and Angelsen describe deforestation as a situation of complete long-term removal of tree cover [21]. For others, such as Collin, it entails permanent destruction of indigenous forests and woodlands [22]. Food and Agricultural Organization defines deforestation as the conversions of forest to another land use or the long-term reduction of the tree canopy cover below a minimum 10 percent threshold [23]. For the present study, by following the definition of FAO, deforestation has been defined as the quantity of degraded forest area possessing tree canopy density less than 10%.

1.3 Forest area, Forest cover and classes of forests in India

Forest Survey of India (FSI), an organization under the Ministry of Environment & Forests, Government of India, has been assessing forest cover of the country on a two-year cycle since 1987 and publishing the information through its "State of Forest Report" (SFR).

According to FSI, the term 'Forest Area' generally refers to all the geographic areas recorded as forest in government records and comprises Reserved Forests (RF) and Protected Forests (PF), which have been constituted under the provisions of Indian Forest Act, 1927. On the other hand, the term 'Forest Cover' refers to all lands more than one hectare in area, having a tree canopy density of more than 10%.

Thus, in the present study, population of forest area means population within the recorded forest area, irrespective of existence or non-existence of tree cover.

The Forest Survey of India (SFR 2009) has divided the forest cover of the country into following four classes –

Very dense forest- All lands with tree cover of canopy density of 70% and above

Moderately dense forest - All lands with tree cover of canopy density between 40% and 70%

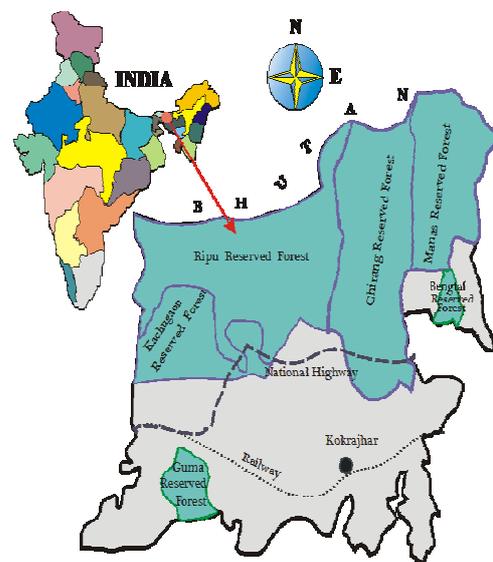
Open forest - All lands with tree cover of canopy density between 10% and 40%

Scrub- Degraded forest lands with canopy density less than 10%

II. STUDY AREA

2.1 Location

Assam is a state of India situated in the northeastern region and it lies in the tropical climate belt. Kokrajhar is one of the twenty-seven districts of Assam. The district occupies an area of 3169 sq. km. and it is bounded by 89°46' to 90°38' East Longitudes and 26°19' to 26°54' North Latitudes. The forest area constitutes a major part of the district, inhabitants of which are mainly tribal people- the *Bodos* and the *Adivasis*, with some migratory population of Nepalese origin. They are underprivileged, solely dependent on paddy cultivation and collection of forest products [24]. They were forest friendly, who used forest resources in their daily life to a subsistence level [25]. Notified forest area of the district is comprised of six reserved forests- Guma, Ripu, Kachugaon, Chirang, Bengtal and Manas (Figure 1).



Source: Department of Forests, Bokoled Territorial Council

Figure 1: Reserved forests of Kokrajhar [p.org](http://www.p.org)

2.2 Topography of forest area of Kokrajhar district

The main forest area of the district is a contiguous area and it lies along the northern tract of the district in the foothills of Bhutan kingdom. The forest reserves along this northern tract occupy an ancient alluvial plateau jutting out south from the Himalayan foothills. This plateau varies in elevation from about 300 ft to 900 ft in the north, near the foothills, to as low as only a few feet above the low-level cultivation land in the south. The entire forest can be divided into two terrains- the **Bhabar** and the **Terai**. The Bhabar terrain extends for a breadth of 12 to 15 kilometers from the border of Bhutan kingdom and is waterless throughout the year except for the monsoon period. The water table in the Bhabar tract is very low due to deep layers of deposited boulders and this tract is extremely porous. Numerous rivers flow through the forest tract in a southerly direction. These rivers remain waterless in the ‘Bhabar’ tract and emerge as perennial streams in the southern ‘Terai’ tract. The ‘Terai’ tract of the Reserves extends over a maximum width of 8 to 10 kilometers south of the ‘Bhabar’ tract [25].

III. AIMS AND OBJECTIVES

The study aims at prognosticating the deforestation of Kokrajhar district based on the deforestation scenario over the last three decades from 1977 to 2007. The study intends at examining the relationship between population increase and deforestation in the district and then to apply Forest Area Change Model, developed by Forestry Information System (FORIS) of Food and Agricultural Organization (FAO), to project the future forest cover from the perspective of population growth. Furthermore, it is also intended to inspect if the results thus obtained were in conformity with theoretical concepts of FAO on deforestation.

IV. MATERIALS AND METHODS

4.1 Population of the district

Populations of the district in different years were obtained from the General Population Census Report of Government of India, which is conducted every 10 years. Population figures for an intercensal year were estimated by the formula (Appendix A):

$$P_i = P_0 + \frac{n}{N}(P_1 - P_0) \tag{1}$$

Populations of notified forest area in different years were extracted from the same census reports. Table 1 shows the population of the entire district and its forest area since 1951.

Table 1: Population of Kokrajhar district and its forest area

Year	District Population	Forest Area Population
1951	202,516	31,673
1961	296,574	44,483
1971	457,554	75,333
1981	633,142	137,545
1991	808,730	199,754
2001	905,764	211,535

4.2 Forest cover of the district

Although the SFR started providing district wise forest cover from its 1991 assessment, independent figure for Kokrajhar district was not available until SFR 1999. The forest covers of the district in different assessments were as in **Table 2** [26].

The forest cover data of Kokrajhar district, provided by FSI, was not adequate to envisage the near future scenario of deforestation in the district as it covered only a small period of ten years. Therefore, four different satellite images- Landsat MSS Satellite Imagery of December 8, 1977, Landsat TM Satellite Imagery of December 14, 1987, Landsat MSS Satellite Imagery of December 14, 1997 and IRS P6 LISS III Satellite Imagery of November 17, 2007 were used to assess and analyze the deforestation situation of the district over the period 1977 - 2007. The assessments were carried out in the very dense forest, moderately dense forest, open forest, and scrub forest cover classes, which are the units for delineating forest cover followed by FSI (SFR 2009). **Table 3** shows the forest covers of the district obtained from these images for the last three decades from 1977 to 2007.

Table 2: Forest cover of Kokrajhar district as per SFR (in sq. km.)

Year	Forest cover	PC of Geog. area
1999	1630	51.44
2001	1364	43.04
2003	1183	37.33
2005	1183	37.33
2007	1163	36.70
2009	1144	36.10

4.3 Deforestation rate

Deforestation rate for a given period was evaluated using the following formula given by Armenteras *et al.* [27].

$$Deforestation\ rate = \frac{(\log F_{t1} - \log F_{t2}) \times 100}{t2 - t1} \tag{2}$$

where 't1' and 't2' indicate time-1 and time-2 respectively and F_{t1} and F_{t2} are the corresponding forest covers.

Table 3: Class wise forest cover of Kokrajhar district obtained from satellite images (in sq km)

Year	Very dense forest	Moderately dense forest	Open forest	Scrub forest	Non-forest
1977	872.00	539.70	410.87	485.39	860.77
1987	721.96	410.59	336.90	469.64	1229.91
1997	661.92	385.45	310.58	425.36	1385.69
2007	464.25	367.84	297.72	387.21	1651.98

4.4 Base work

The work by Walter Antonio Marzoli on application of Forest Area Change Model to Calakmul and Meseta Purépecha regions in Mexico had been used as a base for the current study [28].

4.5 The Forest Area Change Model

In this model, firstly, the forest cover is expressed as the percent of total land area of the geographic unit under consideration and is considered as dependent variable. Then taking the associated population density, stratified by ecological zones, as independent variable, a logistic model is used to relate these two variables. Lastly, the model simulates the loss in forest cover using projected human population for the area in question (Marzoli, 2003).

The equation of the general model is given by-

$$\frac{dy}{dp} = ay^b - cy \tag{3}$$

where $\frac{dy}{dp}$ and P are respectively dependent and independent variables and a, b, c are model parameters. The variable P used in the model was defined as-

$$p = \log(1 + \text{population density})$$

which accommodated the idea of avoiding negative values that may result for geographic units having population density less than 1 per square kilometer.

Besides the parameters mentioned above, the model involves two more implicit parameters, which are symbolized as dm and y_m .

These parameters are defined in the following way –

dm = maximum level of non-forest increase per unit population increase

$\frac{dy}{dp}$, it represents the derivative maximum of $\frac{dy}{dp}$, and

y_m = maximum possible deforestable area of the region, it represents the asymptotic value of y , where an increasing level of population has no effect on forest cover which remains stable in time.

With the help of these implicit parameters, physical interpretation of the model variables and parameters may be given as below-

$$y = \frac{\text{Total area} - \text{Forest area}}{\text{Total area}} \times 100$$

$\frac{dy}{dp}$: the ratio between population change and forest area change

a : a function of bioclimatic parameters that is determined by dm .

b : a function related to the non-forest percent value where the derivative reaches its maximum and the ratio $\frac{dy}{dp}$ starts to decrease.

c : a function related with accessibility, both physical and legal, of the forest resources; and to land suitability of forest areas for transfer to other land uses.

From stepwise statistical investigation, FAO found that a combination of ecological zones, expressed as percentage of total land area, was significantly correlated to dm . Hence the value of dm was evaluated by awarding weights to different ecological zones. The ecological components interpreted in the general model was meant to be valid at global level where local deviations are expected to be balanced at continental or global level. As such, while working at local level, the model predictions are required to be calibrated keeping the specific socio-economic conditions of the region in concern into account; and the model has provided a specific procedure, called 'local fit' for estimating dm in this case. The guiding equation for estimating dm with this technique is:

$$dm = \frac{dy}{dp} \times \frac{y_m^b \times \left(b^{\frac{1}{1-b}}\right) \times \left(\frac{1}{b} - 1\right)}{y^b - y \times y_m^{b-1}} \tag{4}$$

by which, once the general model parameters for a small geographic unit are known, the value of dm may be calculated as a function of dy, dp, y, y_m and b .

On the other hand, from the statistical analysis, it was found that the parameter b was rather constant across different geographic regions and continents with a value of 0.98. So it was considered as a constant in the model formulation.

The value of y_m was kept at a constant of 100% level in the general model. However, it was opined that a value of less than 100% could also be estimated for it if local conditions suggested that for population growing to infinity deforestation would never

reach 100% in the geographic unit in concern due to various factors such as physical constraints, legal constraints etc.

Following relationships may be established among various parameters involved in the model (Appendix B) -

$$y_m = \left| \frac{a}{c} \right|^{\frac{1}{1-b}}, \quad a = \frac{1}{1-b} \times \frac{dm}{y_m^b} \times \frac{1}{b^{\frac{1}{1-b}}},$$

$$c = \frac{1}{1-b} \times \frac{dm}{y_m} \times \frac{1}{b^{\frac{1}{1-b}}}$$

Kokrajhar district covers a small geographical area and lies within one ecological zone. Furthermore, when at least two reliable estimates of population and forest cover of a geographical unit in time are known, the quantities dp , dy and y may be calculated. For the present study, estimates of population and forest cover, both are available from population census and satellite imagery analysis. In addition, the value of y_m may be estimated for the district considering its physical conditions. Hence, the technique (4) can be applied to estimate the value of dm ; and finally, the Forest Area Change Model can be applied for estimation of future forest covers of the district.

4.6 Population projection of the district

Based on the growth trends of the population of the district given in **Table 1**, the population of the district was projected by using the decreasing growth model (Appendix C):

$$P_f = S - (S - P_b)e^{-Kt}$$

4.7 Estimation of forest area change model parameters for the district

Value of y_m : The Bhabar tract of the forest of the district extends to a width of 15.54 km from the Bhutan boarder. This tract is suitable neither for human settlement nor agricultural purposes as water level is at a great depth from the surface. Some parts of this area remain inaccessible even these days. In this circumstance, a minimum of 5 km of forest area along Indo-Bhutan international boundary is expected to remain forested forever. Hence, maximum non-forestable area is less than 100%

for the district. Considering all physical constraints the maximum non-forestable area was estimated at 92.881%, i.e., $y_m = 92.88\%$.

Value of y :

Total geographical area of the district = 3169 sq km

Forest cover for the year 2007 = 1129.81sq km

Percentage of forest cover (fd) = 35.65%,

$y = 100 - fd = 64.35$

Values of dy and dp were obtained as 7.20 and 0.12 respectively.

$$\frac{dy}{dp}$$

Thus, $\frac{dy}{dp} = 61.76$.

The parameter b is constant and $b = 0.98$

Consequently, with above relevant values it was found that

$dm = 89.93$, $a = 142.63$, $c = 130.27$ (Appendix D)

V. RESULTS AND DISCUSSION

5.1 Correlation between population and forest cover

The forest covers and populations of the whole district and forest area since 1977 were as in **Table 4**.

The forest cover of the district bore negatively strong correlations with both the population of the district and the population of forest area (coefficients were -0.990

Table 4: Forest covers and populations of Kokrajhar district and its forest area

Year	Forest Cover	Population (District)	Population (Forest Area)
1977	1822.57	562907	112659
1987	1469.45	738495	174870
1997	1357.95	866950	206823
2007	1129.81	976489	243142

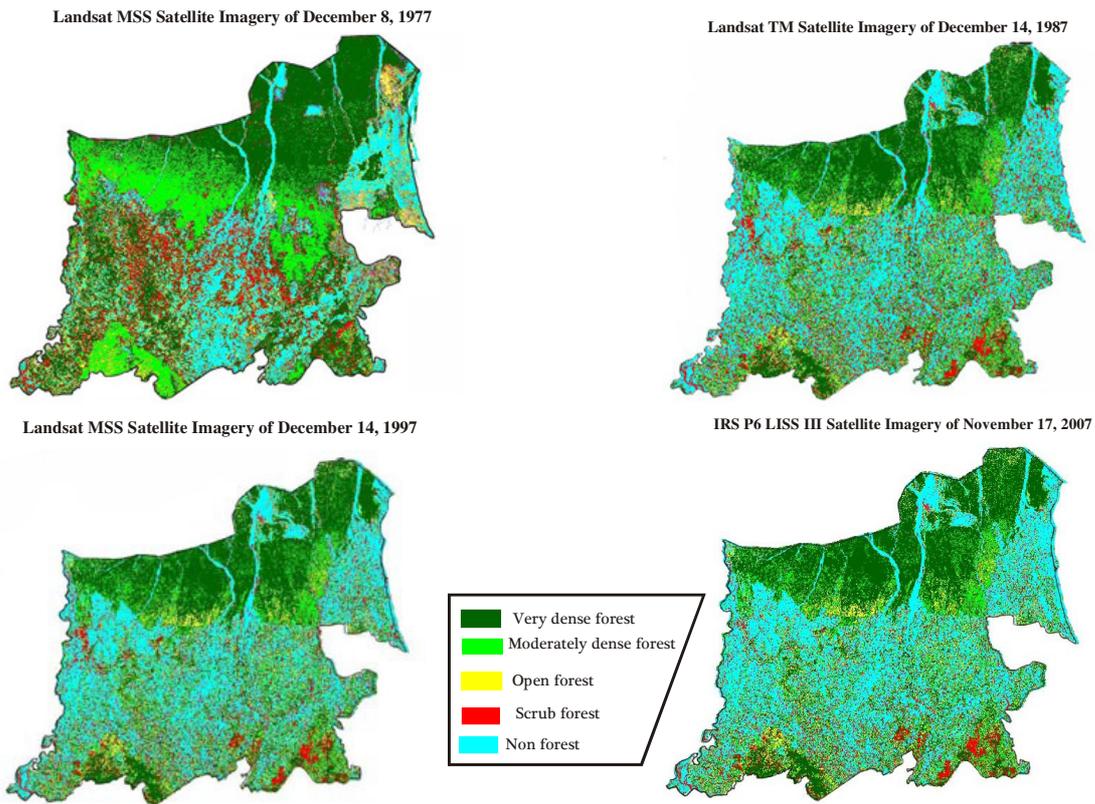


Figure 2: Satellite images indicating forest covers of Kokrajhar district

and -0.997 respectively). Thus, there existed an inverse relationship between the population and forest cover of the district.

5.2 Deforestation of the district

During the last three decades over 1977 to 2007, there was a reduction of 692.76 sq km of forest cover of the district, which was about 38% of the total forest area available in 1977. During the decade of 1977-1987, deforestation was the highest so as to loss a large forest cover of 353.41 sq km. However, during the middle decade of 1987-1997, there was a sudden decline in

deforestation, losing an area of 111.5 sq km of forest. Then during the last decade of 1997-2007, the deforestation rose up again and deforestation of 228.16 sq km occurred. **Figure 2** shows the satellite images of forest covers of the district in 1977, 1987, 1997 and 2007.

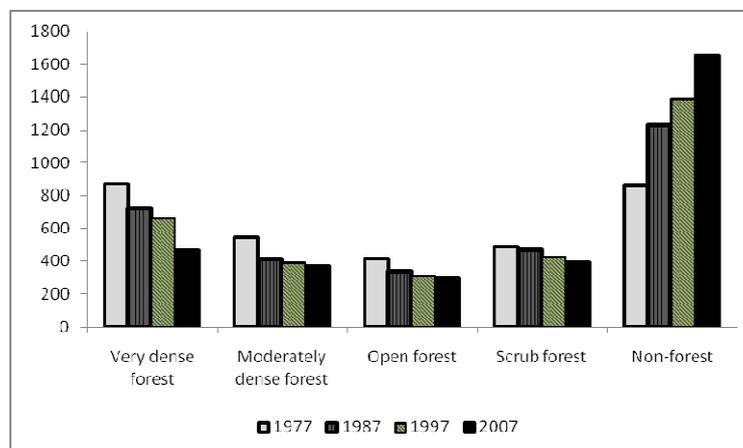


Figure 3: Class wise forest cover change of Kokrajhar district

During the study period, very dense class of forest suffered maximum loss (46.76%), followed by moderately dense forest (31.84%) and open forest (27.54%). There was a decrease of 20.28% in scrub forest. The absolute non-forested area was increased by 91.92% in the period. This suggested that deforested lands were being converted for use in other purposes. **Figure 3** shows the class wise changes in forest cover of the district during the period.

The rate of deforestation during the three decades 1977-1987, 1987-1997 and 1997-2007 were 2.15, 0.79 and 1.84 respectively. The mean rate of change in dense forest was 1.76 ± 0.85 . Thus, deforestation situation in Kokrajhar district was less alarming than the deforestation in Nawarangpur district of Orissa in India, where change rates of dense forest were 3.62 and 3.97 during the periods 1973 – 1990 and 1990 – 2004 respectively [29]. However, the deforestation situation was worse than that of Western Ghats in India, where there was a loss of 25.6 % of total forest cover and 19.5% of dense forest over the twenty-four years from 1973 to 1995 [30]. The deforestation scenario was seemed almost similar to that of the nearby district Sonitpur of the same state [31].

5.3 Trend of population growth

Annual growth rate of population of forest area was initially lower than that of the whole district. However, during the intermediate period from 1971 to 1991, it rose up and remained higher than the district's population growth rate. Again, in 2001, population growth rate of forest area went below the annual growth rate of the district's population growth rate. Over the period 1951-2001, the mean annual growth rate population of the forest area was 3.89 ± 2.17 , while that of the district's population was 3.05 ± 1.29 . **Figure 4** shows the trend of growth rate of the populations of the district and its forest area. Correlation between population growth rate and deforestation rate was positive but weak (coefficient was 0.48).

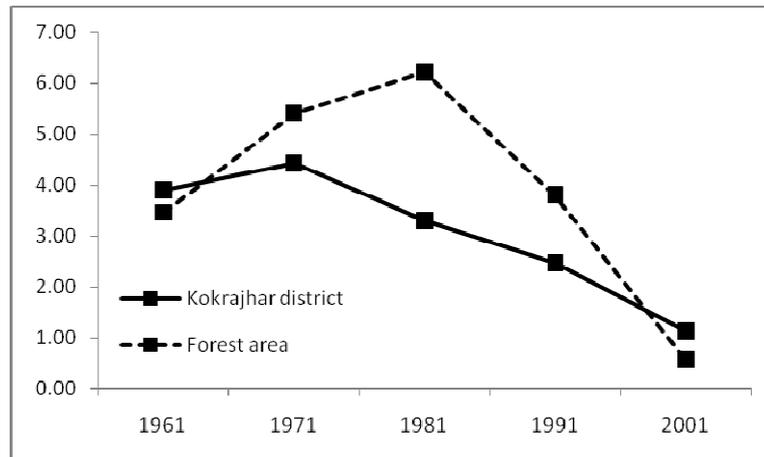


Figure 4: Annual growth rates of populations of Kokrajhar district and its forest area

5.4 Projected forest covers of the district

The future forest covers of the district projected by applying Forest Area Change Model were as in **Table 5**.

Table 5: Projected forest covers of Kokrajhar district

Year	Population	Population density	Non-forested area (%)	Forest Cover	Deforestation in successive periods	Deforestation rate in successive periods
2007	976,489	308	64.35	1129.81	-	-
2012	1,031,404	325	67.63	1025.83	103.98	1.93
2017	1,082,905	342	70.74	927.13	98.70	2.02
2022	1,131,204	357	73.37	844.03	83.10	1.88
2027	1,176,500	371	75.72	769.55	74.48	1.85

2032	1,218,979	385	77.98	697.82	71.73	1.96
2037	1,258,817	397	79.86	638.38	59.44	1.78
2042	1,296,178	409	81.68	580.70	57.67	1.89
2047	1,331,217	420	83.30	529.30	51.40	1.85
2052	1,364,076	430	84.74	483.72	45.58	1.80
2057	1,394,892	440	86.14	439.19	44.53	1.93
2090	1,555,423	491	92.85	226.71	212.47	2.00
2092	1,563,137	493	93.09	218.84	7.88	1.77

The projected figures indicated that after three decades from the base year 2007, in 2037, the forest cover of the district would reduce to 638.38, which amounts a loss of 43.5% of forest cover that was available in 2007. The deforestation was found gradually slowing down through time while population was steadily increasing. When the population density is expected to go up 491 per sq km in 2090, the non-forested area would be 92.85% of the total geographical area of the district, which is very close to the value of y_m .

5.5 FAO theories of deforestation

According to FAO (Marzoli, 2003) -

- 1) Deforestation increases relatively slow at initial stages, much faster at intermediate stages, and slow down at final stages.
- 2) Rate of deforestation starts to decline after non-forest area expands to 38% of maximum possible non-forest area.
- 3) Forest change approaches zero at various non-forest levels between 70 and 100%.
- 4) Forests of the maximum possible non-forest area would be cleared when the population density approaches 500 per sq km.

5.6 Trend of deforestation

Deforestation started in Kokrajhar district during the second quarter of the twentieth century when villages were established by the government within and nearby the forests in order to ensure labors for commercial exploitation of forests. Deforestation of the district was not concerning one until 1972, but afterwards deforestation occurred at fast rate [32]. Deforestation of the decade 1997-2007 was considerably lower than that of the 1977-1987 decade. In addition, the projected forest covers indicate that deforestation would slow down in the next decades. Thus, deforestation was slower at initial stage,

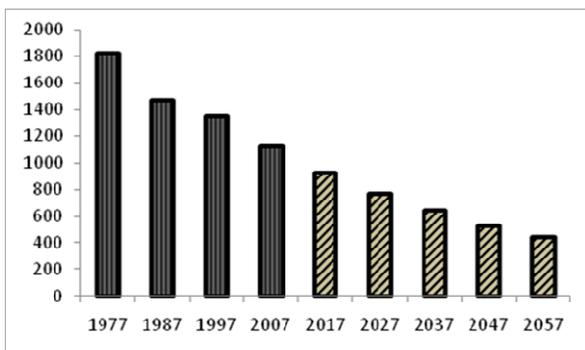


Figure 5: Estimated and projected forest covers of

faster at intermediate stage and slowing down in later stages. The estimated and projected forest covers of the district since 1977 to 2057 was as in **Figure 5**.

For the district, if scrub forest is considered as non-forest due to adopted definition, the non-forested area crossed the value of 38% of maximum possible non-forest area (1107.88 sq km) earlier than 1977. However, if scrub forest is not considered as non-forest, this value was crossed during the period 1977-1987. Deforestations of the decades of 1987-1997 & 1997-2007, together with projected deforestations indicate that deforestation rate has acquired a declining trend.

The SFR of last two assessments of FSI (Table 2), reveal that areas of 20 and 19 sq km were deforested at an interval of two years. Projected deforestation shows that when non-forested area approaches its maximum expandable area, there would be a deforestation of 7 sq km of area in two years during 1990-1992, which is much lower than the current deforestation rate.

5.7 Forest cover - population density correspondence

There seems a consistent declining in the per capita availability of forest area in the district, the per capita availability of forest cover in the years 1977, 1987, 1997 and 2007 being 0.32, 0.20, 0.16 and 0.12 hectares respectively. Current per capita forest cover of the district remains higher than that of India's 0.064 hectares. As per projection, in 2037, after three decades from the base year 2007, the per capita availability of forest cover would be minimized to 0.05 hectares; while in 2090, when maximum possible deforestable area would be almost completely deforested, it would remain at approximately 0.02 hectares.

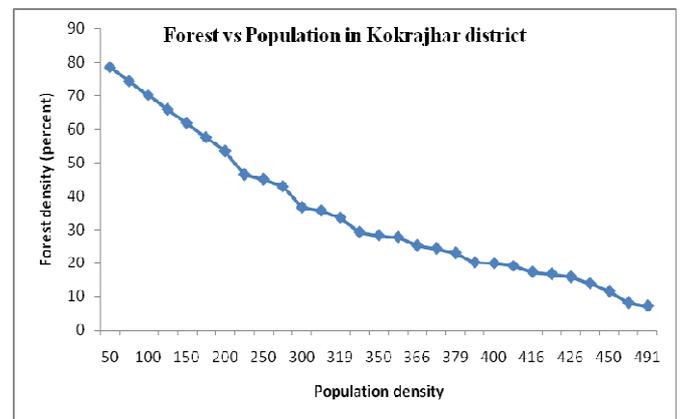


Figure 6: Forest cover - population density correspondence in Kokrajhar district

Projection of forest cover of Kokrajhar district by forest area change model indicates that by the time the maximum possible deforestable area of the district is converted into non-forest, the population density of the district would be approximately 492 per sq km. This is very close to population density of 500 per sq km. **Figure 6** shows the estimated and projected population density-forest cover correspondence in the district.

The discussions in 5.6 and 5.7 lead to a conclusion that the results of the analysis conform to all the FAO theories of deforestation almost in toto, except the third one. However, from the continuously declining deforestation rate point of view, the result of the analysis concerning the third theory also carries the same sense as the FAO theory.

VI. CONCLUSION

Through this work, deforestation of Kokrajhar district has been analyzed from the perspective of association between

population increase and change in forest cover. The findings endorse that the recent trend of direct population-deforestation linkages in developing countries was prevailing in Kokrajhar district too, and that population increase remains to be a primary factor of deforestation. The results of the analysis comply with basic underlying FAO theories of deforestation. Thus, deforestation of a small geographic unit may be well explained by applying FAO Forest Area Change Model in the line of FAO theories of deforestation.

Despite declining trend of population growth rate, deforestation was occurring at high rate. This suggested that along with population increase there are some other significant factors, which are contributing towards deforestation of the district. Therefore, a study on other demographic and socio-economic factors that may contribute towards deforestation is deemed necessary for understanding causes of deforestation in a better way and then to adopt effective measures in order to control deforestation of the district.

VII. APPENDICES

A. Population of intercensal year

In the formula-

$$P_t = P_0 + \frac{n}{N}(P_1 - P_0)$$

P_t = Estimated population at time t , P_0 = Population in the previous census,
 P_1 = Population in the succeeding census, N = Number of years between the censuses,
 n = Number of years between the given year and the previous census year

B. Relationship between parameters

Integration of the differential equation (3) leads to the *Chapman-Richards function* of the form-

$$y = A_0 \left(1 - B_0 e^{-C_0 p}\right)^d \tag{B.1}$$

The equation (B.1) is called the *State model* of the Forest Area Change model. This function gives the estimated forest area for a given population density level.

The parameters of the state model (B.1) are given by-

$$A_0 = \left|\frac{a}{c}\right|^{\frac{1}{1-b}}, \quad B_0 = \left[1 - \frac{y_0^{1-b}}{\frac{a}{c}}\right] = \frac{\frac{a}{c} - y_0^{1-b}}{\frac{a}{c}}, \quad C_0 = c(1-b), \quad d = \frac{1}{1-b} \tag{B.2}$$

$y_0 = y(p_0) =$ non-forested area when population density(p) = 0

a , b and c are parameters of the change model.

Since y_m is the maximum possible deforestation, and asymptotic size of y as $p \rightarrow \infty$, the state model (B.1) gives [33] -

$$y_m = A_0 = \left|\frac{a}{c}\right|^{\frac{1}{1-b}} \tag{B.3}; \text{ which in turn, gives } c = \frac{a}{y_m^{1-b}} = a \times y_m^{b-1} \tag{B.4}$$

Now, according to the model structure, a is determined by dm . In addition-

$$dm = \left[\frac{dy}{dp} \right]_{\max}$$

If y_i be the value of y for which the derivative function (3) is maximum, then-

$$\frac{d^2y}{dp^2} = 0 \quad \text{(B.5), and the second order derivative of equation (3) is-}$$

$$\frac{d^2y}{dp^2} = c \frac{dy}{dp} \left(b \frac{a}{c} y^{b-1} - 1 \right) \quad \text{(B.6)}$$

If there is a population P_i , such that equation (B.6) equals to zero, then -

$$y_i = \left[b \frac{a}{c} \right]^{\frac{1}{1-b}} \quad \text{(B.7).}$$

Thus-

$$\left[\frac{dy}{dp} \right]_{\max} = ay_i^b - cy_i \quad \text{i.e.} \quad dm = ay_i^b - cy_i \quad \text{(B.8)}$$

Using (B.7) and then (B.4) in (B.8), it may be obtained that-

$$dm = ab^{\frac{b}{1-b}} y_m^b (1-b)$$

$$a = \frac{1}{1-b} \times \frac{dm}{y_m^b} \times \frac{1}{b^{\frac{b}{1-b}}} \quad \text{(B.9)}$$

Thus,

$$c = \frac{1}{1-b} \times \frac{dm}{y_m} \times \frac{1}{b^{\frac{b}{1-b}}} \quad \text{(B.10)}$$

Then (B.4) gives -

C. Population projection of the district

Based on the growth trends of the population of the district given in **Table 1**, the population of the district has been projected by using the decreasing growth model -

$$P_f = S - (S - P_b)e^{-Kt}$$

where P_f =future population, S = saturation population,

P_b =base population (start of projection)

P_0 = initial population (in the applicable decelerating growth period)

t_f = future year (end of projection) , t_b = base year (start of projection)

t_0 = initial year (earliest year in the applicable decelerating growth period)

$$K = \frac{-\ln\left(\frac{S - P_b}{S - P_0}\right)}{t_b - t_0}$$

$t = t_f - t_b$ = no. of years from base year upto projected year

Saturation population of the district was obtained by the formula-

$$S = \frac{\frac{1}{N_1} + \frac{1}{N_3} - \frac{2}{N_2}}{\frac{1}{N_1 N_3} - \frac{1}{N_2^2}}$$

where N_1 , N_2 and N_3 are populations of the district at times t_1 , t_2 and $2t_2 - t_1$ respectively [34], and was estimated at 1,859,708.

D. Estimation of forest area change model parameters

The maximum non-forestable area (y_m) has been estimated in the following way.

Total length of Bhabar tract = 45.12 km; Width of Bhabar tract = 15.54 km; Width of area unsuitable for dwelling = 15.54 km; Width of Inaccessible forest area = 5 km (say), Total inaccessible forest area = 225.6 km, Total geographical area of the district = 3169 sq km. Maximum possible non-forested area = 2943.4 sq km, i.e. $y_m = 92.88\%$

Value of dy :

Total Geographical Area (sq km)	Forest Area (sq km)		fd1	y_1	fd2	y_2	dy
	1997	2007	[% of 1997]	[100-fd1]	[% of 2007]	[100-fd2]	[$y_2 - y_1$]
3169	1357.95	1129.81	42.85	57.15	35.65	64.35	7.20

Value of dp :

Total Geographical Area (sq km)	Population		pd1	pd2	$\log(pd1+1)$	$\log(pd2+1)$	dp
	1997	2007					[$\log(pd2+1) - \log(pd1+1)$]
3169	86695	97648					
	0	9	274	308	5.62	5.73	0.12

Value of $\frac{dy}{dp}$:

dy	dp	$\frac{dy}{dp}$
7.20	0.12	61.76

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Isolation of Unique Gram Positive Rod from Diseased Rice Leaves

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Abstract- Rice (*Oryza sativa*) is an important food crop of India and the world, is frequently attacked by pathogens like bacteria, fungi, viruses, pests and weeds. These diseases reduce both quantity and quality of plant products. In this present investigation unique Gram positive pathogenic bacteria, *Bacillus cereus* (as identified by NCBI BLAST) along with fungal spores of *Bipolaris sp* pathogens shared the same leaves of Lal Swarna variety of rice and showed dark brown spots with yellow halo on leaves. Here, *Bacillus cereus* which showed maximum sensitive to Sulbactam and least to Ceftadime was not a pathogen of rice before and it is first time observed as a pathogen of rice and at the same time it shows antagonism with *Bipolaris sp.* growth. This investigation also shown this mixed infection resulted in less vigorous infection of *Bipolaris* to this rice plant and which can be utilized in biological control in place of pesticides.

Index Terms- Bacillus cereus, Koch's Postulate, Lal Swarna, 16s rRNA Sequencing.

I. INTRODUCTION

Rice (*Oryza sativa*) is a staple crop all over the world belongs to the family of **Gramineae (Poaceae)**. The genus *Oryza* contains 25 recognized species, of which 23 are wild species and two, *Oryza sativa* and *Oryza glaberrima* are cultivated (Olga F. Linares 2002). *Oryza sativa* is the most widely grown of the two cultivated species. Within India, rice occupies one-quarter of the total cropped area, contributes about 40 to 43 percent of total food grain production and continues to play a vital role in the national food and livelihood security system. In India, West Bengal is the highest rice producing state while Tamil Nadu has first place in productivity. But, it has been estimated that the world wide annual yield loss and decrease in nutritive values are mainly due to diseases. Rice diseases are mainly caused by fungi, bacteria, viruses or insects. So it is important to choose different varieties of rice and investigate the disease and find out the possible way to combat it because diseases are considered major constraints in rice production and nutrient intake to people. For this purpose **diseased rice plants** locally known as **Lal Swarna** variety of rice were collected from **Katwa (23.6411° N, 88.1347° E)** in **Burdwan** district, **West Bengal, India** and the investigation was undertaken with the following objectives:

- To identify a particular variety showing high rate of disease infection.
- To isolate the obtained pathogenic forms in their pure culture.

- To determine their effect of interaction between these pathogens.
- To suggest eco-friendly ways of treating the disease.

Thus, via a series of experiments carried out, we try to draw up a conclusion of how bacteria and fungi interact to outdo each other and if possible, finding out a potential bio-pesticide or bio-fungicide for disease control because the use of chemical fungicides or pesticides are damaging the ecosystem at large and little effect in curing any disease.

II. MATERIALS AND METHOD

A) ISOLATION AND STAINING:

Infected leaves with specific lesions were selected and washed in sterile water to remove mud and dust and cut into pieces. These pieces were surface sterilized with 0.1% mercuric chloride (HgCl₂) solution and transferred aseptically to Potato Dextrose Agar slant containing streptomycin and Nutrient Agar slant for isolating fungi and bacteria and incubated for isolating pure colonies. The pure colonies were chosen and marked as Sample B and Sample F for bacterial and fungal culture respectively.

B) KOCH'S POSTULATE

To confirm the pathogenicity of both bacteria and fungi by Koch postulate, healthy leaves of same rice plant were inoculated with suspension of Sample B and F and incubated at room temperature.

C) SLIDE BIOASSAY

In this investigation the slide bioassay was done to study of growth and development of these microorganisms in presence of four different nutrition conditions for 48 hours.

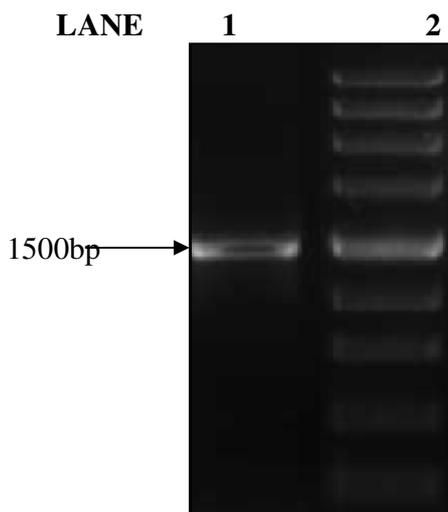
D) ANTIBIOTIC SENSITIVITY TEST

The antibiotic sensitivity test was carried on for Sample B to check the resistance and sensitive antibiotics. This assay was done by disc diffusion test by following Kirby-Bauer method with Ampicilin, Sulbactam Nitrofurantoin, Ceftadime, Linezolid, Ciprofloxacin, Streptomycin and Tetracyclin.

E) IDENTIFICATION OF SAMPLE B BY 16S rDNA

Bacterial 16S rDNA sequences are attractive targets for developing identification methods because they represent conserved regions in all bacteria and species having 70% or greater DNA similarity usually have more than 97% sequence

identity (Stackebrandt and Goebel, 1994). Bacterial identification based on % similarity of 16S rDNA has been using PCR technique, DNA sequencing and similarity analysis of rRNA genes. A direct comparison of 16S rDNA sequence is probably the most powerful tool for the identification of many bacteria (Stackebrandt and Goodfellow, 1991). 16S rDNA was amplified and sequenced using oligonucleotide primers complementary to highly conserved regions of bacterial rRNA gene. For identification, DNA was isolated from the slant culture of Sample B. Its quality was evaluated on 1.2% Agarose Gel, a single band of high-molecular weight DNA has been observed. Fragment of 16S rDNA gene was amplified by PCR from the above isolated DNA. A single discrete PCR amplicon band of 1500 bp was observed when resolved on Agarose Gel (Figure 1). The PCR amplicon was purified to remove contaminants. Forward and reverse DNA sequencing reaction of PCR amplicon was carried out with 8F and 1492R primers using BDT v3.1 Cycle sequencing kit on ABI 3730xl Genetic Analyzer and consensus sequence was generated by Aligner software. The 16S rDNA gene sequence was used to carry out BLAST with the nr database of NCBI GenBank database (Marchler-Bauer et al. 2000; Pruitt et al. 2005). Based on maximum identity score first ten sequences were selected and aligned using multiple alignment software program Clustal W.



Lane 1: 16S rDNA amplicon band, Lane 2: DNA marker

FIGURE 1: Gel Image Of 16s rDNA Amplicon (Sample: B)

III. RESULTS

India is an important rice producer of the world. According to the India's Agriculture Ministry the country had harvested about 103.41 million tons of rice in the 2011-12 crop year (source: PTI 2012, The Economic Times) in which rice output from West Bengal was about 1.51 core tons in 2011-12 (source: PTI 2012, The Times of India). But, the infections act as a devastation for rice plants in India and West Bengal. In the country the rice plants are mainly attacked by bacterial pathogen like Gram negative *Xanthomonas oryzae* pv. *oryzae* (Ray, P.R. et al, 1970)

causing Bacterial Leaf Blight with yield loss of 6% to 60%. *Xanthomonas oryzae* pv. *oryzicola* (David O., et. al 2006) also causes Bacterial Leaf Streak with losses as high as 32.3% in 1000-grain weight. In India they are also attacked by numerous fungal pathogens like *Bipolaris oryzae* (Julie Flood 2010) causing Brown Spot and results in 14-41% losses in high yielding varieties. *Ustilagoidea virens* (Dodan DS, Singh R. 1996; Biswas A. 2001) causing False Smut in India and resulting in yield loss of 7-75%. *Pyricularia oryzae* (Neergaard et al 1970) produces Rice Blast. In India, it results in about 0.8% of their total yield loss. But from various observations it was found out *Bipolaris* sp. is one of the severe pathogen of different varieties of rice in West Bengal. The disease Brown Spot was considered to be the major factor contributing to the "Great Bengal Famine" in 1942 (Julie Flood 2010) resulted in yield losses of 50% to 90% and the death of two million people. So, *Bipolaris* infection is one of the major concern for the rice producer in West Bengal. Even *Bipolaris* is a major disease causing pathogen of Lal Swarna variety of rice India. In our investigation, staining of pure colonies of Sample B and F (TABLE I) from diseased leaves showed the bacteria to be Gram Positive *Bacillus* sp. (FIGURE 2a) and fungus to be *Bipolaris* sp. (FIGURE 2b). Next, the reinoculation of isolated pathogens (Sample B and Sample F) from diseased leaves to healthy leaves showed the growth of these pathogens with their disease symptoms as seen in diseased leaves of rice plant. These symptoms and percentage of infection (Table II) indicate that both the organisms are pathogenic to this rice leaf. The observation (TABLE III), showed the presence of sugar increases the germination of conidia and also the remarkably increased the germ tube length of the fungi. It further showed that fungicide reduce the germ tube length by 16.24% and the pesticide reduce the germination of germ tube by only 1.36% than in presence of sugar solution. Whereas, infection of (Sample B) reduced the germ tube germination by 8.25%. So there is definite antagonism between the two organisms (Sample B and Sample F), which can be utilized in biological control. Thus, it is evident from this investigation that the use of pesticide is not necessary in this form of infection because of the antagonism existing between the two organisms. Thus, the in-vitro slide assay has also shown that use of chemical Fungicide (Saaf) and Pesticide (Thiodan) are of little help to suppress these pathogens because the growth of fungal pathogen was not fully suppressed and it might cause some health hazards. Another important part of the investigation was to find out the sensitive antibiotics for the pathogenic Gram positive bacteria (Sample B) and so antibiotic sensitivity test was performed because bacterial diseases can be easily cured by applying sensitive antibiotics. The result of disc diffusion test (Table IV) showed that the Sample B was resistant to those antibiotics for whom the zone of diameter were less than 20mm and sensitive to those antibiotics for whom the zone of diameter were more than 20mm i.e. Sample B is maximum sensitive to Sulbactam and least to Ceftadime. (Clinical And Laboratory Standards Institute Performance Standards for Antimicrobial Disk Susceptibility Tests, Tenth edition 2008. Microbiology: A laboratory Manual: International Ninth Edition. Cappuccino and Sherman 2011, Page No. 293). Lastly, 16s rRNA characterization showed (SAMPLE B) to be *Bacillus cereus* (TABLES V and VI) by BLAST DATA. The observation (FIGURE 5) showed the

distribution of 283 blast hits on the query sequence of 1439bp matched the alignment scores ≥ 200 and the sequence producing significant alignments by BLAST closely matched to *Bacillus cereus* and different strains of *Bacillus sp.* were also found to be close to this species. Expect value (E value) of all these strains is 0.0 which depicts that all the strains are homolog to *Bacillus cereus*. This pathogen is more common in the production of toxins in the rice product (Chang et.al 2011) and in turn induces

food infection rather than pathogen to rice crop. Moreover, finding of sensitive antibiotics by the disc diffusion test may help us to suppress diseases caused by sole infection of this new pathogenic strain of *Bacillus cereus* of rice plant in future and improve the quality and quantity of rice production in West Bengal and India.



a) *Bacillus sp.* (observed at 100X)



b) *Bipolaris Mycelia* And Spores (Observed At 45X)

Figures 2 Microscopic view of sample B and F

Table I: Result of isolation and staining

Part Of infection	Microscopic features	Sample	Microorganism (Probable)
Leaf	Gram positive rods	Sample B	<i>Bacillus sp</i>
	1. Presence of arthrospore (round, all spores joined to each other, spores intercalary, hyaline, thick walled) 2. Presence of conidia (mature-sickle shaped and colour brownish black)	Sample F	<i>Bipolaris sp</i>

Table II: Result of Koch's Postulate

Name of pathogen	Number of leaves inoculated	Number of leaves infected	Appearance & nature of spots	Percentage of infection
Sample B	89	48	Apex of the leaf accompanied with the browning reaction due to polyphenol oxidase reaction observed .	54.93
Sample F	78	59	Irregular brown spot without any halo observed after 2 weeks.	76.64

Table III: Result of slide Bio- Assay

Name of slides	Suspension of microorganism	Solution	48 hours Incubation	Percentage of Germination	Length of germ tube (µm)
CONTROL 1	Sample F suspension	Sterile Water		14.55	16.65
CONTROL 2	Sample F suspension	Sugar (2%)		20.83	35.75
SLIDE 1	Sample F suspension + Sample B suspension	Sterile Water		11.62	15.54
SLIDE 2	Sample F suspension + Sample B suspension	Sugar (2%)		12.58	18.32
SLIDE 3	Sample F suspension	Fungicide-Saaf (5mg/100ml)		4.59	2.67
SLIDE4	Sample F suspension	Pesticide Thiodan (0.6ml/100ml)		19.47	4.45

Table IV: Result of antibiotic sensitivity test

Name of antibiotic	Concentration (µg)	Diameter (mm)	Mean (mm)
Ceftadime	30	0	0
Linezolid	30	34 36	35
Ciprofloxacin	5	23.3 24.6	23.95
Nitrofurantoin	300	15.6 15.6	15.6
Streptomycin	10	15 16.5	15.75
Tetracyclin	30	22 21.6	21.8
Ampicilin	10	10 10	10
Sulbactam	105	30 30	30

TABLE V : Consensus sequence of SAMPLE B (1439 bp)

```
TGGCGGCGTGCCTAATACATGCAAGTCGAGCGAATGGATTAAGAGCTTGCTCTTATGAAGTTAGCGGCGGACGGGTGA
GTAACACGTGGGTAACCTGCCATAAGACTGGGATAACTCCGGGAAACCGGGGCTAATACCGGATAACATTTTGAACC
GCATGGTTTCGAAATTGAAAGGCGGCTTCGGCTGTCACTTATGGATGGACCCGCGTCGCATTAGCTAGTTGGTGAGGTAA
CGGCTCACCAAGGCAACGATGCGTAGCCGACCTGAGAGGGTGATCGGCCACACTGGGACTGAGACACGGCCAGACTC
CTACGGGAGGCAGCAGTAGGGAATCTTCCGCAATGGACGAAAGTCTGACGGAGCAACGCCGCGTGAGTGATGAAGGC
TTTCGGGTCGTA AAACTCTGTTGTTAGGGAAGAACAAGTGCTAGTTGAATAAGCTGGCACCTTGACGGTACCTAACCAG
AAAGCCACGGCTAACTACGTGCCAGCAGCCGCGGTAATACGTAGGTGGCAAGCGTTATCCGGAATTATTGGGCGTAAA
GCGCGCGCAGGTGGTTTCTTAAGTCTGATGTGAAAGCCACGGCTCAACCGTGGAGGGTCATTGGAAACTGGGAGACT
TGAGTGCAGAAGAGGAAAGTGAATCCATGTGTAGCGGTGAAATGCGTAGAGATATGGAGGAACACCAGTGGCGAA
GGCGACTTTCTGGTCTGTA ACTGACACTGAGGCGCGAAAGCGTGGGGAGCAAACAGGATTAGATAACCTGGTAGTCCA
CGCCGTAAACGATGAGTGCTAAGTGTTAGAGGGTTTCCGCCCTTATGTGCTGAAGTTAACGCATTAAGCACTCCGCCTG
GGGAGTACGGCCGCAAGGCTGAAACTCAAAGGAATTGACGGGGGCCCGCACAAAGCGGTGGAGCATGTGGTTTAATTCG
AAGCAACGCGAAGAACCTTACCAGGTCTTGACATCCTCTGACAACCTAGAGATAGGGCTTCTCCTTCGGGAGCAGAG
TGACAGGTGGTGCATGGTTGTCGTCAGCTCGTGTGTCGTGAGATGTTGGGTTAAGTCCCGCAACGAGCGCAACCTTGATC
TTAGTTGCCATCATTAAAGTTGGGCACTCTAAGGTGACTGCCGGTGACAAACCGGAGGAAGGTGGGGATGACGTCAAA
CATCATGCCCCTTATGACCTGGGCTACACACGTGCTACAATGGACGGTACAAAGAGCTGCAAGACCGCGAGGTGGAGC
TAATCTCATAAAAACCGTTCTCAGTTTCGATTGTAGGCTGCAACTCGCCTACATGAAGCTGGAATCGCTAGTAATCGCG
ATCAGCATGCCGCGTGAATACGTTCCCGGGCTTGTACACACCGCCCGTCACACCACGAGAGTTTGTAAACACCCGAA
GTCGGTGGGGTAACCTTTTGAGCCAGCCGCC
```

Table VI: Sequence producing significant alignments (source:<http://blast.ncbi.nlm.nih.gov/>)

Sequences producing significant alignments:						
Accession	Description	Max score	Total score	Query coverage	E value	Max ident
AP007209.1	<i>Bacillus cereus</i> NC7401 genomic DNA, complete genome	2658	3.703e+04	100%	0.0	100%
JN187086.1	<i>Bacillus cereus</i> strain YC-16 16S ribosomal RNA gene, partial sequence	2658	2658	100%	0.0	100%
JF506009.1	<i>Bacillus anthracis</i> strain KNUC9075 16S ribosomal RNA gene, partial sequence	2658	2658	100%	0.0	100%
JF833090.1	<i>Bacillus cereus</i> strain Js16 16S ribosomal RNA gene, partial sequence	2658	2658	100%	0.0	100%
GU982920.1	<i>Bacillus cereus</i> strain GXBC-1 16S ribosomal RNA gene, partial sequence	2658	2658	100%	0.0	100%
FN663625.1	<i>Bacillus</i> sp. OU-A3 16S rRNA gene, strain OU-A3	2658	2658	100%	0.0	100%
AB116124.1	<i>Bacillus anthracis</i> gene for 16S ribosomal RNA, partial sequence, strain: S51	2654	2654	100%	0.0	99%
AY138332.1	<i>Bacillus anthracis</i> strain 2000032707 16S ribosomal RNA gene, partial sequence	2649	2649	100%	0.0	99%
AB295053.1	<i>Bacillus thuringiensis</i> gene for 16S rRNA, strain: NK2	2652	2652	100%	0.0	99%

Distribution of 283 Blast Hits on the Query Sequence

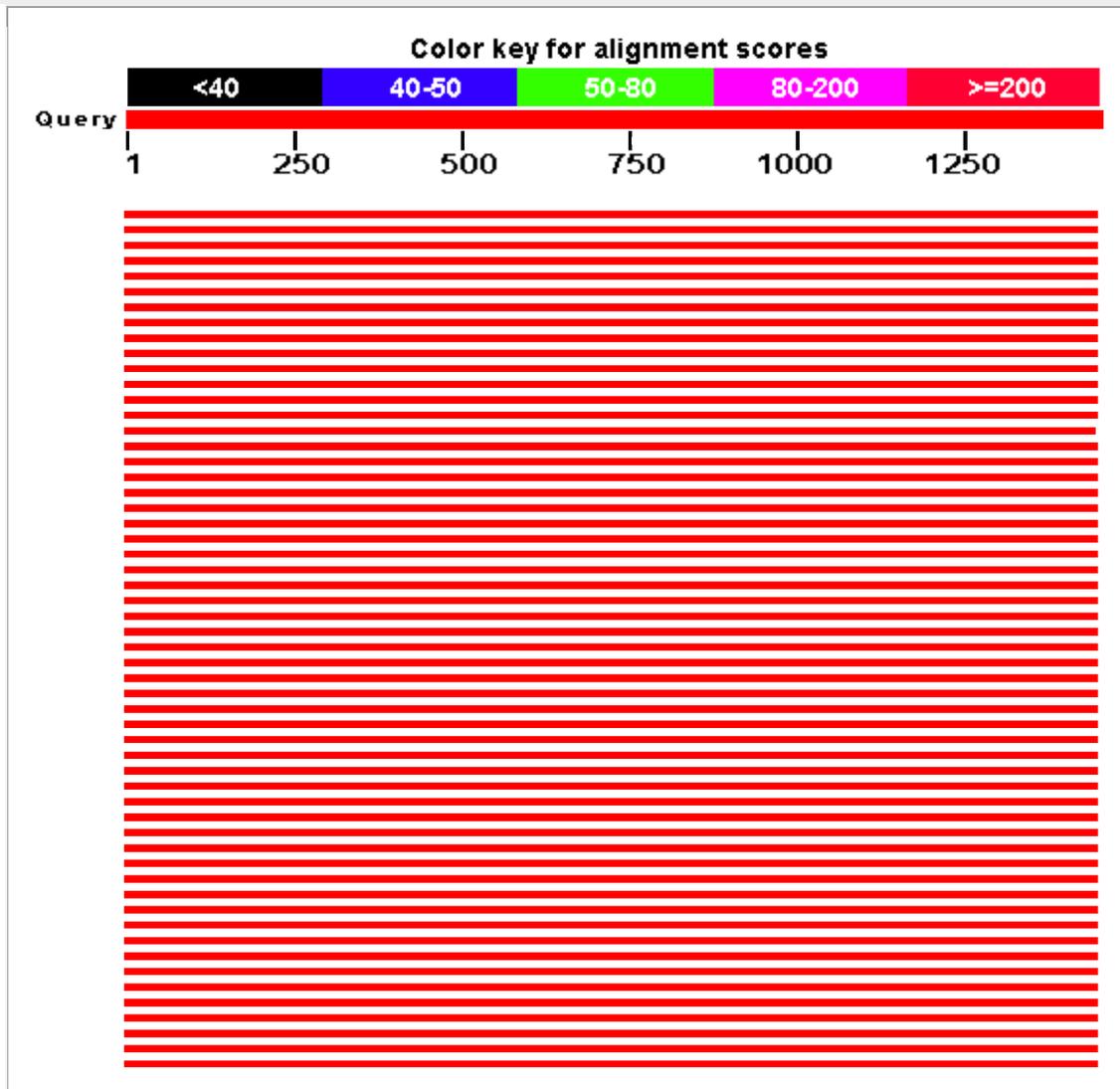


Figure 5: Distribution Of 283 Blast Hits On The Query Sequence

(source: BLAST DATA: ALIGNMENT VIEW USING NCBI GENBANK;<http://blast.ncbi.nlm.nih.gov/>)

Information about other close homologs for the microbe can be found from the Alignment View table.

IV. CONCLUSION

This finding is unique because *Bacillus cereus* was not a pathogen of rice before and it is first time reported as a pathogen of rice and at the same time it shows antagonism with *Bipolaris sp.* very strangely. From this investigation it was found out that when there is a mixed infection of *Bipolaris sp.* along with *Bacillus cereus* (as identified by 16S rDNA analysis), the infection caused by *Bipolaris sp.* was of less intensity. So this how joint infection can reduce vigorous infection of *Bipolaris sp.* and at the same time can protect the severe loss of rice crop.

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Study of Self Esteem of Secondary School Students in Relation to Their Family Environment

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Abstract- The development of the child is considered only from the point of view that development depends on what goes on in a school. That is why perhaps most parents seek and want their children to be sent for better schooling, particularly to schools with the best available infrastructure and teachers. Thus the present study was conducted to explore the relationship between self esteem and family environment. A sample of 175 students was selected through random sampling and taken up for the study that the relationship between self esteem of school children and their family environment is positive and significant. Again there exists significant difference between the self esteem of students belonging to high and low family interaction group. The impact of socio economic status on the self esteem is found to be insignificant. It can be concluded that family interactions or environment influenced the self esteem of secondary school students.

I. INTRODUCTION

All round development of the children is the ultimate goal of education and therefore the learning experiences provided to them contribute towards the achievement of this end. Right from the birth, the child is influenced by all the factors surrounding him though Individual differences due to genetic influences are beyond the control of scientists and educationists. One of the most common beliefs is that the development of the child is considered only from the point of view that development depends on what goes on in a school. That is why perhaps most parents seek and want their children to be sent for better schooling, particularly to schools with the best available infrastructure and teachers. There is need to identify the determinants of educational growth from various aspects of life, which seem to guide an individual's performance in school. Identification of these determinants shall ensure maximum possible growth of abilities in the children and enable the educators to visualize the relevant factors.

I. OBJECTIVES OF THE STUDY

The investigator has carried out the present study with the following objectives.

- To find out the relationship between self esteem of student and family environment.
- To find out the difference between self esteem of student belonging to high and low family interaction groups.

- To find out the difference between self esteem of students belonging to high and low socio economic status.

II. HYPOTHESIS

The following hypotheses were framed to achieve the objectives of the present study:

- There is significant positive relationship between self esteem of school children and family environment.
- There is significant difference between self esteem of students belonging to high family interaction group and low family interaction group.
- There is significant positive relationship between self esteem of school children and socio economic status of the family.

III. SAMPLE

Sample for the present study was selected from two schools of Kurukshetra. A sample of 175 students was selected through random sampling and taken up for the study. Students of class IX and X were taken from two different schools.

IV. TOOLS USED

Coppersmiths self esteem inventory was used to collect data on self esteem. It is in English and highly reliable. Family environment scale was constructed and standardized by the investigator having 49 questions.

V. ADMINISTRATION AND SCORING

The investigator contacted the teachers individually to take permission to collect data from students. The investigator talked to the students for some time to establish rapport with them before their responses were recorded. For self esteem inventory, two response columns like me and unlike me were there. For family environment there were three options to each question – Always (1) sometimes (2), and never (3) which are given against each question and the respondent who agreed to 1 got score 3 and who agreed to 2 and 3, respectively got 2 and 1, respectively. The score 72 and above showed higher family interaction and 71 and below low family interaction.

VI. ANALYSIS

The data was analyzed with coefficient of correlation to find out the relationship and ‘t’ to find out the differentials and by comparing it with table value of t_1 it was found whether the differences were significant or not. 96 students belonged to high family interaction group and 79 belonged to low family interaction group. Again 105 students were having high self esteem and 70 were having low self esteem. Further in high family interaction group 71% were having high Self esteem and 46.56% were having high self esteem from lower family interaction group. In low self esteem it was found that 29% belonged to higher family interaction group and 53.44% belonged to lower family interaction group.

It shows that more number of students having high self esteem belonged to high family interaction group. Furthermore, percentage of students having low self esteem belonged to low family interaction group. It depicts that family environment has its impact on self esteem of students.

VII. FINDINGS

These findings are tentative to the data analyzed and their generalizations can be extended only to similar sample and population. The main findings are as follows –

- ❖ Positive and significant relationship was found between self esteem of students and family environment. (Table-1).
- ❖ There is no significant relationship between self esteem of school children and their socio economic status.(Table-1)

Table-1
Coefficient of correlation between self esteem of school children and overall family environment and socio economic status, N = 175.

Variable	Coefficient of correlation	Level of significances
Family Environment	0.498	.01
Socio Economic status	0.139	N.S.

- ❖ Children experiencing higher family interaction are found to have higher self esteem than those experiencing lower family interaction.(Table-2)

Table -2

Significance of difference between self esteem of students belonging to higher family interaction group and lower family interaction group.

Group	N.	M.	S.D.	T ratio	Level of significance
Higher family interaction	86	83.703	14.629	5.3069	.01

- ❖ The percentage of students (71 %) having high self esteem belonging to high family interaction group was higher as compared to the students (47 %) belonging to low family interaction group.(Table-3)and (figure-1).
- ❖ The percentage of students (29 %) having low self esteem belonging to high family interaction group is low as compared to the percentage of students (53 %) belonging to low family interaction group.(Table-3)and(figure-1).

Table-3

Percentage of students having high and low self esteem belonging to high family interaction group and low family interaction group.

Group	N	High Self esteem		Low Self esteem	
		N	%age	N	%age
Higher family Interaction	96	68	71%	28	29
Lower family interaction	79	37	46.56%	42	53.44

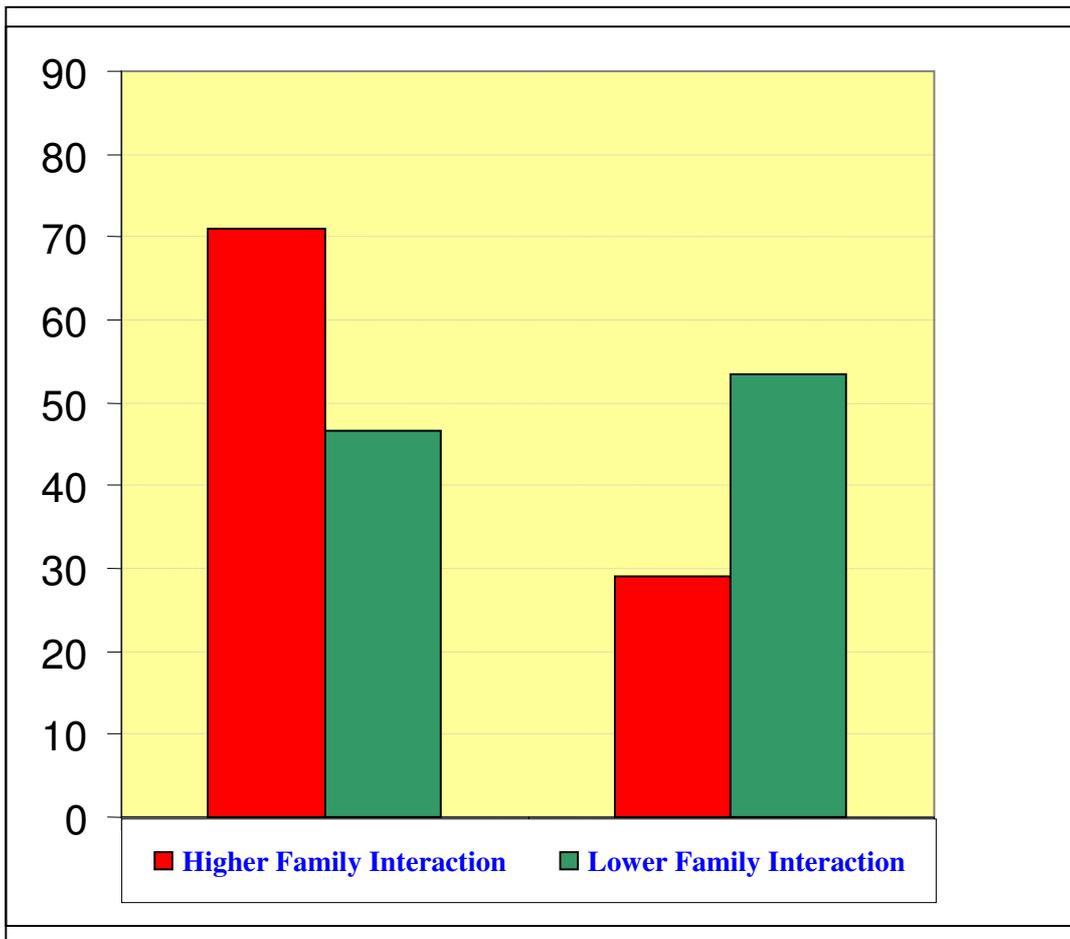


FIGURE -1. Self esteem of student of high and low family interaction groups

VIII. CONCLUSION

On the basis of the obtained results, it can be stated that the relationship between self esteem of school children and their family environment is positive and significant. Again there exists significant difference between the self esteem of students belonging to high and low family interaction group. The impact of socio economic status on the self esteem is found to be insignificant. It can be concluded that family interactions or environment influenced the self esteem of secondary school students.

Educational Implications

The study has its implications for the parents. As family environment influences the children parents should work to develop their children's innate qualities so that the child grows in such a manner which is socially desirable and acceptable.

They should provide conducive home environment. Outdoor and indoor activities should be provided. Parents should be involved with the children. They should be role models to the children. Parents should allow the children to enhance their hobbies and their interests. Opportunities should be provided so that their hidden capabilities get exposure. Parents should help

their children in their studies and keep in touch with the teacher's also. They can discuss the activities and problems of their children.

Educational institutions like school can screen the students who need stimulation and support. Government must establish resource centre which provide quality activities to involve family and children. Institutions like NCERT and NIEPA can help to develop resource materials for such centers.

It is very important that society develops national policies and programmes to ensure that families are able to provide their children with an environment conducive to success in later life. Hence policies can be worked out to provide the resources and nurturance's that young children need to function as effective members of modern society.

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Conventional Synthesis of Isonitroso Phenyl 2 Propanone and It's Screening for Antibacterial and Antifungal Activities

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Abstract- A new ketone Isonitroso phenyl 2 propanone (HINP2P) has been synthesized by the reaction of Benzyl magnesium chloride with cadmium chloride and acetyl chloride. On subsequent treatment of Phenyl 2 propanone with n- amyl nitrite gives Isonitroso Phenyl 2 Propanone. The structure of these compounds has been confirmed by physiochemical and spectral data. A preliminary screening of these compounds for biological activity against microorganisms has indicated that they are selective growth inhibitors.

I. INTRODUCTION

The title ligand Isonitroso phenyl 2 propanone (HINP2P) contain a reactive grouping

$\begin{array}{c} \text{---C---C---} \\ || \quad || \\ \text{O} \quad \text{NOH} \end{array}$ which determine the characteristic

reactions of Isonitroso ketones. The potential ambident ligands capable of forming metal complexes with different types of structure and bonding. These compounds find several applications as sensitive and selective reagents in the detection and determination of various metal ions. In addition, many of these compounds possess a wide spectrum of biological activity. The present paper deals with the preparation and characterization of the title ligand viz Isonitroso phenyl 2 propanone (HINP2P). Various physicochemical techniques such as elemental analysis, U.V., N.M.R., I.R. have been employed to assign the structures of the synthesized ligand. Their biological activity has been tested to find minimum inhibitory concentrations against microorganisms.

II. MATERIAL AND METHOD

The reaction was carried out with analytical reagent grade chemicals. The glasswares used were made of pyrex glass. The organic solvents were redistilled before use. Elemental analysis was done on Perkin Elemer elemental auto analyzer & CHNS thermoquest auto analyzer. I.R. spectra were recorded on Perkin Elemer RX1 Spectrophotometer in Nujolmull/KBr pellets. ¹HNMR spectra were recorded on Bruker FT 300 at 300 MHz Nmr spectrophotometer at CDRI Lucknow. The chemical shifts were reported in δ units relative to TMS used as an internal standard. The antifungal and antibacterial activity of ligand INP2P is determined by disk diffusion method using various biological strains according to the method described elsewhere.

III. SYNTHESIS OF PHENYL 2 PROPANONE

Benzyl magnesium chloride was prepared from a solution of 0.2 mol benzyl chloride in 100 ml. anhydrous ether and 0.2 mol magnesium turnings. The clear dark solution was filtered. The solution of Grignard's reagent was diluted with ether so that the concentration was not greater than 0.2 mole per 300 ml and then cooled in an ice bath. Anhydrous cadmium chloride was added with vigorous stirring over 10-15 min. stirring was continued with cooling for 2 hrs. A solution of 0.1 mol acetyl chloride in 3 volumes anhydrous ether was added to the cold benzyl cadmium reagent over 5 min. The mixture was stirred in an ice bath for 1 hr., and hydrolyzed with 20% H₂SO₄. The ether layer was separated and the aqueous phase extracted twice with ether. The combined ether layer solutions were washed with water and 10% sodium bicarbonate and were allowed to stand without drying over night. The ether solution was then extracted with 10% sodium bicarbonate, and the combined aqueous extracts were extracted twice with ether, and all the pooled ether extracts were washed with water and dried over sodium sulphate. The ether was distilled off, and the residue was distilled to give phenyl 2- propanone.

Preparation of Isonitroso phenyl 2 propanone:

Isonitroso phenyl 2 propanone (INP2P) was synthesized as described. Dissolved 12 g of sodium in 250ml of absolute alcohol and to this solution, added in small portions, and with cooling, first 60 ml of n-amyl nitrite and then 70 ml of Isonitroso phenyl 2 propanone. This mixture was allowed to stand for 2 days in a well-Stoppard bottle in a refrigerator. At the end of this time, the brown sodium salt was filtered and dried in air. The dried sodium salt was dissolved in a minimum quantity of ice cold water and treated with a calculated quantity of glacial acetic acid. Precipitated Isonitroso phenyl 2 propanone was then filtered through suction, and dried in vacuum. The crude product was recrystallised from benzene.

IV. RESULT & DISCUSSION

The melting point of INP2P was found to be 107^o C (reported m.pt. 106-107^oC). The results of chemical analysis are as follows:

Element	%C	%H	%N	%O
	66.01	5.36	8.32	19.34
	(66.23)	(5.56)	(8.58)	(19.61)

Electronic Spectra:

The electronic spectra of INP2P in DMSO show as intense band at 211nm. It splits into two strong bands 241nm and 250nm in NaOH solution. This can be explained by presuming that the symmetric π electron system cloud of INP2P becomes asymmetric by the dissociations of a proton.

Infrared Spectra:

The infrared spectrum of free ligand HINP2P shows a broad band around 3190.17 cm^{-1} is known to be lowered due to the hydrogen bonding^{6, 7}. Therefore the absorption near 3190.17 cm^{-1} in HINP2P is assigned to the hydrogen bonded OH stretching. This assignment is further confirmed by the presence of new band at 2925.18 cm^{-1} in the spectrum of the HINP2P. In the spectrum of HINP2P many bands are observed in the region $1650\text{--}650\text{ cm}^{-1}$. Some of these bands are assigned on the basis of their position and intensity. HINP2P shows two peaks at 1640.40 cm^{-1} and 1602.44 cm^{-1} which may be attributed to the $\nu_{\text{C=O}}$ and $\nu_{\text{C=N}}$ respectively. This is supported by the fact that they do not shift appreciably where as ethylacetoacetate is reported⁹ to show two $\nu_{\text{C=O}}$ bands at 1738 cm^{-1} and 1717 cm^{-1} . The lower peaks are probably due to hydrogen bonding. The peak at $1400\text{--}1450\text{ cm}^{-1}$ may possibly be due to --CH stretching. The $\nu_{\text{N--O}}$ stretching frequency in simple oximes¹⁰⁸ appear between $900\text{--}960\text{ cm}^{-1}$. But in quinone oximes it is observed at a slightly higher frequency 1000 cm^{-1} probably due to the increase in the double bond character. Patel¹⁰⁹ has assigned the bands at 1000 cm^{-1} and 1200 cm^{-1} in isonitrosoacetylacetate (HINAA) to $\nu_{\text{N--O}}$ stretching frequencies. The peak near 1047.75 cm^{-1} in HINP2P may therefore be attributed to $\nu_{\text{N--O}}$ stretching modes, as expected these peaks are not shifted appreciably. Moreover, peaks due to the common group such as methyl are found at their respective positions reported in literature¹⁰.

NMR Spectra:

The nuclear magnetic resonance spectrum HINP2P in DMSO solution reveals a peak around 8.30δ due to $=\text{NOH}$ group, aromatic ring are observed at 7.18δ and for --CH_2 group at 3.38δ . The proton signal due to --CH group appears at 6.74δ . It may be mentioned that the dioxime solutions of isonitrosoacetylacetone (HINAA) & Isonitrosoacetophenone⁹⁹(HINAP) show $=\text{NOH}$ resonance at 8.65δ & 8.60δ respectively. Similarly HIMAP show $=\text{NOH}$ proton resonance at 8.64δ .

Antimicrobial & Antibacterial test:

The synthesized ligand HINP2P was screened in vitro for antibacterial activities against Gram-positive *S. aureus*, *B. subtilis*, *B. cereus* and Gram-negative *P. aeruginosa*, *E. coli* and *K. pneumoniae* as well as antifungal activities against *C. albicans* and *A. niger* by disk diffusion method. Gentamycin and miconazole were used as standard for antibacterial and antifungal activity respectively. The agar dilution method was performed

using Mueller-Hinton agar (HiMedia) medium for antibacterial activity and Sabouroud's dextrose agar (HiMedia) medium for antifungal activity.

It is observed that ligand INP2P is active against all the biological strains. But the synthesized compound does not show more activity as compared to standard drug.

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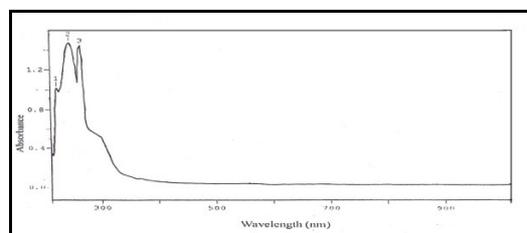
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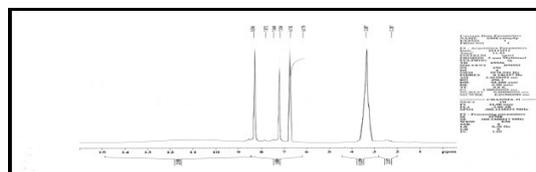
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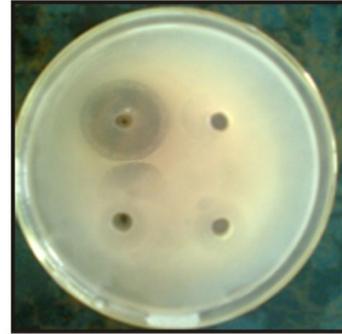
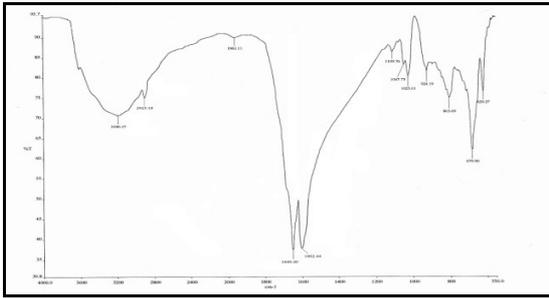
ABSORPTION SPECTRA OF HINP2P



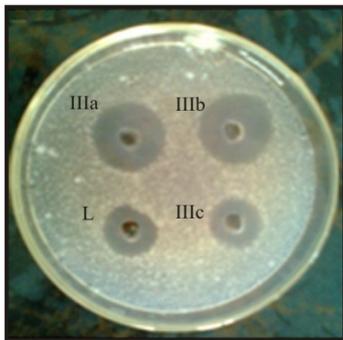
NMR SPECTRA OF INP2P



INFRARED SPECTRA OF INP2P



Photographs showing zone of inhibition by standard Gentamycin against bacteria E.coli



Photographs showing zone of inhibition by INP2P and complexes against bacteria E.coli

Factors Influencing the Passengers to Select Train Travel: A Study in Salem Division of Southern Railway

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Abstract- In India, among the various infrastructure sectors, transport is the prime sector performing dual role as a commercial organisation and vehicle for fulfillment of social obligations. It has a crucial role in the movement of people and goods from one place to another. Now-a-days, there is a steep increase in the mobility of the people with an ultimate aim to earn for their livelihood. In order to facilitate easy movement of people to different corners of the world, there are various modes of transport like road, rail, air and water ways. The better means of transport is the need of the hour. There is a stiff competition prevailing among various modes of transport. Long distance road transport network is non-existent, underdeveloped or poorly maintained in most parts of India. The burden of carrying long distance traffic, whether people or goods falls mostly on railways. It is due to largest network, number of trains, convenience, speed, safety and affordability. Even though the Indian Railways offer many services, the preference and need of the passengers are dynamic. It differs among the passengers based on their level of income, purpose of travel, distance of travel, age and other factors. As the needs of the passengers vary, the reason for them to select railways as convenient mode of travel also varies. There are various factors which influence the passengers to select train as their mode of travel among the various ways of transportation. In this aspect, this paper highlights the factors influencing the passengers to prefer train as their mode of travel.

Index Terms- Convenience, Economy, Passenger, Railways.

I. INTRODUCTION

India is the seventh largest and second most popular country in the world. The economic reform deregulates the country and stimulates foreign investment. It has moved India firmly into the front ranks of the rapidly growing Asia Pacific region and unleashed the latent strengths of a complex and rapidly changing nation. The creation of world class infrastructure becomes essential for the development of the country. The growth of the infrastructure sector is a critical pre-requisite for a sustainable growth of the economy. It also affects international competitiveness and flow of direct international investments. As Indian Railways is one of the pillars of India's infrastructure, it has a symbiotic relationship with the country's economy. It is fondly called as the "Lifeline of the Nation"¹. The Indian Railways acts as a premier mode of transport joining all parts of the country. The railroads of India are the fourth most heavily used system in the world. Earlier there were only three types of

trains viz., the passenger, the mail and the express. But at present, there are many trains with different features in different names. The Indian Railways is increasingly becoming more outward looking and customer centric. Now-a-days, more number of people are preferring train travel due to various reasons. The passengers in the present scenario are highly sensitive. So, they should be handled with due care. Otherwise, it is not possible to achieve the desired goal.

II. OBJECTIVES OF THE STUDY

1. To find the factors influencing the passengers to prefer train travel.
2. To offer suitable suggestions based on the findings of the study to improve the services of the Indian Railways.

III. SAMPLING DESIGN AND METHODOLOGY

This study is an empirical research based on survey method. The present study is confined to Salem Division of Southern Railway zone. In the selected Salem Railway Division, there are four railway junctions viz., Coimbatore, Salem, Erode and Karur. All these junctions have been selected for the study. It is decided to consider 10% of the passengers from the total passengers originating per day at each of the four Junctions of Salem Division. By using Simple Random Sampling technique, the passengers have been selected from all the Junctions of the Salem Division. On the basis of the records provided by the Public Relations Officer of Salem Division, it is found that approximately 9,300 passengers originate every day from all these four Junctions. Out of them, it is decided to collect data from 10% of the passengers from each Junction. It is considered to be adequate and representative. The details of selected sample passengers are shown below.

Table 1: Selection of Sample Passengers

S.No.	Junction	Average Number of Passengers Originating per Day	Number of Interview Schedule		
			Distributed	Collected	Used
1	Coimbatore	6,000	600	378	293
2	Erode	1,000	100	88	76
3	Karur	800	80	62	50
4	Salem	1,500	150	132	81
Total		9,300	930	660	500

The sample passengers are mobile population and they remain busy and hectic in reaching their platforms, finding their respective compartments, listening to the announcements and in enquiry. Hence, out of the target of 930 sample passengers, it is possible to collect the data only from 660 passengers. Of them, owing to non-response, inconsistency and other reasons, 160 Interview Schedules have been excluded. Thus, the total sample passengers is 500. This 500 consists of 293 from Coimbatore Junction, 76 from Erode Junction, 50 from Karur Junction and 81 from Salem Junction.

IV. COLLECTION OF DATA

Both primary and secondary data are used in the present study. The present study is largely based on the primary data. Required primary data have been collected in the course of interview with the railway passengers through survey method with a pre-tested, well structured and non-disguised Interview Schedule. The required secondary data for the present study have been collected through Annual Reports of Ministry of Railways, White Paper on the Indian Railways published by Railway Ministry, Reports of Comptroller and Audit General of India, various issues of RBI Annual Bulletins, data from Central Statistical Organisation, Indian Railways Year Book of various years, records from Public Relations Officer of Salem Division, various journals, periodicals and through web sites.

V. FINDINGS OF THE STUDY

The success of the Indian Railways is judged with the help of various parameters like physical, financial, safety and performance of human resources. Of them, physical (number of passengers) is an important parameter. It is known fact that a passenger's choice of travel is influenced by innumerable factors. Particularly, in the present tech-savvy era, passengers' choice varies frequently. In the pilot study, factors like economy, interactive telephone enquiry system, travelling distance, convenience, tatkal scheme, punctuality, speed, concession and free pass, safety, facilities at station, easy to carry more luggage and reservation facility have been given in the Interview Schedule.

On the basis of the outcome of the pilot study, only factors like economy, travelling distance, convenience, punctuality, speed, concession and free pass, safety, facilities at station, easy to carry more luggage and reservation facility have been used in the Final Interview Schedule. By way of giving these factors in the Final Interview Schedule, sample passengers have been called to assess each factor on its own significance. Each passenger is instructed to indicate the importance of the influencing factor by giving rank 1 to the most important factor, rank 2 to the second important factor and so on.

Based upon the ranks assigned by the sample passengers, the order of important factors influencing the passengers to prefer train travel is identified. To find the most significant factor influencing the sample passengers in selecting train as their mode of travel, Garrett's Ranking Technique is employed. It is calculated as percentage score and the scale value is obtained by employing Scale Conversion Table given by Henry Garrett.

The Percentage Score is calculated as²,

$$\text{Percentage Score} = \frac{100(R_{ij}-0.5)}{N_j}$$

Where, R_{ij} is Rank given for i^{th} item j^{th} individual
 N_j is Number of items ranked by j^{th} individual

The percentage score for each rank from 1 to 10 are calculated. The percentage score thus obtained for all the ten ranks are converted into scale values using Scale Conversion Table given by Henry Garrett. The scale values for first rank to tenth rank is 81, 70, 63, 57, 52, 47, 42, 36, 29 and 18 respectively. The score value (fx) is calculated for each factor by multiplying the number of respondents (f) with respective scale values (x). The total scores are found by adding the score values (fx) of each rank for every factor. The mean score is then calculated to know the order of preference given by the respondents for the factors. Based on the mean score, the overall ranks are assigned for each. The ranking analysis of the factors influencing the passengers in selecting train as their mode of travel through Garrett's Ranking Technique is shown in Table 2.

Table 2: Factors Influencing the Passengers to Select Train Travel

Ranks Scale		I 81	II 70	III 63	IV 57	V 52	VI 47	VII 42	VIII 36	IX 29	X 18	Total	Total Score	Mean Score	Rank
Economy	f	72	76	73	65	54	48	29	21	34	28	500	27984	55.97	2
	fx	5832	5320	4599	3705	2808	2256	1218	756	986	504				
Facilities at station	f	67	64	48	49	73	63	52	36	24	24	500	27089	54.18	3
	fx	5427	4480	3024	2793	3796	2961	2184	1296	696	432				
Travelling distance	f	68	66	58	66	45	40	43	56	29	29	500	26949	53.90	4
	fx	5508	4620	3654	3762	2340	1880	1806	2016	841	522				
Reservation facility	f	42	37	38	44	68	50	52	65	53	51	500	23759	47.52	6
	fx	3402	2590	2394	2508	3536	2350	2184	2340	1537	918				
Convenience	f	107	65	64	42	32	43	40	36	41	30	500	28033	56.07	1
	fx	8667	4550	4032	2394	1664	2021	1680	1296	1189	540				
Speed	f	49	38	22	30	38	31	67	60	77	88	500	21949	43.90	9
	fx	3969	2660	1386	1710	1976	1457	2814	2160	2233	1584				
Punctuality	f	49	73	64	37	55	50	37	37	53	45	500	25663	51.34	5
	fx	3969	5110	4032	2109	2860	2350	1554	1332	1537	810				
Concession and free pass	f	03	23	47	40	39	61	71	69	80	67	500	20981	41.96	10
	fx	243	1610	2961	2280	2028	2867	2982	2484	2320	1206				
Easy to carry more luggage	f	24	31	42	57	45	65	53	72	59	52	500	22869	45.74	7
	fx	1944	2170	2646	3249	2340	3055	2226	2592	1711	936				
Safety	f	19	27	44	70	51	49	56	48	50	86	500	22224	44.45	8
	fx	1539	1890	2772	3990	2652	2303	2352	1728	1450	1548				
Total	$\sum f$	500	500	500	500	500	500	500	500	500	500				

Note: x = Scale value; f = Number of Passengers; fx = Score

It is clear from the Table 2 that the passengers are giving more importance to the factor Convenience (56.07) followed by Economy (55.97), Facilities at station (54.18), Travelling distance (53.90), Punctuality (51.34), Reservation facility (47.52), Easy to carry more luggage (45.74), Safety (44.45), Speed (43.90) and the least importance is given to Concession and free pass (41.96).

VI. SUGGESTIONS AND CONCLUSION

- It is suggested that the Ministry of Railways can provide adequate and necessary basic facilities to the passengers like pure drinking water, hygienic food, good sanitation, seating arrangement, electronic scrolling indicator inside the trains, electronic charging facility and proper enquiry facilities at all stations and in trains to enhance the convenience of the passengers thereby attracting more number of passengers.
- The majority of the passengers are having strong negative opinion about the Railways regarding theft, robbery and bed bug menace. Hence, it is suggested that the Ministry of Railways should take all possible steps by deploying more number of Mobile Security Forces to give further protection to the passengers and by keeping the bed rolls in an insect free manner.
- Even in the ladies compartment, female passengers are of the opinion that they are insecure. Hence, it is

suggested that the Authorities concerned should come forward to extend their helping hands for female passengers by deputing more Women Security Forces in a serious manner. This arrangement will definitely boost up the image of the Railways in the minds of the female passengers.

- Further, it is also suggested that medicine facilities can be provided in long distance trains as the passengers face health problems like indigestion, cold, etc at the time of their travel.

By realising the significance of the contribution of the service sector in the Indian economy, an attempt has been made to examine the factors influencing the passengers to prefer train travel. Every facet has been thoroughly examined on the basis of collected data and with the statistical tool. The effect of the present study shows that the performance of the Indian Railways is not up to the mark and they face many problems both at the station and on-board the train. With the aim of making the Indian Railways to increase the number of originating passengers various suggestions have been offered. If all the suggestive measurements have been considered earnestly by the Indian Railways and the Policy Makers, it is hope that the Indian Railways will excel and bring grandeur to our country in the near future.

Appendix: Interview Schedule to the Railway Passengers
SERVICE QUALITY OF THE INDIAN RAILWAYS: A STUDY
IN SALEM DIVISION OF SOUTHERN RAILWAY

Interview Schedule

I. PERSONAL DETAILS

- 1.1 Name :
- 1.2 Address :
- 1.3 Gender : a) Male b) Female
- 1.4 Age : a) Below 30 years b) 30 – 50 years c) Above 50 years
- 1.5 Educational Qualification : a) Illiterate b) School Level
c) Graduate and Post-Graduate d) Professional
- 1.6 Marital status : a) Married b) Unmarried
- 1.7 Occupational Status : a) Student b) Employed c) Professional
d) Business e) Others (Specify)
- 1.8 Nature of family : a) Joint b) Nuclear
- 1.9 Number of members in the family: a) Male -
(including sample respondents) b) Female -
- 1.10 Annual income : a) Individual - `-----
b) Family - `-----
- 1.11 Annual expenditure : a) Individual - `-----
b) Family - `-----

III. FACTORS INFLUENCING THE PASSENGERS TO PREFER TRAIN TRAVEL

3.1 Kindly rank the factors influencing you to prefer train travel.

S.No.	Factors	Rank
1	Economy	
2	Facilities at station	
3	Travelling distance	
4	Reservation facility	
5	Convenience	
6	Speed	
7	Punctuality	
8	Concession and free pass	
9	Easy to carry more luggages	
10	Safety	

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Drop Test Analysis of Impact Attenuator for Formula SAE Car

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Abstract- Driver Safety is one of major research area in race car engineering. Researchers are designing advance active and passive safety system to assure the safety of the driver. Development time and cost of any product is reduced by great extend with the use of computer simulated software's. But the simulated results can't be used directly into real life without any validation with experimental results. Aim of this paper is to compare the computer simulated results of energy absorbing capabilities of low cost aluminium alloy impact attenuator using LS-DYNA with that of actual drop test performed in the laboratory. The analysis results are found in good agreement with experimental results obtained from crash testing in real time, performed at ARAI, Pune. Average deceleration of impact is less than 20 g as per the requirement of FSAE design rules.

Index Terms- Drop Test Analysis, Impact Attenuator (IA), Formula SAE, Crash Analysis

I. INTRODUCTION

From the past so many years, teams around the world had proposed many successful designs of impact attenuator using different materials and geometry. M.T.J.Fonteyn, et al [1] proposed five different materials having different mechanical properties. Polymethacrylimide (PMI) used for IA is a type of hard foam having very good stress-strain properties. But properties of hard foam totally depend upon the density of foam. It is difficult to maintain the uniform density throughout the material of the IA. Giovanni Belingardi et al [2] performed the finite element simulation using Hypermesh software. The model includes two different type of materials: steel S275JR UNI EN 10025 (Fe430) and 6082T6 aluminum alloy. Results obtained by these materials are nearly same, but design of the IA is shell like structure and holes are punched on it as they are operating as triggers, that means have both the scope to decrease the weight of the structure itself and to obtain a better crush behavior by decreasing the first peak of the collapse force. Crash test was conducted considering face to face direct collision. In case when the collision divers the zero angle, the hollow structure will try to bend in different direction, instead of absorbing impact energy. It will not give acceptable results as in case of bulk material or any design having through connected members. Jon Hart et al [3] defines honeycomb pyramid design with 3003 Aluminum plates. Computer simulation results of crash testing shows no co-relation with that of experimental results. Hiroshi Enomoto et al [4] proposes designs KF-IA04, KF-IA05B, KF-IA06 and KF-IA07. But impact attenuator formed by the Vacuum assisted Resin Transfer Modeling (VaRTM), KF-IA07, could satisfy the 2007

FSAE rules. Jovan Obradovic et al [5] managed to simulate the carbon fiber IA using LS-DYNA code. Conducted experimental analysis shows stable behavior of the nose cone structure with flat curve. But cost involved material is very high. Thus it affects the financial targets of design team and limitations of manufacturing facilities in India.

Main goal of design team was to design an impact attenuator which fulfils deceleration and size requirement under SAE rules with minimum cost and weight.

II. MATERIAL SELECTION AND DESIGN

As per the rules, attenuator to be installed in the front of the bulkhead must be at least 200mm long with its length oriented along the fore and aft axis of the frame. It must also be 100 mm high, 200 mm wide with a minimum distance of 200mm forward of the bulkhead. In any case, it should not penetrate the front bulkhead. For a total vehicle mass of 300 kg run into a solid, non yielding impact barrier with an impact velocity of 7 m/s, the attenuator must give an average deceleration of less than 20g. The present work concentrates on the impact performance of a structure made of Aluminium 6063 T6 [6] This paper aims at verifying the dynamic deceleration by drop test method.

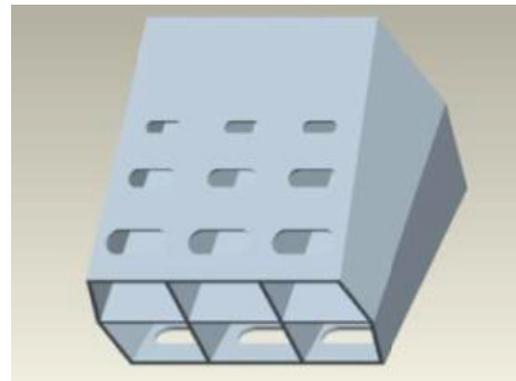


Figure 1 [6]

Aluminium 6063 T6 (alloy of Al with Mg and Si) is commercially available. Its sheets were used for the impact attenuator. This material is highly weldable using tungsten inert gas welding. It has good mechanical properties as per our requirements of the design. It is light in weight and cost effective. Fig. (1) depicts the designed CAD model of the attenuator. Overall dimensions of the attenuator were 250 x 250 x 250 mm³. The sheet thickness eventually used was 1.5 mm. Contours of elliptical shapes with varying dimensions were extruded out of the upper and lower surfaces. These were placed

symmetrically in horizontal rows. The presence of these elliptical cuts helped in attaining deformation in concertina fashion. Consequently, it yielded a sinuous graph of deceleration versus time, thus providing an ideal cushion for energy absorption.

III. ANALYSIS OF THE DESIGN

A. Simulation Using LS-DYNA Package

Simulation of CAD model requires proper boundary conditions. Carefully applied boundary conditions will only give good results which can be correlated with experimental results. As per the CAD model front rigid wall and IA with backside rigid wall were meshed with four noded and three noded reduced integrated shell elements. Surface-to-surface type contact interface was used for the contact between the front wall and the IA. This type was selected in order to prevent penetration of the IA's internal nodes as they could be in contact with the rigid plate during the simulation procedure. In-between contacts of the inner and the outer surfaces of the IA were assumed frictionless. To start with the simulation, we needed to define the material for the model and then define the boundary conditions. Boundary conditions are shown in fig.2

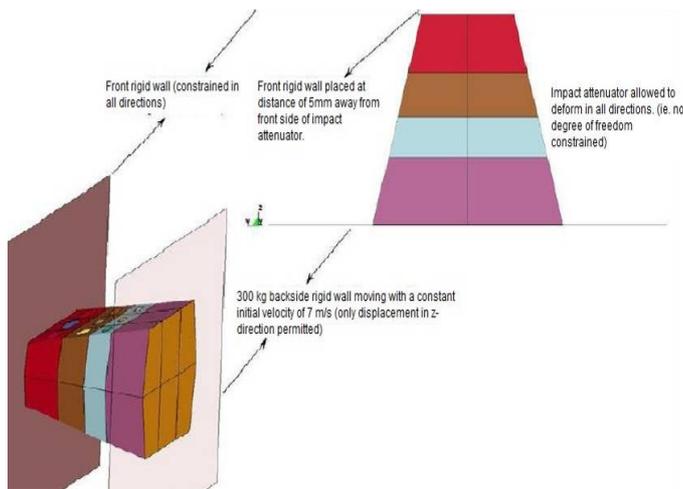


Figure 2 [6]

Simulated results obtained are shown in fig. 3[6]. The average deceleration of 18.8g was obtained with 29g as the maximum value of the deceleration. Fig. 4[6] shows the pattern of energy absorbed by the IA during crash.

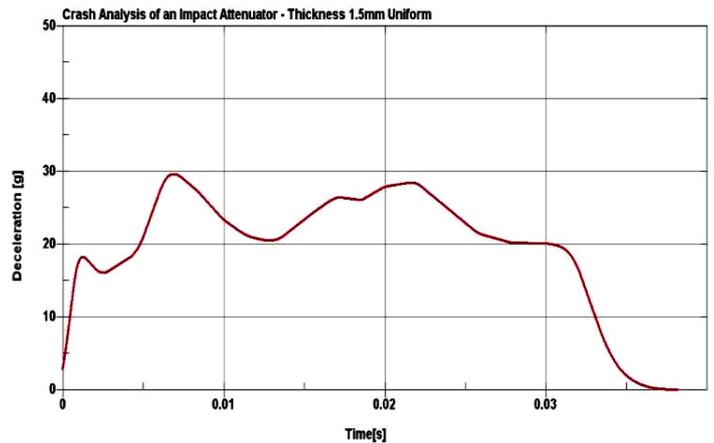


Figure 3

B. Drop Test

In order to verify results obtained in simulation on L S Dyna package, we performed the actual testing of impact attenuator, as discussed below:

This test was carried out by dropping a weight of 265 kg from a height of 2.8 m with an impact velocity of 7.4 m/s. This is equivalent to dropping a weight of 300 kg from a height of 2.5 m.

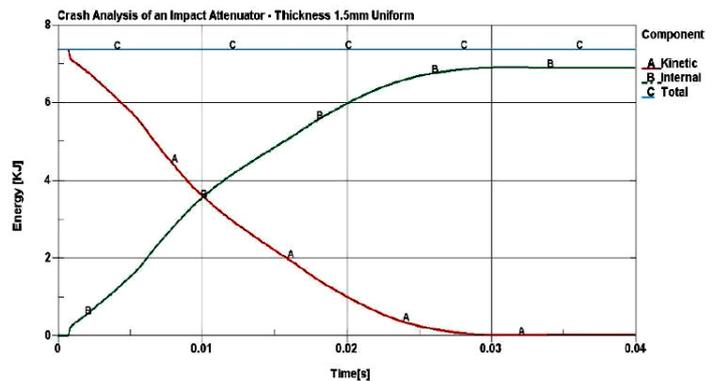


Figure 4



Figure 5

Fig.5 shows the setup of impact test in the testing facilities of ARAI, Pune. The impact attenuator was kept on plain ground and a weight of 265 kg was lifted to 2.8 m height using Goliath crane and was freely dropped using a quick release mechanism. High speed digital cameras were used to record the subsequent displacement with time of the marked up positions as shown in fig.7 on the weight box. These cameras recorded the displacement of 4 markers placed on the weight. The relative displacement of marker 1 and marker 3 with time yielded the velocity versus time plots. Fig 8, Fig 9 and Fig 10 gives displacement, velocity and deceleration plot for marker 1 and 3 respectively. Fig. 6 shows the deformed attenuator after the drop test. The average deceleration obtained in experimental drop test is 13.5 g .



Figure 6

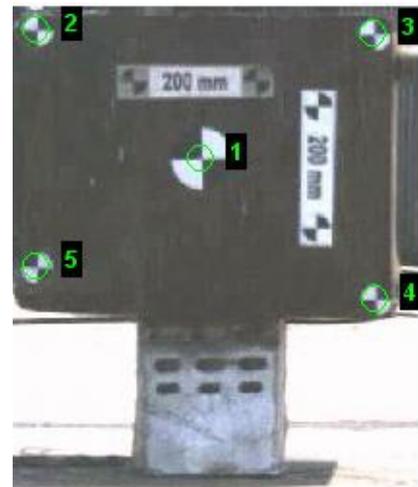


Figure 7

IV. RESULTS AND DISCUSSION

The average deceleration using LS Dyna Package simulation is 18.8g and the average deceleration using experimental drop testing is observed to be 13.15g (at marker 1). The experimental testing showed better results, though both confirmed to the Formula SAE rule of not to exceed average deceleration of 20g. The total energy is the sum of the Kinetic, Internal Damping and Sliding energy. Thus variation in results may be attributed to damping and sliding energy considerations and the welding done on the attenuator sheet.

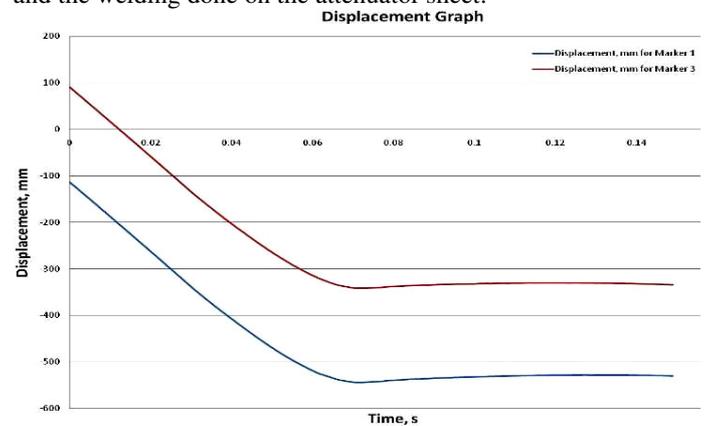


Figure 8

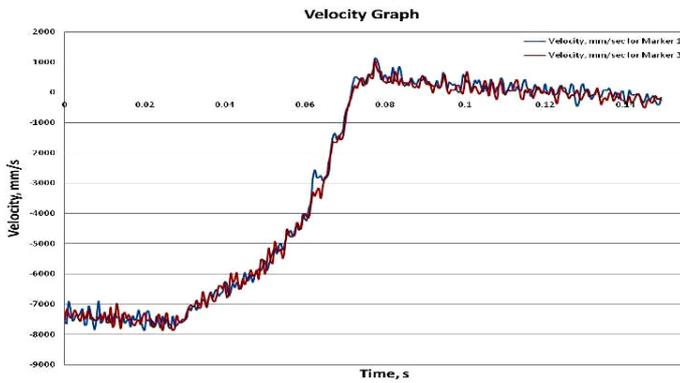


Figure 9

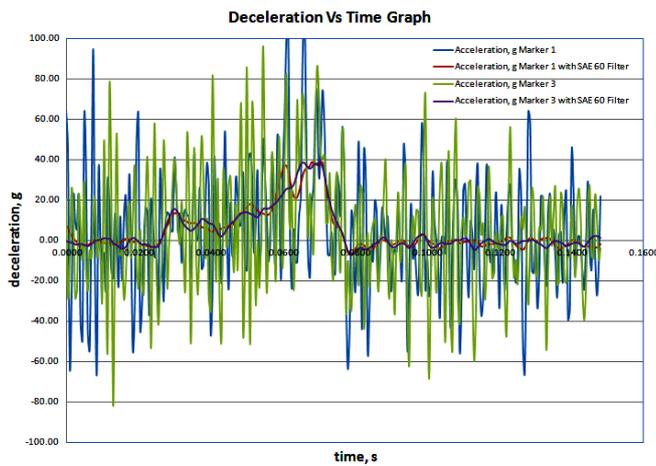


Figure 10

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Alternative Shift Algorithm for Digital Watermarking on Text

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Abstract- Various techniques have been employed till date to ensure the achievement of three basic needs of security: authenticity, integrity and confidentiality. With sharing of documents becoming a mundane phenomenon and the risk of copyright infringement becoming even more predominant with the easy availability of digital media, the need of better ways to ensure integrity and authentication was never more palpable. These growing issues led to the evolution of digital watermarking. In this paper the proposed algorithm generates a watermark which modifies the inter-word space based on the content of the document. The value being too small remains unnoticeable to the human eyes which increases the robustness. The watermark can be extracted to ensure the authenticity and the integrity of the document. The content of the document remains unchanged which ensures one of the advantages of this algorithm.

Index Terms- Digital Watermarking, text, inter-word shift, copyright protection, authentication.

I. INTRODUCTION

The Internet is a series of computers which are connected by either electronics, wireless or optical medium. The Internet has provided us with the option to share information between computers distance between them now being a trivial issue. Data are shared, transferred over long distance as signals. Digital information such as websites, e-paper, e-books, document files, social networking sites mostly contains plain text. With the growth of information sharing there has also been an increase in information duplicity and illegal distribution. Thus with this expansion of technology there is a growing need for information security or protection.

In real life, data or any possession that can be replicated are usually protected by a sign or a symbol. For example Banknote is protected with the various techniques like the use of security thread (the silver security band), latent image, micro lettering (visible only under microscope) and watermark etc. A virtuoso protects his creation by signing it or using a thumb-print or symbol(s).

In virtual world, data - image, audio, video and text or an amalgamation of the two or more are prone to plagiarism, falsification, fabrication, distortion, fraud, infringement, and piracy and even stealing. Out of this plain text is most easily tampered as compared to other digital data. The characters in a text file can easily be read by a character reader and be regenerated, text being most sensitive. Human vision is restricted

to detect such changes and redundancy in a plain text. The already existing copyright rules are inefficient to detect such changes and limit the illegal activities. This growing need of security led to new technologies. Digital watermarking is one the methods to authenticate and protect the data. Digital watermark is very similar to steganography and it is based on hiding signal in the document and the signal can be an image, pattern, text or simply some text hidden in the data to be secured. But unlike steganography it does not secure the access to the information, the information is very much shared and distributed and digital watermark holds the authenticity, integrity and identification of the owner(s) of the data. [1]-[2]. The signal which is used as a watermark does not need to be related with the content of the document. The watermark is separately embedded to ensure security without disrupting the contents.

A digital watermarking generally involves three steps: generating and embedding of the watermark, attacking and detecting (Figure 1). The watermarking can be done by various algorithms, the algorithm works on the document, generating and embedding the watermark. In attacking the attacker chooses to change some content or add some content in the document or may even try to remove the watermark. This is detected in the extracting stage where the algorithm is applied on the attacked document to extract and check for any modification in the watermark.



Figure 1: Steps involved in watermarking

A digital watermark may be visible or invisible. The visible watermark is easy to identify as it is noticeable on the screen whereas an invisible is embedded in the document and it's done by changing the bit, inserting noise, masking or some transformation. Generally a watermark should be secure, robust and it should not affect the quality of the signal. The watermark is characterized by robustness and perceptibility. The digital watermarking used for text can be either fragile, that is it should not resist any tampering or it can be Semi-fragile, if it is meant to resist any modification. Robust- this is meant to resist a list of transformations. Perceptibility: imperceptible-this is invisible and perceptible being the visible one. The watermarks also classified on the capacity or length of the data embedded and the algorithm used for embedding the watermark.

The type of watermark used and its use vary in different field. Watermark is not limited to copyright protection but has also found application in ensuring authentication and determining credibility for instance if an image has been compressed watermark is applied to ensure that the content has not been rigged with. Watermark is one essential part of this digital world and every day the use, technique and application is improving.

II. DIGITAL WATERMARK: APPLICATION

1. Copyright Protection

Protection of the intellectual property through digital watermark technique is one of the basic motives of watermarking. [3] It is very essential to protect the document and maintain the ownership against illegal use or duplicity. There are cases in which the owner has a license and the product is reproduced and redistributed without the consent of the owner(s) by an authorized person. This is common in video, audio and even in image, text, what we commonly known as piracy. The unauthorized person makes profit by illicit access to the content. In this case digital watermarking comes into play by embedding a mapping relation between the owner and the protected creation. There may also be cases when an end user may claim any protected content as his own. Digital watermark is very effective in these cases as the quality of the duplicate work though lower than the original one, is usually of low or little significance.

2. Tamper proofing

Tamper proofing in its etymology means to hinder, suspend or detect unauthorized access to any protected device or content. In general the most common use is the burglar alarm in which the alarm goes on tampering. In case of digital protection on unauthorized access the watermark must be fragile and should be able to sense any plausible tampering and disable the content i.e. the data and its functionality.

3. Multimedia authentication and broadcasting

With the wide distribution and sharing of multimedia content it very essential to identify the owner and also track its distribution to recognize any illegal use. Every multimedia is embedded with information (owner details, transaction id, serial number etc). This can be perceivable or unperceivable to hums and is used to track the use of the multimedia content and ensure proper broadcasting.

4. Fingerprinting

Fingerprinting algorithm is used to detect illegal duplication and the source of it. This method can be seen as a high performance hash function. A hash index is created with every distribution, re-distribution based on the content. The original hash value is fetched and compared at each level of distribution to find the source of illegal circulation.

5. Application in medical science

It is very essential to restore the content of a medical image [4] and to detect any tampering. Medical diagnosis of disease, treatment and proper steps are taken on the medical

image taken with proper equipments. Several times the medical image may need to transfer between health professionals. When the image is taken it is watermark patient details or the authorization group to protect the privacy and detect the tampering. Any tampering with the image can be revealed by its watermark

6. Surveillance camera/ Monitoring system

Sometimes the video or image in a system is a very essential part of evidence. In any protected zone or place of interest we see surveillance camera or CCTV. The video becomes very essential part of evidence and thus there is a need of protection. Every frame is embedded with a watermark, and in case of evidence it can be found out whether part of the video/image has been changed or not. [5]

III. PREVIOUS WORKS

Document involving plain text transferring and sharing over the Internet has become popular and has become essential over the last two decades. Text watermarking is one of the most difficult types of watermarking. There are several algorithms on text digital watermarking and each algorithm is efficient and improved in its own way. The algorithms are based on image, semantic, syntax, structure. Text watermarking incorporating text and image is most common and widely used. The first one to propose such a method using text image was Brassil, et al [6]. Later Maxemchuk, et al [7]-[8] and Low, et al. [9] further analyzed this work and both worked individually on these methods.

Ding Huang and Hong Yan [10] were the first to propose a work based on inter-word space statistics and without changing the content of the text document. The work is efficient and still used today for references. Their work involved changing the space between the words over a number of lines and forming a pattern in the form of a sine wave. The characteristics of their work included that sine wave varies gradually and such variation cannot be noticed by the human eyes. Sine wave's periodic symmetry makes it easy and reliable for decoding. Young-Won Kim, [11] et al proposed their work based on word classification and inter-word space statistics.

Works including text-image based to fully protect the document were proposed [12] and where a signature was embedded to ensure the authenticity [13]. Recently a work has been proposed which not only protects the document but ensure the authenticity by encrypting the text which involves cryptography. [14] Algorithms based on secret message being embedded in the text document also have been put forwarded. [15]

Xingming, et al's works included noun-verb basis for text watermarking [16], which uses nouns and verbs in a sentence parsed with a parser grammar using semantic. There are also work which based on the synonym, the watermark is the certain words which are replaced with their synonyms [17] There are also works based on the occurrence of punctuation marks and double letter words and the frequency of them. Some of them change the content of the text document while others simply work on encrypting. We propose a method that is based on the statistics of the occurrence of words in English text and changing

the attribute of the adjoining words to certain words. Hence we propose the algorithm which ensures integrity and authenticity.

IV. PROPOSED WORK

We propose a fragile digital watermark with a new concept to safeguard the text documents. This algorithm is entirely based on the frequency of occurrence of words in a text document in English. We use the analysis of the Oxford English Corpus which lists the 100 most occurring words used in English language. The list is being given in Table .1 with only the first 20 words and we use the first 10 words skipping the single letter words. The study which listed the words claims that the first 25 words consist of about thirty-three percent of all printed material in English. Our algorithm uses the document content to be protected to generate the watermark.

Table I: Most common words in English by Oxford English Corpus

Rank	Word								
1	the	5	and	9	have	13	not	17	you
2	be	6	a	10	I	14	on	18	do
3	to	7	in	11	it	15	with	19	at
4	of	8	that	12	for	16	he	20	

We maintain an array which consists of the 10 words and any one of the words is randomly chosen as the keyword K. Next we find the character M at the center of K. Then we determine a value S using the ASCII value of M. Now the document is searched for words matching the keyword K and a note is taken for the preceding and the following word of K. At each occurrence of K in the text, alternatively either the previous or the following word is shifted from its position by S pixels which have been calculated earlier either by performing a left shift or a right shift. In our experiment this value of S is lesser than 1. The words are shifted at a very small pixel and this is almost unperceivable to human eyes. Now the keyword K is sent along with the document in an encrypted form.

The keyword is checked against each word the case being ignored. It is assumed that all the words i.e. that the keyword are in lower case for our experiment. It is because then the ASCII value ranges from 97 to 122. We use the central character of the keyword and using our algorithm we find value of sine 10 to sine 35. This value ranges between 0.34 to 0.94 thus varies gradually and bring unpredictability.

Algorithm:

1. Write 10 most frequent words in an array A
2. Randomly read a keyword K from A
3. Determine M as central character of K
4. Determine $S = \sin(\text{ASCII of } M - 87)$
5. Declare $\text{ctr} = 0$
6. While 1
7. Read each word T
8. Read the previous word in P and the next word in N
9. Determine if T equals K
10. if ctr is even
11. Then Right shift N by S pixels
12. Else Left shift P by S pixels
13. End if;
14. $\text{ctr} = \text{ctr} + 1$
15. if end of document is reached
16. break
17. end if
18. End while
19. Include the keyword with the document

T = each word of the document
P = previous word corresponding the word matching the keyword
K = keyword
N = next word corresponding the word matching the keyword K
S = pixel to be shifted
ctr = counter to determine whether left shift or right shift

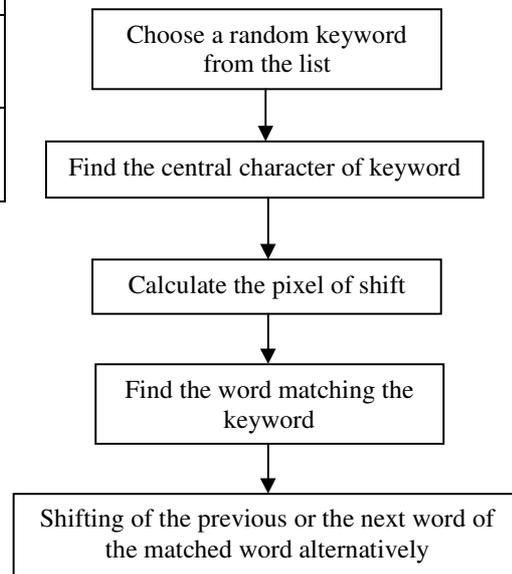


Figure 1: Embedding of digital watermarking

The advantage of this algorithm is manifold. Firstly we are operating on the document only once and the keyword is chosen randomly. This randomness of choosing the word increases protection to the document concerned. Thus if anyone has been tracking some documents of this same algorithm concerned it would be very difficult to determine the keyword used for a document concerned. Moreover choosing the alternative word

against the keyword i.e. either preceding or following word along with alternative shifts increases imperceptibility and robustness. If anyone tries to duplicate or change any part/whole of the document the authenticity and integrity of the document can be easily determined. As the keyword is sent in an encrypted form, to determine the ownership or integrity the keyword is decrypted correctly and the same algorithm is used and checked against the document concerned. Any mismatch in the space will prove tampering.

An example showing how our algorithm works:

The random keyword chosen here is: the

A word from the list has been chosen as the keyword over here and this is an example to show how the proposed algorithm works.

Figure 2: The original text

A word from the ||list has been chosen|| as the keyword over here and this is an example to show how the ||proposed algorithm works.

Figure 3: The enlarged image of embedded text

Arrow shows the original position of the word.

V. CONCLUSION

This paper provides an overview on the different features of digital watermarking, the various applications and its use in various fields. Text is the most widely used means of communication and we have proposed an algorithm that ensures the integrity of the document. A new technique is put forward which creates a watermark based on the content of the document and embeds it without changing the content of the document. As the keyword used for the algorithm is randomly chosen from a list of words it improves the robustness of this algorithm. Further the alternative shifting adds to the security and imperceptibility without adding any complexity. To authenticate and prove the integrity of the document, the watermark can be easily extracted and verified for tampering.

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Assessment of Service Quality in Public and Private Sector Banks of India with Special Reference to Lucknow City

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Abstract- In the present scenario banking sector of India is running in a dynamic challenge concerning both customer base and performance. Service quality is an indispensable competitive strategy to retain customer base. Service quality plays a major role in getting customer satisfaction. Banks are trying hard to win customer satisfaction by providing better quality services. This study compares customers' perceptions of service quality of both public and private banks of India. The service quality of both the banks has been measured using SERVQUAL (service quality) scale.

Data was collected from total 410 customers of Lucknow of public and private sector banks using Questionnaire. The results show that dimensions of service quality such as Tangibility, Reliability, Responsiveness, Empathy and Assurance significantly predict customer trust and commitment. Private bank customers are more committed and satisfied as they receive better quality of service. The study implies that public sector banks should also come forward and try their best to provide better quality service to win back their customers.

Index Terms- Customer Satisfaction, Service Quality, Public Sector Banks, Private Sector Banks.

I. INTRODUCTION

At the time of independence, Indian banking system was not sound. The strengthening of the banking system took place after the establishment of the Reserve Bank of India in 1935 as it was empowered to regulate banking by issue of directive, inspection, mergers, amalgamation etc. In 1949 two major actions were taken which were very important from the point of view of structural reforms in banking sector. First, the Banking Regulation Act was passed. It gave extensive regulatory powers to Reserve Bank of India (RBI) over the commercial banks. On 19th July, 1969, Fourteen major Indian commercial bank were nationalized and on 15th April, 1980, Six more were added on to constitute the public sector banks. After nationalization these banks started rendering various types of functions by assuming social responsibilities. Through these banks, the government tried to implement various welfare schemes. These banks occupy a pivotal place in the Indian Banking system. Before 1991 there was little competition in the banking sector. The public sector banks dominating the banking industry in terms of size of assets. The government has now recognized the need to make banking industry more competitive. It has thus made certain policy

changes such as deregulation of interest rates and dilution of consortium lending requirement. Moreover, banking has been opened up to the private sector. As a result, new private sector Banks have been set up, old private sector Banks have expanded their operations and more foreign sector banks have entered the Indian banking industry. This has promoted competition and has helped in increasing efficiency. The paper endeavors to determine customer satisfaction. In the era of cut throat competition the survival of any banks depends upon the satisfied customers. Customer satisfaction is the state of mind that consumers have about a bank when their expectations have been met or exceeded over the life time of the service different people may have different expectations based on their prior experience, personal needs and what other people told them. As perceptions are always considered relative to expectations and expectations are dynamic, perceptions may also shift over time from person to person. What is considered quality service or the things that satisfy customer today may be different tomorrow, same is in banking industry. Understanding of the customer's expectations and their perceptions about a particular bank can be the game changer.

II. LITERATURE REVIEW

According to K. Rama Mohana Rao Quality means the degree of excellence in service performance. Consumers perceive the quality of a service by experiencing the consumption process and comparing the experience with their expectations. The best service quality firms cannot blame for poor quality. The service firm need to formulate strategies for quality performance. Service quality management is the most critical task of service companies. Quality may be perceived in many dimensions. It may relate to cost, profitability, customer satisfaction, customer relations or positive word of mouth, customer assess service quality with their own criteria. Buzell and Gale's empirical research shows the positive relationship between service quality and organizational performance. According to Parasuraman, Zeithmal and Berry Service quality is the degree and direction of discrepancy between consumer's perceptions and expectations in terms of different but relatively important dimensions of the service quality, which can affect their future purchasing behaviour. Douglas et al define service quality as an attitude formed by long term, overall evaluation of performance. In 1990 Professor Evert Gummesson said that service quality must be viewed in conjunction with service productivity and profitability,

According to him service quality had been widely researched but not service productivity. According to Philip Kotler et al 2010 services firm can differentiate it by delivering consistently higher quality than its competitors provide. Now a day's most of service industries have joined the customer-driven quality movement and like product marketers, service providers need to identify what target customers expect in regards to service quality. The top service companies set high service –quality standards. They watch service performance closely, both their own and that of competitors. They do not settle for merely good service; they aim for hundred percent defect-free service. Studies of Panda reveal that customer tests the quality of service of a firm at every encounter. Each of the customer encounter is called moment of truth. If the experience from service encounters are bad, it may not lead to customer satisfaction .Quality management involve deciding on quality standards and implementing a method of assurance on performance level of the staff and facilities. Quality has emerged as a major competitive element in service company strategies. Service providers are giving increasing emphasis on creating reputation for good quality of service as this provides a positive image for their organization. The service quality management process involves matching evolving customer expectations. Customers have their own service expectations. From a firm a customer is satisfied when his expectations match the perceived service. When the perceived service passes over the expected service, the customer is delighted if there is failure in meeting expectation the customer is dissatisfied. Lovelock et al (2006) opined that if a firm wants to retain customer they are required to provide better services to their customers by quality improvement programs and should continuously enhance benefits desired by customers. At the same time, productivity improvement efforts decrease the cost. The customers are satisfied with the organization if the services deliver by firm are better than their competitors. According to Zeithamal et al (2008) customer have two different types of service expectations: 1) Meaning and types of expected service 2) Current issues in customer service expectations. In a Perception of the service, service quality may be the most critical determinant of satisfaction. They mentioned the service encounters or “moments of truth” as the building blocks for both satisfaction and quality. Service encounter is an opportunity to build perceptions of quality and satisfaction.

III. OBJECTIVES

- To measure and analyze the quality of services provided by public sector and private sector Banks in Lucknow, India.
- To ascertain service quality variations across selected banks by demographic variations.
- To measure the customer satisfaction in selected public and private sector banks by analyzing the gap between expectations and their perceptions of banking services.

IV. RESEARCH METHODOLOGY

This study is based on a survey conducted in Lucknow City. Primary as well as secondary data were collected. The

theoretical foundation of the study is based on various secondary sources such as texts book on service quality, articles, quality magazines, and published papers. For the purpose of the study, a questionnaire was designed on 5 point Likert scale, where '1' represents SD (strongly disagree) and '5' represents SA (strongly agree), and the total 410 respondents were asked to respond to the statements in the SERVQUAL scale. Questionnaire consisted of 26 questions related to five dimensions of service quality in which the customers of various banks responded against their expectations and perceptions. Questionnaires were personally delivered by hand at workplaces and homes, which was used as a method for data collection. The respondents (220 of public sector banks and 190 of private sector banks) were required to record their perceptions and expectations of the service of the respective public sector Bank and private sector banks in Lucknow. Three public sector banks-SBI, PNB and BOB and three private sector banks –HDFC, ICICI and Axis were selected for the study. The study is based on the assumption that all banks belong to the same category. This categorization was based on the responses of the customers.

The parameters identified are Tangibility, Assurance, Reliability, Responsiveness and Empathy.

V. DATA ANALYSIS

DEMOGRAPHIC PROFILE OF THE RESPONDENTS

Table 1: GENDER WISE DISTRIBUTION OF THE RESPONDENTS

Gender	Number & % of respondents			
	Public sector banks		Private sector banks	
	No.	%	No.	%
Male	142	64.55	142	74.73
Female	78	35.45	48	25.27

Table 2: AGE WISE DISTRIBUTION OF THE RESPONDENTS

Age	Number & % of respondents			
	Public sector banks		Private sector banks	
	No.	%	No.	%
<25 years	26	11.82	23	12.1
25-35	36	16.36	63	33.15
35-45	52	23.64	55	28.95
45-55	55	25	33	17.36
>55	51	23.18	16	8.44

Table3: EDUCATION WISE DISTRIBUTION OF THE RESPONDENTS

Education	Number & % of respondents			
	Public sector banks		Private sector banks	
	No.	%	No.	%
Graduate	85	38.74	42	22.1
Post grad.	72	32.73	68	35.79
Professional	33	15	61	32.1
Others	30	13.63	19	10

Table 4: OCCUPATION WISE DISTRIBUTION OF THE RESPONDENTS

Occupation	Number & % of respondents			
	Public sector banks		Private sector banks	
	No.	%	No.	%
Government	55	25	22	11.58
Private	59	26.82	63	33.15
Professional	21	9.55	43	22.63
Business	21	9.55	41	21.58
Student	25	11.36	12	6.32
Others	39	17.72	09	04.74

Table 5: INCOME WISE DISTRIBUTION OF THE RESPONDENTS

Income/Rs.	Number & % of respondents			
	Public sector banks		Private sector banks	
	No.	%	No.	%
<10,000	24	10.91	09	04.74
10,000-15,000	38	17.27	22	11.58
15,000-25,000	58	26.36	43	22.63
25,000-40,000	72	32.73	55	28.95
>40,000	28	12.73	61	32.10

Chart 1

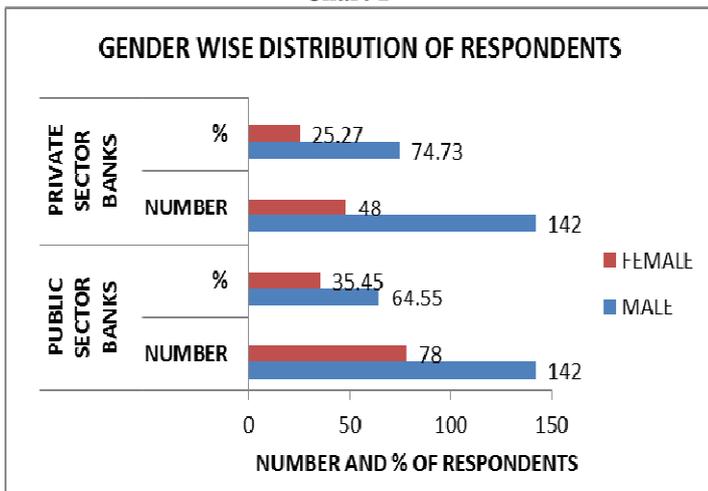
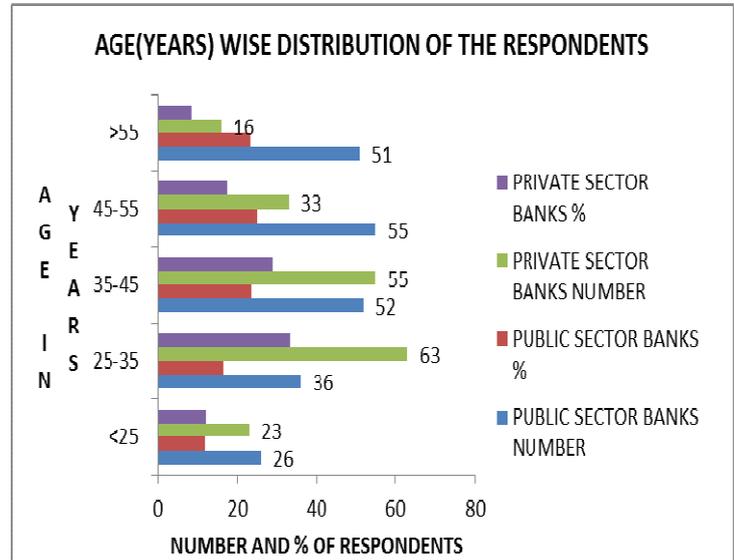


Chart 2



VI. ANALYSIS OF CHI SQUARE TEST OF INDEPENDENCE

Chi square test of independence

Hypothesis:

H0: Preference towards public/private sector banks and age group is independent of each other.

H1: Preference towards public/private sector banks and age group is dependent of each other.

$$X^2 = \sum \left[\frac{(F_o - F_e)^2}{F_e} \right]$$

where Fo= observed frequency and Fe= expected frequency for each cell

Fe=(frequency for the column)(frequency for the row)/n

Table 6

Observed frequency						
	Age group					
Preference towards banks	<25 years	25-35	35-45	45-55	>55	Total of row
Public sector banks	26	36	52	55	51	220
Private sector banks	23	63	55	33	16	190
Total of column	49	99	107	88	67	410

Table 7

Expected frequency					
	Age group				
Preference towards banks	<25 years	25-35	35-45	45-55	>55
Public sector banks	26.292	53.121	57.414	47.219	35.951
Private sector banks	22.707	45.878	49.585	40.780	31.048

Table 8 Calculation of χ^2

Fo	Fe	Fo-Fe	(Fo-Fe)^2	[(Fo-Fe)^2]/Fe
26	26.292	0.292	0.085	0.003
36	53.121	-17.121	293.12	5.51
52	57.414	-5.414	29.31	0.510
55	47.219	7.781	60.54	1.28
51	35.951	15.049	226.47	6.29
23	22.707	0.293	0.085	0.003
63	45.878	17.122	293.16	6.39
55	49.585	5.415	29.32	0.591
33	40.780	-7.078	60.52	1.48
16	31.048	-15.048	226.44	7.29
χ^2Cal = 29.347				

Degree of freedom=(R-1)*(C-1)
 = (2-1)*(5-1)
 =4

Confidence level = 95 %

Therefore $\chi^2_{tab} = 9.488$

Now in this case $\chi^2_{cal} > \chi^2_{tab}$ hence null hypothesis is rejected and alternative hypothesis is accepted.

VII. SERVQUAL ANALYSIS

Table 9: GAP MODEL FOR PUBLIC SECTOR BANKS

Tangibility					
Statement	E-score	p-score	SERVQUAL Score	Average Dimension	Chi square
1.	4.48	3.64	-0.84	-0.81	1.0561
2.	4.28	3.38	-0.90		
3.	4.30	3.69	-0.61		
4.	4.59	3.90	-0.69		
5.	4.50	3.68	-0.82		
6.	4.66	3.68	-0.98		
7.	4.62	3.75	-0.87		

Reliability					
Statement	E-score	p-score	SERVQUAL Score	Average Dimension	Chi square
1.	4.51	3.66	-0.85	-0.83	0.6815
2.	4.36	3.80	-0.56		
3.	4.55	3.29	-1.26		
4.	4.33	3.67	-0.66		

Responsiveness					
Statement	E-score	p-score	SERVQUAL Score	Average Dimension	Chi square
1.	4.50	3.48	-1.02	-1.08	1.0451
2.	4.60	3.53	-1.07		
3.	4.42	3.41	-1.01		
4.	4.45	3.23	-1.22		

Assurance					
Statement	E-score	p-score	SERVQUAL Score	Average Dimension	Chi square
1.	4.52	3.48	-1.04	-1.02	1.1684
2.	4.55	3.83	-0.72		
3.	4.52	3.38	-1.14		
4.	4.54	3.33	-1.21		
5.	4.63	3.64	-0.99		

Empathy					
Statement	E-score	p-score	SERVQUAL Score	Average Dimension	Chi square
1.	4.48	3.12	-1.36	-1.25	2.1284
2.	4.52	3.27	-1.25		
3.	4.38	2.99	-1.39		
4.	4.41	3.05	-1.36		
5.	4.32	3.28	-1.04		
6.	4.50	3.42	-1.08		

Table 10: GAP MODEL FOR PRIVATE SECTOR BANKS

Tangibility					
Statement	E-score	p-score	SERVQUAL Score	Average Dimension	Chi square
1.	4.52	3.96	-0.56	-0.68	0.7449
2.	4.31	3.89	-0.42		
3.	4.42	3.90	-0.52		
4.	4.55	3.86	-0.69		
5.	4.69	3.80	-0.89		
6.	4.57	3.80	-0.77		
7.	4.75	3.85	-0.90		

Reliability					
Statement	E-score	p-score	SERVQUAL Score	Average Dimension	Chi square
1.	4.48	3.91	-0.57	-0.77	0.5195
2.	4.62	3.85	-0.77		
3.	4.76	3.90	-0.86		
4.	4.63	3.76	-0.87		

Responsiveness					
Statement	E-score	p-score	SERVQUAL Score	Average Dimension	Chi square
1.	4.74	3.92	-0.82	-0.80	0.5574
2.	4.77	4.21	-0.56		
3.	4.62	3.71	-0.91		
4.	4.64	3.75	-0.89		

Assurance					
Statement	E-score	p-score	SERVQUAL Score	Average Dimension	Chi square
1.	4.57	3.85	-0.72	-0.77	0.6678
2.	4.64	4.21	-0.43		
3.	4.67	3.77	-0.90		
4.	4.68	3.80	-0.88		
5.	4.71	3.80	-0.91		

Empathy					
Statement	E-score	p-score	SERVQUAL Score	Average Dimension	Chi square
1.	4.52	3.89	-0.62	-0.88	1.05
2.	4.71	3.60	-1.11		
3.	4.72	4.16	-0.56		
4.	4.65	3.65	-1.00		
5.	4.62	3.56	-1.06		
6.	4.73	3.81	-0.92		

VIII. DATA INTERPRETATION

The major findings of the study are given below on the basis of analysis and interpretation.

- The result of the study reveals that the majority of the respondents of public sector banks and private sectors banks are male (69.2%) and belong to the age group of 35-45 years (26.10%).
- Majority of the respondents for this study are post graduate (34.15%), private employees (29.76%) and are

having income in the range of Rs.25, 000- 40, 000 (30.98%)

- A Chi-square analysis was performed to determine the impact of SERVQUAL with banking services. The results are summarized in Tables 6, 7, 8, 9 and 10.
- It is evident from the above tables 6, 7 and 8 that the χ^2 calculated value at 5% level of significance is 29.347 while the χ^2_{tab} is 9.488.
- Since in this case $\chi^2_{cal} > \chi^2_{tab}$ hence null hypothesis is rejected and alternative hypothesis is accepted i.e.
- Preference towards public/private sector banks and age group is dependent on each other.
- From the tables 9 and 10 SERVQUAL dimension, Tangibility (Modern looking equipment, physical facilities appearance communication material) has χ^2_{cal} 1.0561 for public sector banks and χ^2_{cal} 0.7449 for private sector banks respectively. Both the values are much lower than χ^2_{tab} 12.592 which shows that for tangibility dimension the expected and perceived scores are nearly same at 5% level of significance. And the same trends are observed for other dimensions like reliability (Timely service, error free records, ability to perform the promised service dependably and accurately), Responsiveness (Willingness to help and provide prompt service), Assurance (Knowledge and courtesy of employees and their ability to convey trust and confidence) and Empathy (The firm provides individual attention, care, understanding specific needs and maintain long term customer relationships).
- SERVQUAL SCORE of tangibility suggests that public sector banks need to improve their infra structure and ambience to compete with private sector banks.
- According to SERVQUAL SCORE of responsiveness and empathy training on stress management and better public dealing should be imparted to the employees of public sector banks.
- The overall customers' attitude towards bank services is that they are satisfied with the services provided by their banks. But still customers expect more and better services to be provided.

IX. CONCLUSIONS

In the modern marketing customer satisfactions is of paramount importance. The study on service quality in selected banks is measured in five dimensions by using SERVQUAL scale developed by Parasuraman et al (1988). The number of responses in the present research reveals that there exists a small perceptual difference regarding overall service quality with the respective banks. The respondents of both the banks mostly concentrate on the staffs of the banks for improving customer satisfaction while the bank have more concentration on the tangible factor like a computerization, physical facilities, etc. to attract the customers. The dimensions Reliability, Responsiveness and Assurance are found to be the most vital and strategic determinants of service quality and customer satisfaction for both public and private sector banks. If banks want to sustain customers on a long term basis, bankers should

work towards 100% customer satisfaction that automatically foster customer delight.

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A Synchronous Cuk Converter Based Photovoltaic Energy System Design and Simulation

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Abstract- In this paper, a synchronous cuk converter proposed for analyzing the performance of photovoltaic system is presented. In the proposed cuk converter, the conduction losses and switching losses are reduced. The conduction losses are reduced by replacing the diode with MOSFET and the switching losses are reduced by providing an auxiliary circuit. The proposed converter system is operated based on the soft switching techniques. These switching techniques are to provide smooth transition of voltage and current. So, the conversion efficiency of the PV system is improved and the load meeting the dynamic energy requirement is in an efficient way. It has a significant advantage over other inverting topologies since they enable low voltage ripple on both the input and the output sides of the converter. Then, the different operation mode of proposed synchronous cuk converter is analyzed at different operating condition of auxiliary and main circuit. From the operating mode, the output current of each modes are determined. The proposed synchronous cuk converter implemented in MATLAB simulation platform and the output performance is analyzed.

Index Terms- cuk converter, synchronous cuk converter, photovoltaic system, MOSFET, auxiliary and main circuit.

I. INTRODUCTION

Renewable sources of energy acquire growing importance due to massive consumption and exhaustion of fossil fuel [4] [11] [12]. Generally, solar energy conversion systems can be classified into two categories: thermal systems which convert solar energy into heat and photovoltaic systems which convert solar energy to electricity [3]. Among several renewable energy sources, Photovoltaic arrays are used in many applications such as water pumping, battery charging, hybrid vehicles, and grid connected PV systems [5]. Photovoltaic system is the direct conversion of sunlight to electricity [1]. They are highly reliable and constitute a nonpolluting source of electricity, which can be appropriate for many applications [2].

For storage or other DC components to be used in conjunction with AC loads, some type of power conversion capability is required [6]. Considering that the output characteristic of a photovoltaic cell has a wide voltage range, depending on the operating conditions of a photovoltaic cell, the DC/DC converter needs to have a wide input voltage range to regulate the constant output voltage [7]. To achieve high step-up and high efficiency DC/DC converters is the major consideration in the renewable power applications due to the low voltage of PV arrays and fuel cells [10] [14]. The purpose of dc-dc converter is insure the impedance adaptation between the PV source

generation and the main utility by tracking the reference voltage required by the grid [9]. The DC-DC converter converts a DC input voltage, to a DC output voltage, with a magnitude lower or higher than the input voltage [8] [15] [17].

There are several different types of dc-dc converters, buck, boost, buck-boost and cuk topologies, have been developed and reported in the literature to meet variety of application specific demands. One advantage of these converters has high power efficiency [13] [16] [18]. Higher order dc-dc converters, such as the cuk converter, have a significant advantage over other inverting topologies since they enable low voltage ripple on both the input and the output sides of the converter [19]. As with other DC-DC converters the cuk converter can either operate in continuous or discontinuous current mode. However, unlike these converters, it can also operate in discontinuous voltage mode [20].

In this paper, a synchronous DC-DC cuk converter design and implement for photovoltaic application. The proposed synchronous cuk converter has a significant advantage over other inverting topologies since they enable low voltage ripple on both the input and the output sides of the converter. So, the performance of photovoltaic system and the output efficiency of converter is improved. The circuit diagram of synchronous cuk converter and the different mode of operation are described in section 3. Prior to that, the recent research works are given in section 2. In section 4, the results and discussion of synchronous converter based PV system are described. The section 5 concludes the paper.

II. RECENT RESEARCH WORKS: A BRIEF REVIEW

Numerous related research works are already existed in literature which based on DC-DC converter PV system. Some of them reviewed here.

Yu Kang Lo et al. [21] has presented a photovoltaic (PV) system parallel connected to an electric power grid with a power factor corrector (PFC) for supplying the dc loads. The operation principles and design considerations for the presented PV system were analyzed and discussed. The balanced distribution of the power flows between the utility and the PV panels was achieved automatically by regulating the output dc voltage of the PFC. Experimental results were shown to verify the feasibility of the proposed topology, which could effectively transfer the tracked maximum power from the PV system to the dc load, while the unity power factor was obtained at the utility side.

Ho-sung Kim et al. [22] has discussed that the photovoltaic (PV) power conditioning system (PCS) must have high

conversion efficiency and low cost. Generally, a PV PCS uses either a single string converter or a multilevel module integrated converter (MIC). Each of these approaches has both advantages and disadvantages. For a high conversion efficiency and low cost PV module, a series connection of a module integrated DC-DC converter output with a photovoltaic panel was proposed. The output voltage of the PV panel was connected to the output capacitor of the fly-back converter. Thus, the converter output voltage was added to the output voltage of the PV panel. The isolated DC-DC converter generates only the difference voltage between the PV panel voltage and the required total output voltage. This method reduces the power level of the DC-DC converter and enhances energy conversion efficiency compared with a conventional DC-DC converter.

Athimulam Kalirasu et al. [23] has presented simulation of open loop and closed loop controlled boost converter system for solar installation system. MATLAB models for open loop and closed loop systems were developed using the blocks of simulink and the same are used for simulation studies. The closed loop system was able to maintain constant voltage. These converters have advantages like reduced hardware and good output voltage regulation. Thus the boost converter was capable of improving the voltage level from 15 V to the required level.

Arun K. Verma et al. [24] has investigated the solar power generation isolated portable system using a boost converter and a single stage sine wave boost inverter. The proposed configuration boosts the low voltage of photovoltaic (PV) array using a dc-dc boost converter to charge the battery at 96V and to convert this battery voltage into high quality 230V rms ac voltage at 50Hz for feeding autonomous loads without any intermediate conversion stage and a filter. A maximum power point tracking (MPPT) scheme was proposed with series connection of a dc-dc converter input with a PV panel for high efficiency.

M. Vaigundamoorthi et al. [25] has analyzed and designed the high efficient modified soft controlled (ZVS-PWM) Active-Clamping Cuk (buck- boost type) converter to extract maximum power from solar Photo Voltaic (PV) module. The solar PV module, Maximum Power Point Tracking (MPPT), ZVS based Cuk converter have been modeled and simulated in MATLAB/Simulink. Using Perturb and Observer (PAO) algorithm, the maximum power was tracked from solar PV module. In order to reduce the switching losses across the switches, the soft switching has been implemented for all the three active switches of modified Cuk converter, resulting in high conversion efficiency at high-frequency operation, improved transient, and steady state response without significant increase in voltage and current stresses on switches.

A.Kalirasu et al. [26] has presented simulation of open loop and closed loop controlled buck converter system for solar installation system. MATLAB models for open loop and closed loop systems are developed using the blocks of simulink and the same are used for simulation studies. The closed loop system is able to maintain constant voltage. This converter has advantages like reduced hardware and good output voltage regulation. The simulation results are in line with the theoretical predictions.

W.M.Utomo et al. [27] has proposed a neural network control scheme of a DC-DC Buck-Boost converter to produce variable DC voltage source that would be applied on DC motor

drives. In this technique, a back propagation learning algorithm was derived. The controller was designed to track the output voltage of the DC-DC converter and to improve performance of the Buck-Boost converter during transient operations. Furthermore, to investigate the effectiveness of the proposed controller, some operations such as starting-up and reference voltage variations were verified.

The review of the recent research works reveals that, the DC-DC converter based photo voltaic (PV) energy system is applied various convenient applications. It converts one DC voltage level to another, by storing the input energy temporarily and then releasing that energy to the output at a different voltage. In the time of conversion process, the MOSFET switching frequency is increased so switching power loss is occurred. Therefore, the switching driver circuit is needed for driving the device without switching losses. In recently, the synchronous buck converter is used to reduce the switching loss in the main MOSFET over conventional dc-dc buck converter. The drawbacks of synchronous buck converter is that it converts only the limited range voltage, so it can be used only for low switching frequency applications. Also, in higher order application, the converter topologies have the disadvantage that the high voltage ripples are present on both the input and the output sides of the converter. Thus, a soft switching based converter is required for reducing the power loss.

To overcome this problem, in this paper a synchronous cuk converter based PV system is proposed. The proposed cuk converter improves the performance of PV system so that the converter performance is also improved. In the proposed converter, the conduction loss is to be reduced by replacing the diode with MOSFET, but also switching losses is reduced by providing an auxiliary circuit. The proposed converter system is operated based on the soft switching techniques. These switching techniques are used to provide for smooth transition of voltage and current. So, the conversion efficiency of the PV system is improved and the load meeting the dynamic energy requirement is in an efficient way. The proposed synchronous cuk converter is have a significant advantage over other inverting topologies since they enable low voltage ripple on both the input and the output sides of the converter.

III. PROPOSED SYNCHRONOUS CUK CONVERTER

The proposed synchronous cuk converter is the extension of classical converter but, for making the synchronous operation, the auxiliary circuit is added. The structure of proposed synchronous cuk converter is illustrated in figure 1. In the proposed cuk converter, the input side and output side inductors are denoted as L_1 and L_2 respectively. The output capacitor and inductor acts as filter circuit providing only the DC component and filtering the AC component. Here, three MOSFETs are used as main switch as well as auxiliary switches which are denoted as S, S_1 and S_2 . The auxiliary switches S_1 and S_2 are parallel with the main switch. The resonant capacitor and resonant inductor are denoted as C_r and L_r . The resonant capacitor is charged at normal operation and it

discharges the voltage during abnormal operation and the diode is conducted. The resonant capacitor is providing the time delay and to minimize the switching losses of converter. So this synchronous converter can be used for high as well as low switching frequencies. The output voltage, current, resistance and capacitor are denoted as V_o, I_o, R_o and C_o respectively. Then, the current capacitor across the main circuit is denoted as C_r . The resistance across the MOSFETs S, S_1 and S_2 are denoted as $r_o, r_{o(1)}$ and $r_{o(2)}$ respectively. The proposed cuk converter circuit L_1 ram is given as follo C_S them. L_2

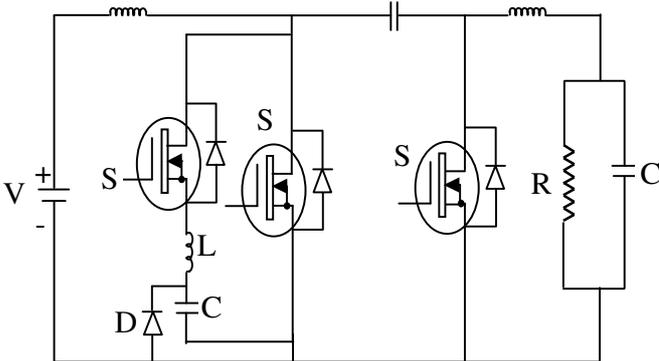


Figure 1: Structure of Proposed Synchronous Cuk Converter.

From the above diagram, the main switch and auxiliary switch are not subjected to additional voltage stresses but the main switch has more current stress in comparison to the auxiliary one. The output inductor is chosen such that the output current is kept constant and the output capacitor is chosen in such a way that the output voltage remains constant and ripple free as well. The resonant capacitor and resonant inductor are calculated as following formula.

$$C_r = \frac{I_{in(max)} T_D (\alpha - 1)^2}{V_o \left(1 + \frac{\pi(\alpha - 1)}{2}\right)} \tag{1}$$

$$L_r = \frac{V_o T_D}{I_{in(max)} \left(1 + \frac{\pi(\alpha - 1)}{2}\right)} \tag{2}$$

Where, T_D is the delay time and α is the stress factor. Then, the above circuit is converted into equivalent circuit model and from the model, the output current is calculated by following formula.

$$I_o = I_s - \frac{1}{V_s} \left(r_o + r_{o(1)} + r_{o(2)} + j\omega L_r + \frac{1}{j\omega} \cdot \left(\frac{1}{C_r} + \frac{1}{C_s} \right) \right) \tag{3}$$

Then, the values of resonant capacitor and resonant inductor are substituted in equation (3), and the modified equation is given as following formula.

$$I_o = I_s - \frac{1}{V_s} \left(r_o + r_{o(1)} + r_{o(2)} + j\omega \left(\frac{V_o T_D}{I_{in(max)} \left(1 + \frac{\pi(\alpha - 1)}{2}\right)} \right) + \frac{1}{j\omega} \left(\frac{V_o \left(1 + \frac{\pi(\alpha - 1)}{2}\right)}{I_{in(max)} T_D (\alpha - 1)^2} + \frac{1}{C_s} \right) \right) \tag{4}$$

The output resistance of MOSFET is varied in two different operating points. The two operating points are linear and saturation. In these two different operating points, the output resistance values are tabulated as follows.

Table I: MOSFET Output Resistance.

Operating Points	r_o	$r_{o(1)}$	$r_{o(2)}$
Linear	$\frac{1}{K(V_{GS} - V_S)}$	$\frac{1}{K_{(1)}(V_{GS(1)} - V_S)}$	$\frac{1}{K_{(2)}(V_{GS(2)} - V_S)}$
Saturation	$\frac{1}{K(V_{GS} - V_S)^{\lambda}}$	$\frac{1}{K_{(1)}(V_{GS(1)} - V_S)^{\lambda_{(1)}}$	$\frac{1}{K_{(2)}(V_{GS(2)} - V_S)^{\lambda_{(2)}}$

3.1. Different Operating Modes of Proposed Synchronous Cuk Converter

The different operating modes are derived from the equivalent circuit model of synchronous cuk converter. The operating modes are based on zero-voltage switching (ZVS) and zero-current switching (ZCS). These operating modes are selected by the main and auxiliary MOSFET switching. As per the operation of main and auxiliary circuit, the operating modes of synchronous cuk converter are categorized into eight modes. The circuit diagrams of eight modes are illustrated as follows.

Mode I:

In the mode I operation, the main circuit MOSFET is ZVS and the auxiliary circuit MOSFET S_2 is also ZVS. But, in the second auxiliary circuit, the MOSFET diode is only ZCS. Then, in mode I, the resonant capacitor C_r and resonant inductor L_r are conducted. The mode I operation equivalent circuit is given below. As per the conduction of equivalent circuit, the output current expression of mode I is given as follows.

$$I_o = I_s - \frac{1}{V_s} \left(r_{o(1)} + j\omega \left(\frac{V_o T_D}{I_{in(max)} \left(1 + \frac{\pi(\alpha - 1)}{2}\right)} \right) + \frac{1}{j\omega} \left(\frac{V_o \left(1 + \frac{\pi(\alpha - 1)}{2}\right)}{I_{in(max)} T_D (\alpha - 1)^2} \right) \right) \tag{5}$$

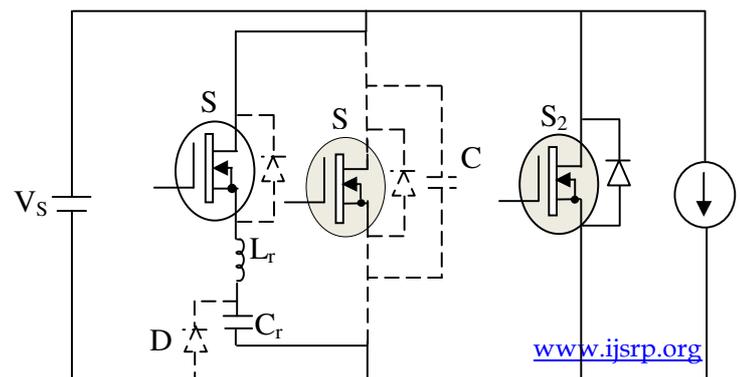


Figure 2: Equivalent Circuit of Mode I.

Mode II:

In mode II, the auxiliary circuit diodes are not conducted but, the MOSFET S_1 and S_2 are ZCS. Also, the resonant capacitor and resonant inductor are activated. The main circuit components go to ZVS. The current capacitor across the main circuit is not charged. The equivalent circuit model of mode II operation is given below. From the equivalent circuit model, the output current I_o expression is developed and it is given as follows.

$$I_o = I_s - \frac{1}{V_s} \left(r_{o(1)} + r_{o(2)} + j\omega \left(\frac{V_o T_D}{I_{n(max)} \left(1 + \frac{\pi(\alpha-1)}{2} \right)} \right) + \frac{1}{j\omega} \left(\frac{V_o \left(1 + \frac{\pi(\alpha-1)}{2} \right)}{I_{n(max)} T_D (\alpha-1)^2} \right) \right) \quad (6)$$

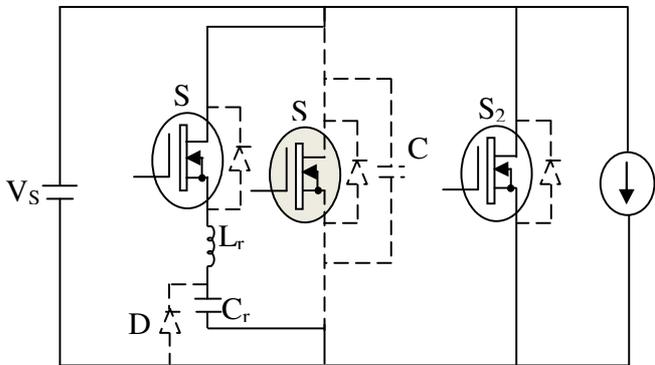


Figure 3: Equivalent Circuit of Mode II.

Mode III:

In mode III, the auxiliary circuit diodes are not conducted but, the MOSFET S_1 is ZCS and the MOSFET S_2 is ZVS. Also, the resonant capacitor and resonant inductor are activated. The main circuit MOSFET goes to ZVS and the MOSFET diode is conducted. The current source capacitor across the main circuit is not charged. The equivalent circuit model of mode III operation is given below. From the equivalent circuit model, the output current I_o expression is developed and it is given as follows.

$$I_o = I_s - \frac{1}{V_s} \left(r_{o(1)} + j\omega \left(\frac{V_o T_D}{I_{n(max)} \left(1 + \frac{\pi(\alpha-1)}{2} \right)} \right) + \frac{1}{j\omega} \left(\frac{V_o \left(1 + \frac{\pi(\alpha-1)}{2} \right)}{I_{n(max)} T_D (\alpha-1)^2} \right) \right) \quad (7)$$

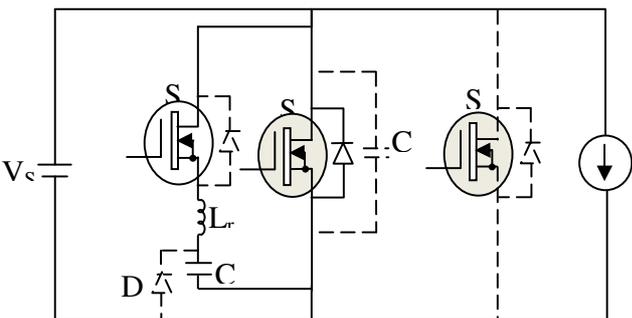


Figure 4: Equivalent Circuit of Mode III.

Mode IV:

In mode IV, the auxiliary circuit diodes are not conducted but, the MOSFET S_1 is ZCS and the MOSFET S_2 is ZVS. Also, the resonant capacitor and resonant inductor are activated. The main circuit MOSFET goes to ZCS and the MOSFET diode is not conducted. The current source capacitor across the main circuit is not charged. The equivalent circuit model of mode IV operation is given below. From the equivalent circuit model, the output current I_o expression is developed and it is given as follows.

$$I_o = I_s - \frac{1}{V_s} \left(r_{o(1)} + r_{o(2)} + j\omega \left(\frac{V_o T_D}{I_{n(max)} \left(1 + \frac{\pi(\alpha-1)}{2} \right)} \right) + \frac{1}{j\omega} \left(\frac{V_o \left(1 + \frac{\pi(\alpha-1)}{2} \right)}{I_{n(max)} T_D (\alpha-1)^2} \right) \right) \quad (8)$$

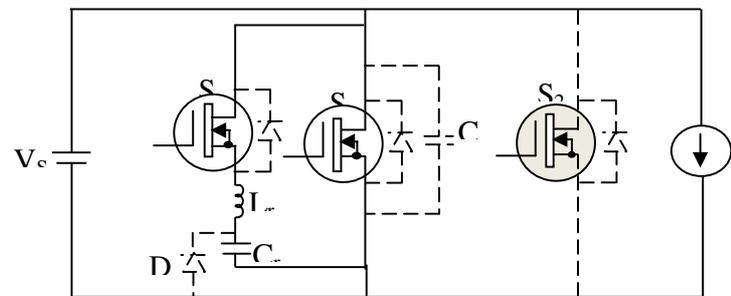


Figure 5: Equivalent Circuit of Mode IV.

Mode V:

In mode V, the auxiliary circuit MOSFET diodes one is conducted and other is not conducted but, the MOSFET S_1 and S_2 are ZVS. Also, the resonant capacitor and resonant inductor are activated. The main circuit MOSFET goes to ZCS and the MOSFET diode is not conducted. The current source capacitor across the main circuit is not charged. The equivalent circuit model of mode V operation is as follows. From the equivalent circuit model, the output current I_o expression is developed and it is given as follows.

$$I_o = I_s - \frac{1}{V_s} \left(r_{o(1)} + j\omega \left(\frac{V_o T_D}{I_{n(max)} \left(1 + \frac{\pi(\alpha-1)}{2} \right)} \right) + \frac{1}{j\omega} \left(\frac{V_o \left(1 + \frac{\pi(\alpha-1)}{2} \right)}{I_{n(max)} T_D (\alpha-1)^2} \right) \right) \quad (9)$$

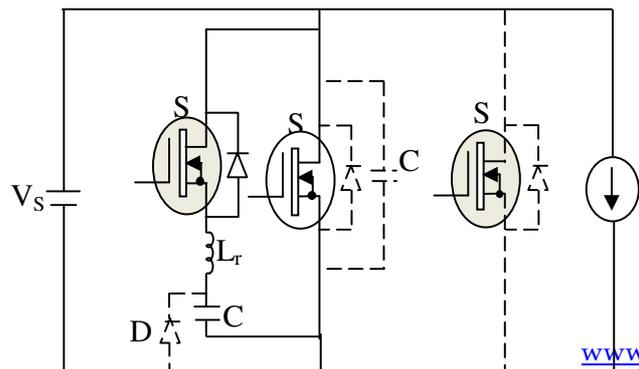


Figure 6: Equivalent Circuit of Mode V.

Mode VI:

In mode VI, the auxiliary circuit MOSFET diodes are not conducted, the MOSFET S_1 and S_2 are ZVS. Also, the resonant capacitor and resonant inductor are inactivated. The main circuit MOSFET goes to ZCS and the MOSFET diode is not conducted. The current source capacitor across the main circuit is not charged. The equivalent circuit model of mode VI operation is as follows. From the equivalent circuit model, the output current I_o expression is developed and it is given as follows.

$$I_o = I_s - \frac{r_D}{V_s} \quad (10)$$

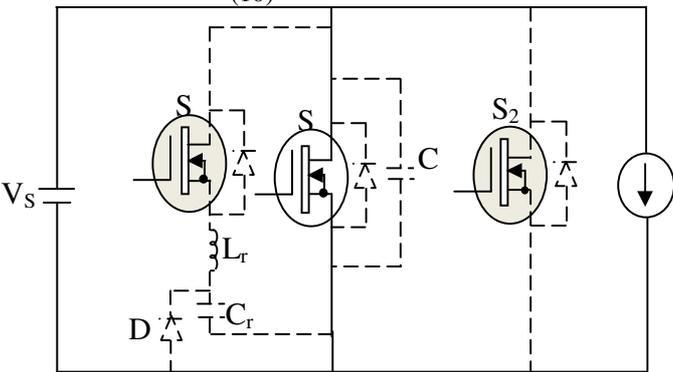


Figure 7: Equivalent Circuit of Mode VI.

Mode VII:

In mode VII, the auxiliary circuit MOSFET diodes are not conducted, the MOSFET S_1 and S_2 are ZVS. Also, the resonant capacitor is activated and resonant inductor is inactivated. Due to the reason, the auxiliary circuit diode is conducted. The main circuit MOSFET goes to ZVS and the MOSFET diode is not conducted. The current source capacitor across the main circuit is not charged. The equivalent circuit model of mode VII operation is as follows. From the equivalent circuit model, the output current I_o expression is developed and it is given as follows.

$$I_o = I_s - \frac{1}{V_s} \left(\frac{1}{j\omega} \left(\frac{V_o (1 + \frac{\pi(\alpha-2)}{2})}{I_{in(max)} T_D (\alpha-1)^2} \right) \right) \quad (11)$$

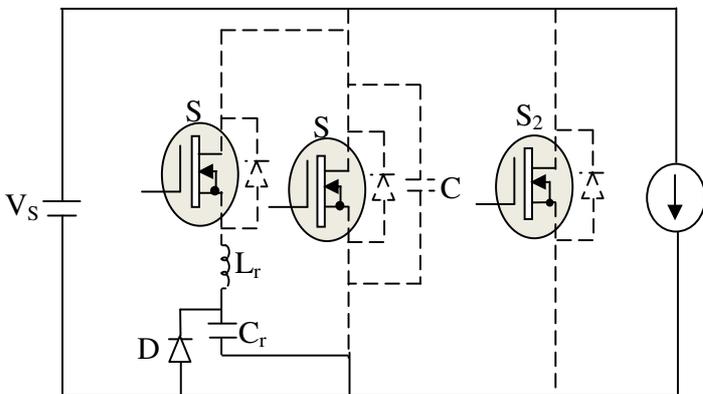


Figure 8: Equivalent Circuit of Mode VII.

Mode VIII:

In mode VIII, the auxiliary circuit MOSFET diodes are not conducted; the MOSFET S_1 is ZVS and MOSFET S_2 is ZCS. Also, the resonant capacitor and resonant inductor are inactivated. The main circuit MOSFET goes to ZVS and the MOSFET diode is not conducted. The current source capacitor across the main circuit is not charged. The equivalent circuit model of mode VIII operation is as follows. From the equivalent circuit model, the output current I_o expression is developed and it is given as follows.

$$I_o = I_s - \frac{r_D(\alpha)}{V_s} \quad (12)$$

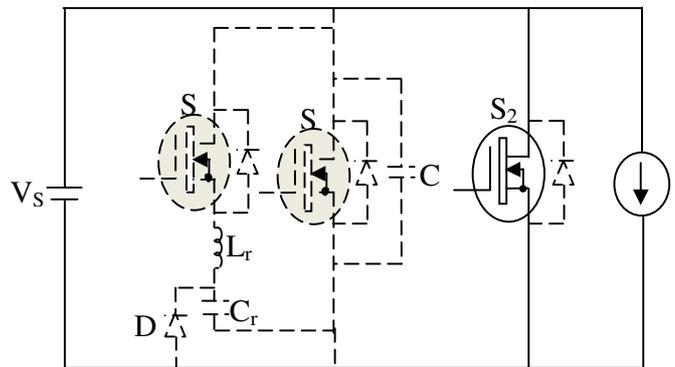


Figure 9: Equivalent Circuit of Mode VIII.

IV. RESULTS AND DISCUSSION

The proposed synchronous DC-DC cuk converter was designed and simulated in MATLAB working platform. Then, the performance of synchronous cuk converter was tested with photovoltaic renewable energy system. The simulink model of synchronous cuk converter and the simulink model of cuk converter with photovoltaic system are illustrated in Fig.10 and Fig 11 respectively. From the model, the main MOSFET output voltage, and the output current performance are given in Figure 14 and 15 respectively. The V-P characteristics and V-I characteristics of PV system are illustrated in Figure 12 and 13. The implementation parameters of the proposed model are tabulated as follows.

Table I: Implementation Parameters.

Component	Parameters	Values
PV System	Short circuit current (I_{sc})	5.45A
	Open circuit voltage (V_{oc})	22.2V
	Current at P_{max}	4.95A

	Voltage at P_{max}	17.2V
MOSFET	FET resistance (R_{on})	0.1 Ohms
	Internal diode resistance (R_d)	0.01 Ohms
	Snubber resistance (R_s)	1e5 Ohms
	Resonant capacitor (C_r)	0.2 μ F
	Resonant Inductor (L_r)	200nH
	Series Capacitor (C_s)	0.05nF

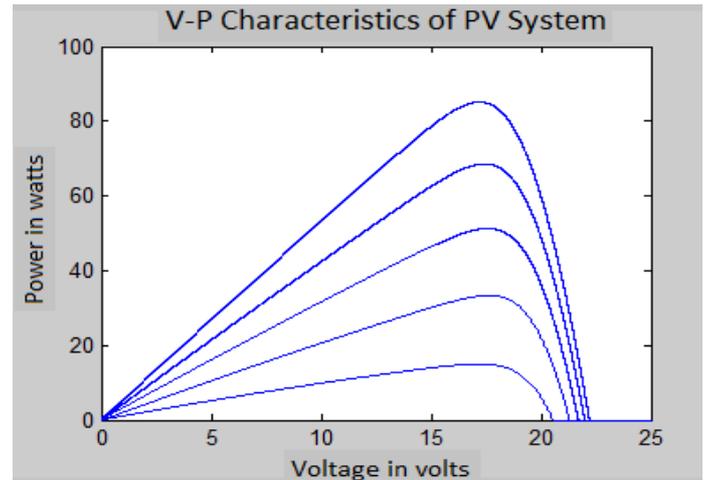


Figure 12: Performance of V-P of PV system.

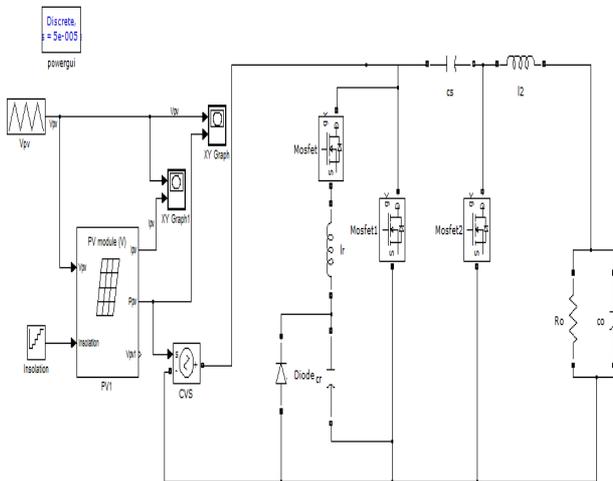


Figure 10: Simulink model of synchronous Cuk converter with PV system.

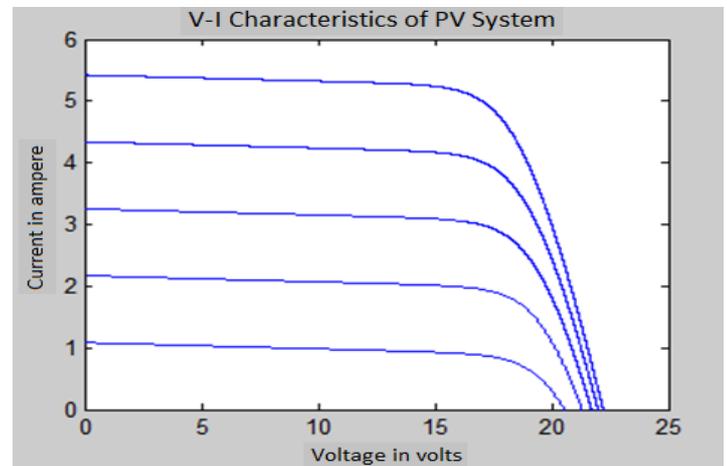


Figure 13: Performance of V-I of PV system.

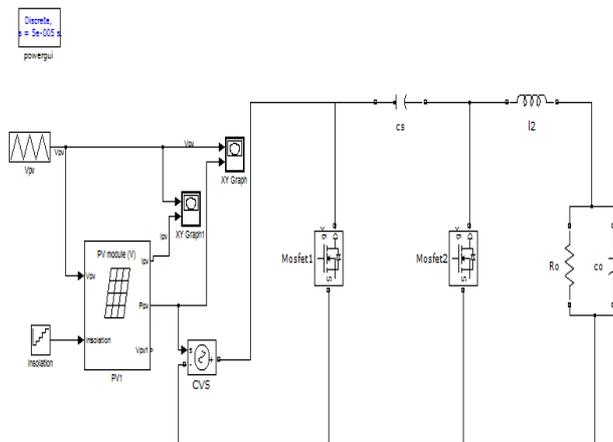


Figure 11: Simulink model of Cuk converter with PV system.

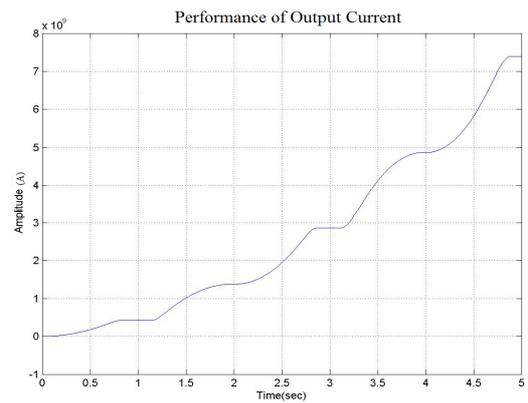


Figure 14: Performance of output current of proposed Cuk converter.

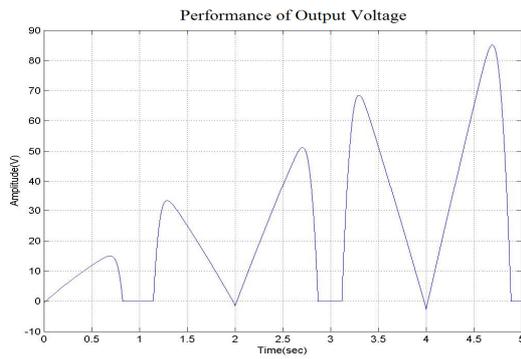


Figure 15: Performance of output voltage of proposed cuk converter.

From the above performances, the output voltage and output current of cuk converter are evaluated at different simulation period. According to the simulation period variations, the output power of the photovoltaic system is varied. Also, the output power of the proposed cuk converter is evaluated. The evaluated values are tabulated as following them (Table II). Similarly, the output current, voltage and power of cuk converter is evaluated using the model which represented in Figure 11.

Table II: Output voltage, current and power of synchronous cuk converter.

Time in sec	Output voltage in volts	Output current in amp	Output power in watts
T=1	15	0.5	7.5
T=2	34	1.5	51
T=3	52	2.8	145
T=4	68	4.8	326.4
T=5	85	7.4	629

In Table II, the voltage (V_o) and current (I_o) are calculated from figure 5 and 6. Using these calculated values, the output power is calculated ($P_o = V_o * I_o$). Then the converter efficiency of both proposed synchronous cuk converter and cuk converter are calculated. The converter efficiency expression is given as following them.

$$\text{Converter efficiency} = \frac{P_o}{(P_o + \text{converter losses})} \times 100$$

The converter losses are varied in both synchronous cuk converter and cuk converter. In proposed synchronous cuk converter, the converter loss is 190 mW (0.19W). The converter loss of cuk converter is 445 mW (0.445W). These converter losses are based on the main MOSFET switching time. From the analyzed values, the following performances are obtained. The performance of synchronous cuk converter output power, performance of converter efficiency and performance of efficiency deviation are illustrated in Figure 16, 17 and 18

respectively. Then, the efficiency deviation of proposed converter is calculated by the following expression.

$$\text{Efficiency deviation} = \frac{\text{Efficiency}(\text{synchronous cuk converter} - \text{cuk converter})}{\text{synchronous cuk converter}}$$

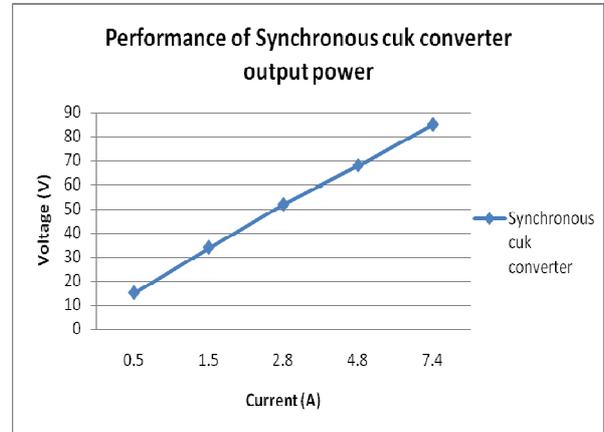


Figure 16: Performance of synchronous cuk converter output power.

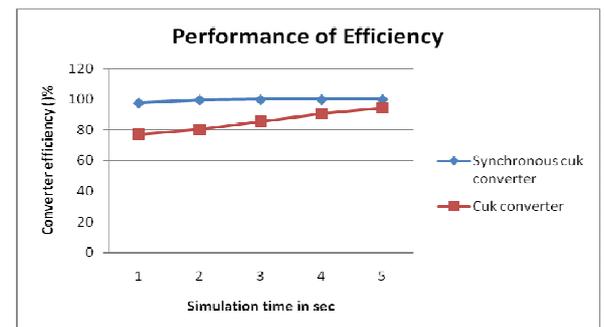


Figure 17: Performance of converter efficiency.

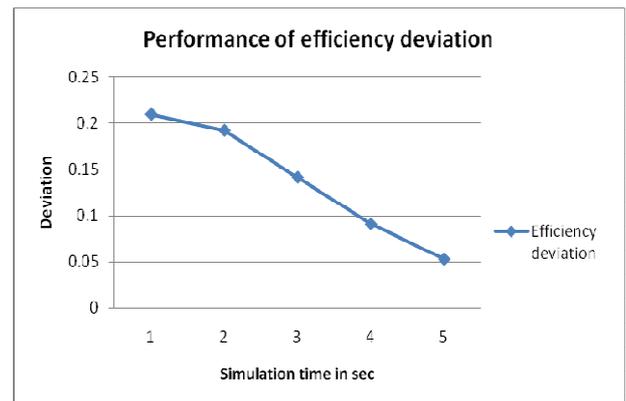


Figure 18: Performance of efficiency deviation.

From the comparative analysis, it is revealed that the proposed synchronous cuk converter is better when compared to the cuk converter. The proposed converter efficiency is deviated more than the cuk converter. Hence, the proposed synchronous cuk converter is better than the cuk converter for the photovoltaic application.

V. CONCLUSION

The proposed synchronous cuk converter was simulated in MATLAB simulation platform and the output performance was evaluated. Then, the mode of operation of proposed converter was analyzed by the operating condition of auxiliary and main circuit. From the eight operating mode circuit, the output currents were calculated. For evaluating the output performance, the proposed synchronous cuk converter output was tested with one PV system. From the testing results, the output power of the synchronous converter, the converter efficiency, and the efficiency deviation were analyzed. The analyses showed that the proposed synchronous cuk converter was better when compared to cuk converter.

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Real-Time PCR for the Rapid detection of common β -Thalassemia mutation in Gujarat

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Abstract- The inherited Haemoglobinopathies are autosomal recessive disorder including beta Thalassemia. Out of 200 different mutations causing β Thalassemia, IVS 1-1, IVS 1-5, Codon 41-42, Codon 8-9, and Codon 619 Bp deletion are most common in Gujarat Thalassemic patients. Rapid technique of prenatal diagnosis of only IVS 1-1, IVS 1-5 and Codon 8-9 have been standardized in our lab and Prenatal Diagnosis of these mutations was implemented. The Roche Light Cycler 480 (LC 480) system was evaluated for qualitative diagnosis of common mutations in β Thalassemia in Hb beta gene. A total number of 60 whole blood samples from carrier couples, 11 CVS and 9 Amniotic fluid samples were obtained from antenatal mothers. For testing; LC480 system is more suitable and versatile. Real time PCR platform in a routine laboratory settings for the diagnosis of common mutations in β Thalassemia as noted above is the basis of the present study. DNA Samples used for amplification were obtained from CVS or Amniotic fluid and whole Blood samples. The Standardized mutations in our lab were detected using 2 sets of probes and one common set of universal primer, usually distinguishing mutants from the normal alleles. In Prenatal diagnosis of β Thalassemia mutations accuracy and the speed are of paramount importance taking only one and half hours by the entire procedures in our present study.

Index Terms- Beta Thalassemia, Real time PCR, MPLC, Prenatal Diagnosis

I. INTRODUCTION

Around 7% of the world populations are carriers of globin gene mutations in the α or β globin gene clusters (1). In view of above, Indian Red Cross Society, Gujarat State Branch carried out population screening for beta Thalassemia, during the period from 2004 -2011. It was observed from the carrier screening that 1000 infants are born each year with homozygous β Thalassemia disorder in Gujarat. (2) Hence there is need to develop cost effective diagnosis technique for prenatal diagnosis.

The Aim of the present Study was to develop new Real Time PCR assay protocol for the diagnosis of above 3 common mutations in β Thalassemia in Gujarat on the Light Cycler 480 system.

II. MATERIALS AND METHODS

2.1 Patients and Samples

60 Blood samples in EDTA vacuttes were collected in our lab from the antenatal couples and CVS /Amniotic fluid samples were collected by gynecologist from the antenatal mothers (3). In a Study of the molecular basis of β Thalassemia in Gujarat 5 different mutations have been identified (4). Amongst them only 3 mutations (IVS 1-1, IVS 1-5, and Codon 8-9) were standardized in our lab. For Control 10 Blood samples were also collected from healthy individuals. The test was performed after obtaining written consents from parents.

III. DNA EXTRACTION

For prenatal diagnostic assay 20 microlitre of amniotic fluid that is free of maternal blood or a pinhead sized clean chorionic villus sample (CVS) free of maternal tissue were obtained. A 20 microlitre blood sample was collected from each parent to confirm the diagnosis, before the amniocentesis or the CVS was performed.

For the isolation of DNA, proprietary magnetic glass particles and specialized MagNA Pure LC kits were used. DNA binds to Magnetic Glass Particles (MGPs) in the presence of a chaotropic salt at a pH>7.0. MGPs have a glass (silica) surface and a magnetic core. Nucleic acids are bound to the silica-surface of the MGPs in the presence of isopropanol and high concentration of chaotropic salts, which remove water from hydrated molecules in solution. Polysaccharides and proteins do not bind to the beads and are removed by sequential washing steps. Pure nucleic acids are then eluted from the beads by applying low-salt conditions and heat.

Once bound to the surface of the MGPs, the nucleic acids gets separated from the solution with a magnet. The advantage of this isolation technology is that it requires no centrifugation or any other manual steps (5-8).

IV. DESIGN OF OLIGONUCLEOTIDE PRIMERS AND PROBES:

PCR and mutation detection by melting curve analysis were performed on the LightCycler, which can simultaneously measure emitted signals from two different fluorophores. Forward primer,

New A 5'-gCTgTCATCACTTAgACCTCA-3' and Reverse primer New B 5'-CACAgTgCAgCTCACTCAg-3' annealing in the beta-globin at positions 42-63 and 629-611 respectively are used to amplify the 457 bp region spanning the IVSI-1, IVSI-5 and codon 8-9 mutations.

V. PROBES

Four sequence-specific fluorescent-labeled,

- 1) FITC IVI.5.6 5'-
TgCCCAgTTTCTATTggTCTCCTTAAACCTgTC--FL ,
- 2) Red705- IV1 5'-LC705-
TgTAACCTTgATACCAACCTgCCCA—PH
- 3) Sensor 5'-LC 640-gACTCCTgAggAgAAgTCTgC—PH
- 4) Anchor+ 5'CCTCAAACAgACACCATggTgCACC—FL

Probes were designed in collaboration with Tib Molbiol (Berlin, Germany) to span the IVSI-1, IVSI-5, Codon 8-9 mutations. The probe sequences were based on the wild type or the mutant sequence depending on the mutation. This is to maximize the difference in the probe melting temperature between the wild type and the mutant genotype (9). For example, Probe FITC IVI.5.6 was based on the wild type sequence and the difference in the probe melting temperature between the wild type (64.6 deg centigrade) and the Probe FITC IVI.5.6 is labeled with fluorescein at the 3' end and probe Red705- IV1 is labeled with fluorescein at the 5' end. Upon hybridization, the two probes come in close proximity resulting in fluorescence resonance energy transfer (FRET). During FRET, the FITC IVI.5.6 fluorescein is excited by the LC light source donating part of the excitation energy to the acceptor fluorophore of probe Red705 which then emits energy that is measured by the optical unit of the Light Cycler instrument.

VI. LIGHTCYCLER- PCR (LC-PCR) PROTOCOL

LC-PCR is performed using 5 microlitre DNA, 4 microlitre genotyping master, 0.2 microlitre of specific fluorescein labeled probes and 0.5 microlitre of primers with the LightCycler-Faststart DNA Master Hybridization Probes Kit (Roche Biodiagnostics, Mannheim, Germany) according to the manufacturer's recommendations in a final reaction volume of 20 microlitre using disposable glass capillaries. Cycling was started after a 5-min incubation period at room temperature to enable UNG activity. Forty amplification cycles are performed as follows: Denaturation and AmpliTaqGold activation (95 deg C for 10 Sec), annealing (58 deg C for 20 Sec), and extension (72 deg C for 25 Sec).

The ramp rates are programmed at 4.4 deg C/Sec from denaturation to annealing, 2.2 deg C/Sec from annealing to extension and 4.4 deg C/Sec from extension to denaturation. At the end of the amplification, a programme for melting curve was

set, analysis was added as follows: Heating to (95 deg C for 1 min), cooling to (40 deg C for 1 min), heating slowly at 85 deg C without holding time and a final recooling to 40 deg C for 30 Sec. Genotyping is decided after melting curve analysis is done by comparing the melting peaks of the suspected patient with that of individuals with known genotypes.(10-13)

This Technique is based on the employment of Real time PCR Quantification and melting curve formation for the mutation detection. This Method relies on the use of fluorescent -Labeled oligonucleotides probes hybridizing to complementary sequences harboring the mutation, hence producing curves with melting peaks that clearly distinguish between the wild type and the mutant genotypes

The temperature at which a DNA strand separates or melts when heated can vary over a wide range, depending on the sequence, the length of the strand, and the GC content of the strand. This effect is more pronounced for short DNA hybrids and is thus, the basis for probe based genotyping analysis.

In the case of hybridization probes, the separation of targets-probe hybrids results in the spatial separation of the fluorescence resonance energy transfer (FRET) partners and in a drop of fluorescence from the reporter dye at a certain temperature. The melting temperature or T_m , is defined as the point at which half the probes have melted off their target DNA sequence.

VII. RESULTS

The Light Cycler method was standardized by analyzing DNA from 80 beta Thalassemia heterozygotes and homozygotes as per the availability. All the cases were known, and previously diagnosed from RDB and ARMS PCR technique. 18 samples for IVSI-1, 15 samples for IVS 1-5, and 15 samples for codon 8-9 were analysed. A separate experiment was set up with each mutation with the appropriate pair of acceptor and donor probes. After melting curve analysis, the presence or absence of a mutation could be recognized by a noticeable shift in the melting peak as compared to wild type or known genotype control.

IVS1-1 mutation

A melting peak from Red 705 acceptor probe FITC donor probe using primer NEW A New B was observed at 58 ° centigrade indicating the IVS 1-1 mutation (Fig. 1) which accounts for 13.74 % in Gujarat Population. It was distinct from the melting peak of the wild type, observed at 67° centigrade. An IVS 1-1 homozygous individual shows a single peak at 58° centigrade (Fig 2). As compared to single peak at 67° centigrade for a homozygous normal individual. A heterozygous individual displays two peaks, one at 58° and one at 67° centigrade.

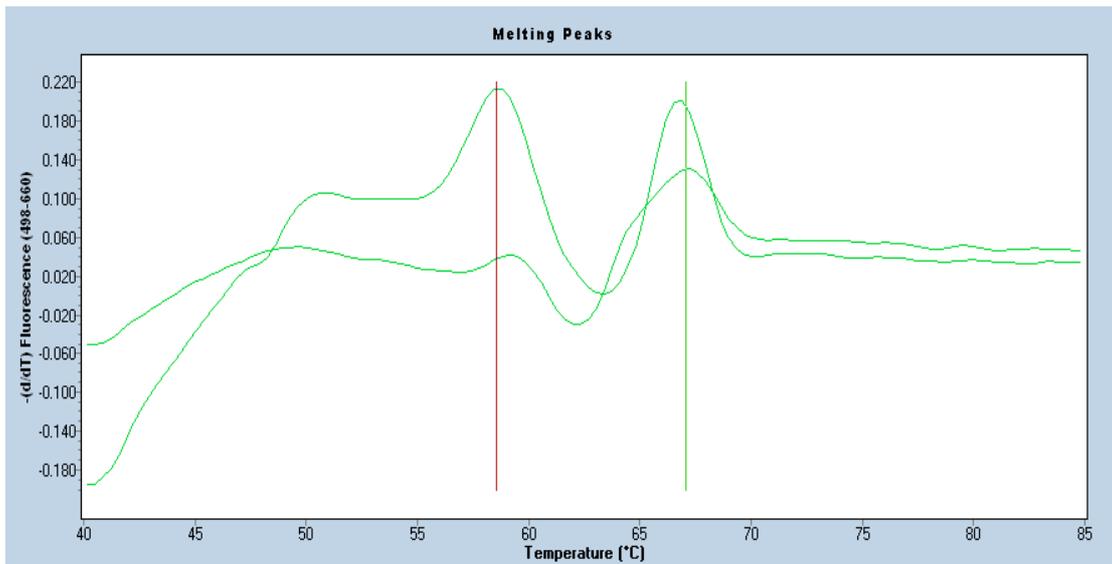


Figure 1- Melting curves for the heterozygous IVS 1-1 mutations in β Thalassemia

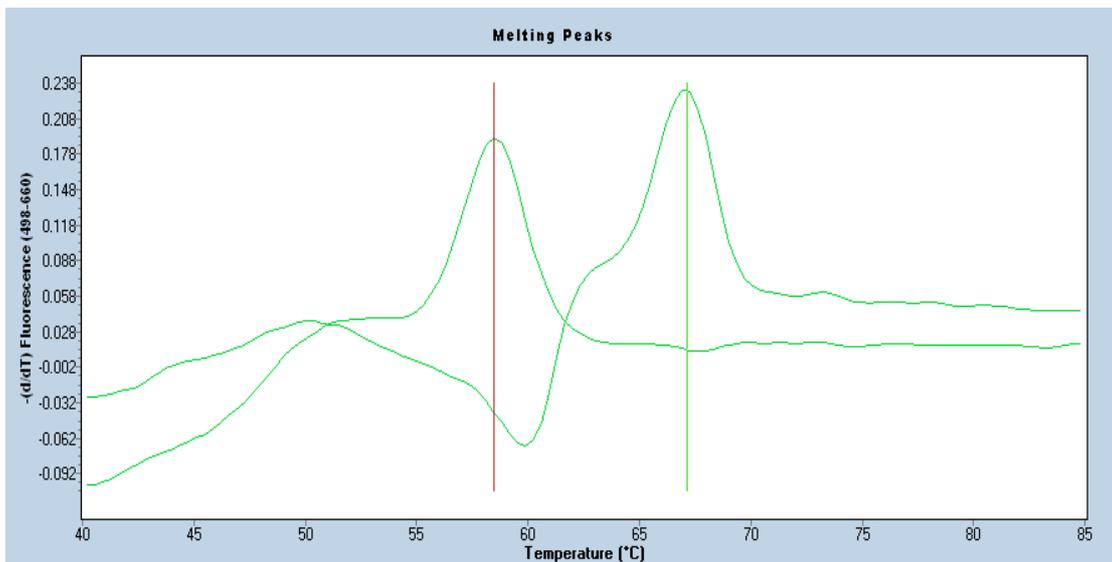


Figure 2- Melting curves for the Homozygous IVS 1-1 mutations in β Thalassemia

IV1- 5 mutation

A melting peak from Red 705 acceptor probe FITC donor probe using primer

New A New B was observed at 59° centigrade indicating the IVS 1-5 mutation which accounts for 41.34 % in Gujarat Population. It was distinct from the melting peak of the wild type, observed at 67° centigrade. An IVS 1-5 homozygous individual showed a single peak at 59° centigrade (Fig 4), as compared to single peak at 67° degree centigrade for a

homozygous normal individual. A heterozygous individual displays two peaks, one at 59° and one at 67° centigrade (Fig 3). However the shift of temperature in between IVS 1-1 and IVS I-5 is close to each other. In such cases, the IVSI-1 mutation was identified by use of ARMS PCR (14), And the IVSI-5 mutation was confirmed by digestion with *EcoRV* (15).

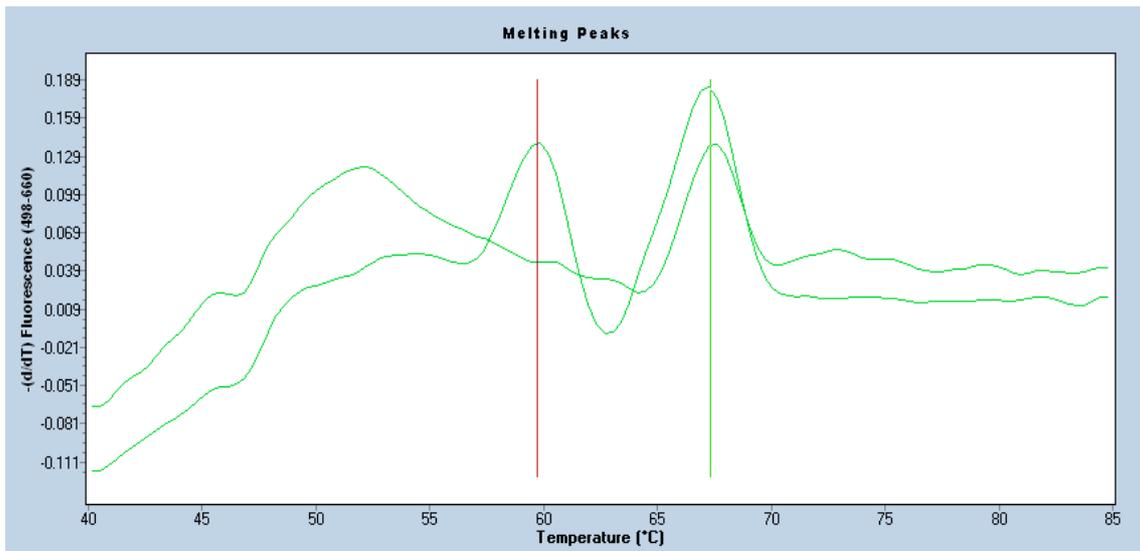


Figure 3- Melting curves for the heterozygous IVS 1-5 mutations in β Thalassemia

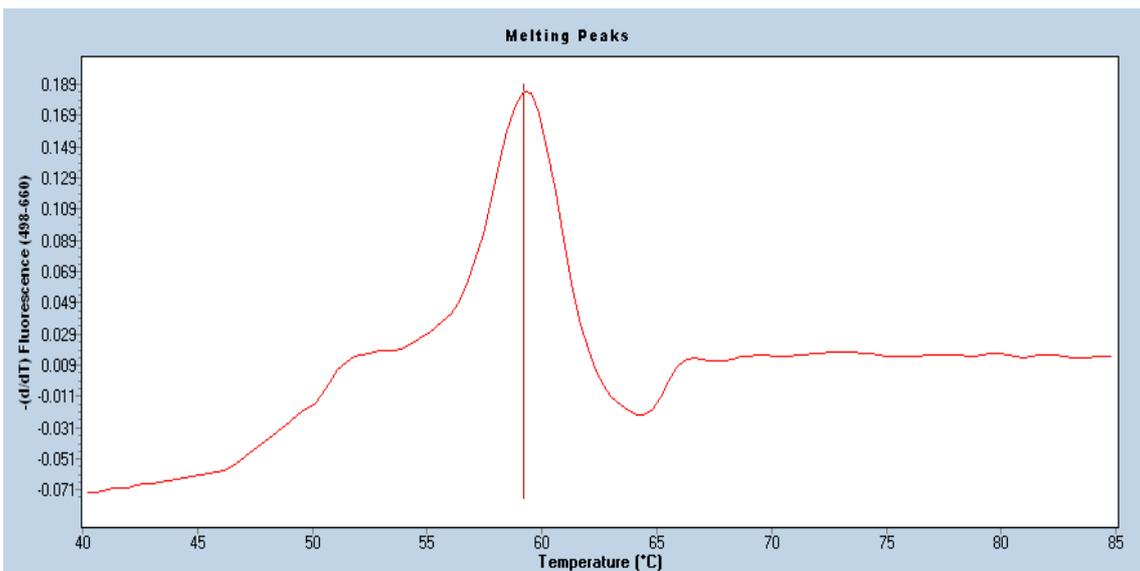


Figure 4- Melting curves for the homozygous IVS 1-5 mutations in β Thalassemia

CD 8-9

A melting peak from Sensor acceptor probe and Anchor +donor probe using primer NEW A New B was observed at 58 ° centigrade indicating the codon 8-9 mutation which accounts for 7.70 % in Gujarat Population. It was distinct from the melting peak of the wild type, observed at 64° centigrade. Codon 8-9

homozygous individual shows a single peak at 58° centigrade (Fig 5), As compared to single peak at 64° centigrade for a homozygous normal individual. A heterozygous individual displays two peaks, one at 58° and one at 64° centigrade (Fig 6).

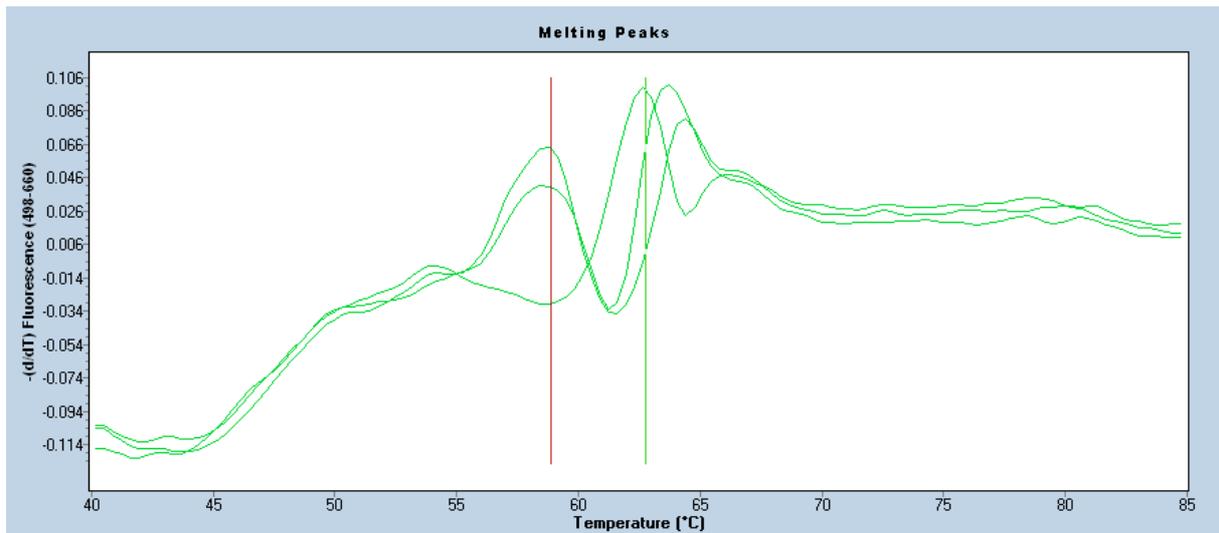


Figure 5- Melting curves for the heterozygous Codon 8-9 mutation in β Thalassemia

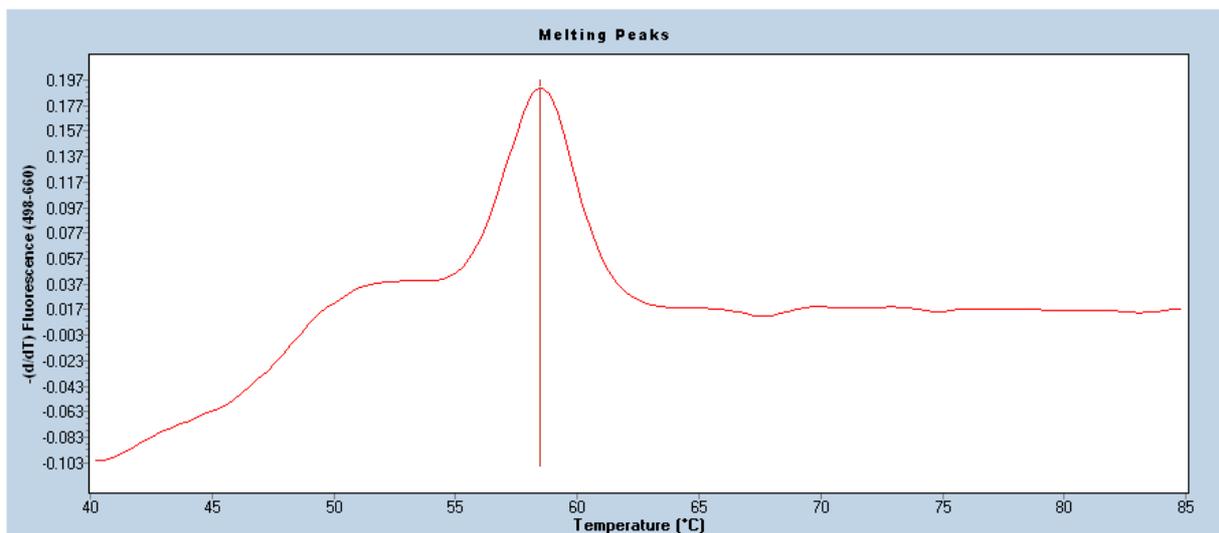


Figure 6- Melting curves for the homozygous Codon 8-9 mutations in β Thalassemia

VIII. DISCUSSION

The β -globin gene is a relatively small gene (<2000 bp) located on the short arm of chromosome 11(16). Although more than 180 mutations have been reported for β Thalassemia syndrome, the spectrum of mutations and their frequencies in most population usually consist of a limited number of common mutations and a slightly larger number of rare mutations(17).

Mutation characterization in carriers is a pre requisite when offering prenatal diagnosis to couples at risk for having an affected child and frequently needs to be achieved as quickly as possible. With the aim of rapid DNA analysis, Real time PCR has become an important tool in both research and routine clinical diagnosis. According to the published data the cumulative gene frequency of haemoglobinopathis in India is

42%.wears the frequency in western India is 34% of the total population. Every year 1200 homozygous beta Thalassemics are born, in western India and 1000 in Gujarat as per the annual activity report of Indian Red Cross society Gujarat State Branch India.

To prevent this birth a cost effective and less time consuming technique was developed i.e. Real time PCR assay has been developed which allows an easy assay of β Thalassemia mutations.

In western India more than 15 mutations have been found out but among them 5 accounts for the common mutations and rest are classified under rare mutations. In this study we designed a protocol for at least three common mutations which are common in western India.

An analogous light cycler method has been described for genotyping samples. This sample carry mutations which are very close to each other, hence Tm calling method was used to distinguish the melting curves. The peaks were different for different mutations in both the cases of homozygotes as well as in heterozygotes. Due to the close proximity of Snp's a single primer and two different sets of probe worked for 3 common mutations in Gujarat population i.e. for IVS 1-1, IVS 1-5 and codon 8-9; but out of the three mutation as above one single different sets of probes were designed for codon 8-9 i.e. sensor and anchor+ . Even then, this method was cost effective, rapid and allows easy detection among known samples with less than 2 hours. It was also observed that in cases where common probes have been used, the TM was different for wild type and hence no ambient results were produced.

Overall the present method was cost effective reliable, accurate and rapid.

IX. CONCLUSION

The LC 480 Systems, coupled with Magna pure Compact instrument(Roche Diagnostics) for automated DNA extraction, constitutes a suitable and versatile Real time PCR platform in a routine laboratory setting for the diagnosis and monitoring of common mutations in beta Thalassemia.

CONFLICT OF INTEREST

Authors have no conflict of interest.

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Human's Delusion of Time

Allan Zade

Abstract- Time intrigued humankind for thousands of years. From the beginning of its consciousness, mankind has some "idea", "feeling" or "vision" of Time.

Something ever happens around a man. The Sun rises and falls to/from the horizon. The Moon moves through the stars. The rivers run to the oceans, and a falling leaf followed a river stream to disappear forever; and even human lives follow the flow of Time to be vanished from the memories of the next generations.

Gradually for thousands of years humankind comes back again and again to the concept of Time in a desperate attempt to find the answer on the most fundamental question: what is time? Many other questions related to the concept of time have a strong connection to that question.

This work is dedicated to finding the right answer on that question and digs deeper in some aspects of Z-Theory published recently. Hence the investigation begins in the mist of first steps of Earth's civilizations their believe systems and theology.

Index Terms- Philosophy; Time; Physics; Delusion; Innate idea; Humankind; Z-Theory.

I. INTRODUCTION

From its childhood humankind has an interest in number of things which they believed to be real. Those were basic properties of the world. In the Age of the Prehistoric gods, mankind made a connection between each observable phenomena and some god who was responsible for a number of events.

Ancient civilizations of Greece and Rome had a lot of gods. Each of them had his own power and used it by his/her wish. They ever appeared in legends as entities that looked like humans with excellent physical and mental condition. Their behavior looked like behavior of humans. For example, many of them got angry in case of abuse or disobedience from the other Gods. They felt in love with each other and grew their children as a new generation of the gods. Humans did similar things creating families and growing their children.

Each god had his/her personal responsibility for some events and ruled human lives that way. For example, Zeus was worshiped as the Chief god for the other gods. He had an incredible ability to throw lightning from the Sky to the Earth to condemn the humans or punish them for disobedience. Poseidon was a god of the sea, and he was a god of water. He has a symbol of his power – the Trident that he ever holds in his hand. Many other gods were worshiped in Ancient Greece and Rome and among them was one single god with unique duty who cares of Time. That was *Chronos*. He was usually portrayed through an old, wise man with a long, grey beard. That depiction coincides with human imagination about the passage of Time. They believed that wisdom comes mostly to men with a gray beard.

II. ANCIENT PEOPLE AND THEIR IMAGINATION OF TIME

This example shows that. Human's vision of Time has deep roots in human philosophy and theology. Even Ancient people saw that, something changes in their everyday life. Something *was done* yesterday something *has to be done* today, and something *will be done* tomorrow. Language, as well as the human mind, possessed categories of the past, present and future. Whole life of the ancient people was divided on some periods as days, months and years. Some days were dedicated for work, and the other days were dedicated to rest or celebration of holidays in honor of the gods. A *calendar* was invented in ancient time.

"Greek calendar is any of a variety of *dating systems* used by the several city-states in the time of classical Greece and differing in the names of their months and in times of beginning the year. Each of these calendars attempted to combine in a single system the lunar year of 12 cycles of phases of the moon, totaling about 354 days, and the solar year of about 365 days. Generally, three extra months were intercalated in every period of eight solar years. This practice, which was adequate to keep the calendar roughly in step with the seasons, seems to have been in force as early as the *8th century BC*. Months, each of which contained either 30 or 29 days, began with the new moon. The Greek calendar that has been most studied, the Athenian, customarily began its year with the first new moon after the *summer solstice*".¹⁸

That ancient Greece calendar incorporated few key features. Those are notions of a year, a month and a day. Each notion associated with the calendar has perfect relation to a celestial body and its observable behavior. Obviously, ancient people were able to use only observation with a naked eye, and used only easily observable properties of the celestial bodies to keep their calendar in some *synchronization* with celestial events and seasons of the Earth.

Moreover, we have to remember that. According cosmology of ancient Greek the Earth was the motionless center of the Universe. That point of view was not under question for an exceptionally long time. Same point of view permitted two main celestial bodies rotating around the Earth. Those were the Sun and the Moon. Duration of one complete revolution of the Sun around the statically located Earth appeared for ancient people as a day. That was a fundamental property of the Heavens. Hence duration of revolution of any other celestial body around the Earth they understood in connection with duration of a day. In other words, *any other duration* was comparable with duration of one complete revolution of the Sun around the Earth.

Even today we can see result of that ancient people point of view. Their calendar consisted 365 days in one solar year. Hence *duration* of one year was 365 times greater than the *duration* of a day. Each month consisted 30 or 29 days and shows that *duration*

¹⁸ **Greek calendar.** (2008). Encyclopædia Britannica. *Encyclopaedia Britannica 2008 Deluxe Edition*. Chicago: Encyclopædia Britannica.

of a month was 29 or 30 times greater than the *duration* of a day. Consequently *each period* of calendar's circle can be shown as the number of days as soon as the sum of *duration* of those days becomes equal for the *duration* of any given circle of a celestial event.

That method had one serious problem. Visible periods of celestial bodies revolutions around the Earth are not exactly match *summarizing duration* of days. Hence, whole method has imbedded *precision problem*. That problem requires additional activity from humans to adjust the calendar (from time to time) and put into consideration additional periods with more or less *additional durations* to keep that calendar usable and suitable for the seasons.

Invention of calendar followed one more practical reason. That was idea of unification of relation between days. Notion of a day has not any controversy, but a relationship between days has such controversy in notions as "yesterday" and "tomorrow". Unlike the notion of "today", notions of "yesterday" and "tomorrow" have relative meaning because they point ever to the relationship between days. Hence present day is ever referred to as "today", but following question arises as soon as we describe a notion of "today". What is tomorrow? It ever seems as hallucination because "tomorrow" becomes "today" each day. They should ask, "Are we living in a yesterday's tomorrow or we living in tomorrow's yesterday????!!!"

Calendar has an answer on such questions and many other questions become answerable by means of calendar application. We can make easily imagination of the following situation in Ancient Greece. A young athlete from Athens goes to his teacher and asks him easy question "What day is today?" The old-aged man with a long beard made his response to the younger one. "Today is the fifth day of the Ianuários¹⁹". The young athlete was satisfied with that answer because he knows that today is the fifth day of the Ianuários. Hence yesterday was the fourth day of the Ianuários and tomorrow *will be* sixth day of the Ianuários.

Using that way each day with an appropriate number in calendar possessed *unique* relation to *any other day*. In that case, only number of current day becomes significant because knowledge of that number and name of the current month gave the possibility for people to make any calculation in number of days for or after any other *date*. Calculation of current day number, as well as examination of location of the celestial bodies responsible for calendar, became the responsibility of the calendar keepers. Usually, in ancient societies, only high priests were able to make calculations of days for calendar. They were also responsible for the declaration of right day for any celebration of each god and days for launch of significant activity of the community (harvesting for example).

Hence, any activity of humans to maintain calendar needs artificial process of calculation. Easy observable events of the nearest celestial bodies (the Sun and the Moon) provide information for such calculations. They used the easiest method of calculation to maintain calendar - *summarizing of natural numbers*. As a result, a calendar never used any fractional number (*even today*).

From the one hand, that happened because mathematics of ancient time was unable to make any deal with *fractional*

numbers. From the other hand, human society was unable to understand *fractional* relation between durations of celestial processes. For example, statement about duration of the year in fractional number of days looked strange to any ancient society (*as well as to a modern society*). That way led to fractional days and stood in contradiction with whole mathematics of natural numbers. Hence a calendar was created as a calculation system that was based on natural numbers and used celestial events as a start points for any calculation circle. Those calculations included *duration* of three basic circles as day, month and year. Obviously intimate connection between calendar and mathematics gave way for calendar creation *only after the invention of mathematics*.

That strategy was successful, because numbers gave way to make a mark on each day, and subsequently separated references from any given day to any other day. Thus, notion of date was invented as unique description of any given day in terms related to the nearest celestial event and subsequent calculation of additional duration. That duration appears as summarizing duration of the most noticeable circle of visible revolution of the Sun around the Earth. I mention here *Ancient point of view* on celestial mechanics. According to that point of view the Sun makes revolution around the Earth.

As any other physical process that process of revolution has some duration. Summarizing of that duration gives the possibility to compare calculation result (*that was duration itself of course*) with duration of any other event in the Heavens. Each key event that had a place in the Heavens stops circle of old calculation and starts new circle of calculation immediately. For example, event of New Moon appearance triggered new *circle of day calculation* that belong to a *new month (new moon circle)*. That system of observations and calculations gave way to use a notion of date as an unique combination of numbers that linked to each day. Hence mankind possessed a system to describe countless number of upcoming days in a comparatively easy and convenient way.

Each day in a year possessed its unique *identification* as a combination of a day number in a month and name of a month. Everything went well until the end of a year. A celestial event that triggers new circle of *day calculation* (usually summer solstice) puts the definition of a new year under question. In case of the moon, its phase changes continuously for each month and clearly visible for any observer. New Moon naturally separates behavior of that celestial body from wane to wax, but such a thing does not happen with a year. As soon as it was discovered, following question have raised immediately. What does happen with a year after the summer solstice? Does it wane as the Moon or wax again or simply disappear? Does a *New Year* carry any *unique property* that distinguish it from the *Old Year*? What is that property? Obviously celestial observation in Ancient times was unable to answer such fundamental question.

However, they have found *odd solution* for all those matters that was able to answer all questions about upcoming celestial years. They simply spread calculation for years themselves. In that case, years become calculable. As well as each day has its unique number in the calculation of a month, each year possess its unique number and become calculable (*distinguishable*) from any other year. Such separation could not be reached by *physical observation* and was replaced by *logical extension* of known calculation method.

¹⁹ January

Hence notion of date was established as the unique combination of numbers. Number of days shows the *duration* between appearance of new moon and beginning of any given day. Name (number) of the month shows the *duration* in moon circles that have passed between the last summer solstice and the last appearance of New Moon, but number or year ever shows *only abstract number* that they used to distinguish one year from another one. It can be explained easily. There is not *any possible way* (even for today), to conduct *any physical experiment* that shows *the number of current year!*

There was not also (*and is not yet*) any noticeable celestial event (phenomenon) that can be used as point of origin for calculation of years. That incomparability between calculation of days and years caused a serious problem for anybody who ever try to create a calendar. Subsequently one more *odd solution* was developed for such matter. As soon as ancient people had strong imagination of the gods, those gods become responsible for zero point of years calculation. Hence *zero point* for beginning of years was associated with one old well known event described in legends or myths. Thus in Greek tradition god *Chronos* became responsible for a number of years between the current year and beginning of years as well as for continuous changes of days, months and years.

Different events in different countries were used as marks of *first years*. As a result, each calendar system has its own number of years between the current year and first one. For example, "Roman republican calendar was a dating system that evolved in Rome prior to the Christian era. *According to legend*, Romulus, the founder of Rome, instituted the calendar in about 738 BC"²⁰ Hence current year according to the calendar has the number of 2750 (2012+738).

That way helped ancient people to use calendar with a deep connection between their live, myths and legends. From their point of view, there was something divine in passing days, months and years. There was nothing that can be hold instantly between days and months. Each season had magical power to rise vegetable or to blow winter winds. Each year has something beyond understanding of their mind *something* rules seasons and organizes each year the same way. Summer never appeared *before* spring and winter appeared only *after* autumn. That circle was so strong that people believe in divine power that kept that circle of years as well as a large circle of their lives. Events in a live of a man had same order beginning from the day of his/her born. Childhood was ever before adult years, and after that was senility, and once again senility and mature wisdom were never before childhood.

Obviously, young persons of ancient people asked the following question for their preceptors. What is responsible for inevitable circle of years and has enough power to rule the lives of people from their childhood to senility? The ancient sages have found an answer on that question that was comparable with an ancient point of view. According to their philosophy and believe system, that was divine power of the *Chronos*. That god rules everything and gives perfect place for each event in world order. That order exists eternally as well as power of any god.

²⁰ **Roman republican calendar.** (2008). Encyclopædia Britannica. *Encyclopædia Britannica 2008 Deluxe Edition*. Chicago: Encyclopædia Britannica.

Hence *Chronos*²¹ is responsible for each change in the world. It is divine power of that god to support each circle of changes and repeat them again and again in the endless circle of renovation.

One of those circles was the most noticeable *day circle* of change. That circle changed day and night. Same circle had divine connection to a year circle by relative duration of day and night during a year, but full duration of day and night was ever equal to the same value. Obviously that aspect of divine power intrigued ancient people. How it is possible to Chronos to keep that relationship between duration of day and night at each day of the year? That aspect seemed as the best indication of Chronos' divine power.

In ancient times, after many centuries from the beginning of astronomical observations, people had necessity to use something with minor duration than the duration of minimal observable period of celestial events - lesser than the duration of a *solar day*. Presumably it was the reason for developing a better condition for trade and human activity during a day. Calendar had enough power to organize human activity during a year, but it was useless to make a deal with any event that has duration *lesser than a day*.

That task had a serious problem. Ancient people have not any *suitable celestial event* to create connection between duration of that event and duration of a day. The only one possible way to reach a solution of the problem was that. They try to use some circle of well known *recurrent* celestial event and divides its duration to number of *stages*. The easiest way to achieve that goal was a creation of correlation between duration of solar day and duration of a new *artificial recurrent circle* of events. It was necessary because that event *must* happen again and again during a day and *must* be observable as a recurrent process. However, as soon as that event occurs again and again during a day, it must be *calculable*. Only some *set* of events happened from sunrise to *present stage of a day* gives information about current stage of duration of a given solar day.

Finally, their used duration of solar day and divided it to number of stages. Hence each stage possessed its number to be *distinguishable* from the other stages (they were numbered), and a link was established between duration of celestial day and duration of new *artificially made process*. That link involved relation between location of the Sun and location of shadow of an object. Almost every object can be used to indicate location of the Sun during whole celestial day because of unique connection between location of the Sun in the sky and casting a shadow of any object. Thus, motion of one celestial object in the sky became traceable by humans everywhere they like. Moreover, any devices that use that way stay *ever synchronized* to each other and have same readings ever *without any additional efforts* from the humans. Device that uses that principle of operation was called *sundial*.

"... early device was the *hemispherical sundial*, or *hemicycle*, attributed to the *Greek astronomer Aristarchus of Samos* about 280 BC. Made of stone or wood, the instrument consisted of a cubical block into which a hemispherical opening was cut; to this block a pointer or style was fixed with one end at the centre of the hemispherical space. The path traveled by the tip of the pointer's shadow during the day was, approximately, a

²¹ chrono- form relating to time. Origin: from Greek khronos 'time'

circular arc. The length and position of the arc varied according to the seasons, so an appropriate number of arcs was inscribed on the internal surface of the hemisphere. Each arc was divided into 12 *equal divisions*, and each day, reckoned from *sunrise to sunset*, therefore had 12 equal intervals, or “**hours**.” Because the length of the day varied according to the season, these hours likewise varied in length from season to season and even from day to day and were consequently known as *seasonal hours*. Aristarchus's sundial was widely used for *many centuries* and, according to the Arab astronomer al-Battānī (c. AD 858–929), was still in use in Muslim countries during the 10th century. The Babylonian astronomer Berosus (fl. c. 290 BC) invented a variant of this sundial by cutting away the part of the spherical surface south of the circular arc traced by the shadow tip on the longest day of the year.”²²

Hence, from ancient Greeks' point of view Chronos by himself gives them right indication of *sundial* each day and was responsible to manage changes of sundial readings according to the current moment of a day. Looking back to an example with dialogue between an athlete and his master we can image next step in their conversation.

The wise bearded old-aged man a preceptor of the young athlete asked a question to him. “Aeolos²³, what does Chronos *tell us now*?” Aeolos understood his preceptor and ran down the street from the gymnasium to the downtown where a large seasonal sundial was installed for general use. As soon as Aeolos reached the sundial he looked at its indication. The pointer casted shadow just to the seventh line drawn on the internal surface of the hemisphere according to the curve of current day. The athlete ran back to the gymnasium and told to his preceptor, “Master, there are seven hours left from the beginning of the day!” The old-aged man nodded. He understood that the young athletes have two extra hours to complete their exercises for today. As soon as Chronos tells the hour number nine all exercises in the gymnasium must be finished, and all athletes go to their homes until tomorrow. They have three extra hours to the time of sunset to complete their tasks at home until the Sun hides itself behind the horizon.

That way made no problem for ancient people in their understanding of Chronos. It was a god among many other gods worshiped in ancient Greece and Rome. Hence readings of a sundial had divine aspect for all ancient people and showed a direct link to the god who was responsible for every change in the world. In other words, question about the origin of Chronos made no sense for ancient mind because the question about the origin of a god was unrelated to the point of view that dominated in the ancient world.

III. MATTER OF WORDS

New people with a new mind have appeared in Europe after few centuries. They look toward ancient world as a source of some ideas that were useful even after many years of staying in limbo. Many words with Greece origin were again in use as well as ideas that they represent. Here, European civilization met one

powerful *mind-shift* that subsequently produced enormous impact on humankind in all following generations. It was a matter of words.

As soon as Greek words become in use again in new alphabets they make a connection with meaning of the other words. Many of them were translated and mistranslated according to different circumstances and purpose or usage of a given word. Word Chronos suffered the same fate of some misunderstanding and misusing. According contemporary sources we have the following information related to that word and number of the other words that are extremely close in the inscription to the first one.

Preposition chrono- has the following definition “chrono- [kronəʊ] form relating to *time* chronometry. Origin: from Greek *khronos* ‘time’”²⁴.

“*Anachronism* is (from Greek *ana*, “back,” and *chronos*, “time”), neglect or falsification, intentional or not, of chronological relation. It is most frequently found in works of imagination that rest on a historical basis, in which appear details borrowed from a later age; e.g., a clock in William Shakespeare's *Julius Caesar*, an attendant to the Pharaoh shod in tennis shoes in Cecil B. deMille's *The Ten Commandments*. Anachronisms originate in disregard of the different modes of life and thought that characterize different periods or in ignorance of the facts of history.”²⁵

That way creates two different type of link to the same word with the same meaning. First link mentioned word *khronos* with “k” letter as its first character. Second link mentioned word *chronos* with “c” letter as its first character. One might ask “What is a matter with those inscriptions?” Everything should be well, but there is one serious problem. There were two totally different gods that can be easily mistaken by their names especially in *pronunciation*. Those are gods with names *chronos* and *kronos*!

“Cronus *also spelled Cronos, or Kronos* was, in ancient Greek religion, male deity who was worshiped by the pre-Hellenic population of Greece but probably was not widely worshiped by the Greeks themselves; he was later identified with the Roman god *Saturn*. Cronus' functions were connected with *agriculture*; in Attica his festival, the *Kronia*, *celebrated the harvest and resembled the Saturnalia*. In art he was depicted as an old man holding an implement, probably originally a sickle but interpreted as a *harpē*, or curved sword.

“In Greek mythology Cronus was the son of Uranus (Heaven) and Gaea (Earth), being the youngest of the 12 Titans. On the advice of his mother he castrated his father with a *harpē*, thus separating Heaven from Earth. He now became the king of the Titans, and took for his consort his sister Rhea; she bore by him Hestia, Demeter, Hera, Hades, and Poseidon, all of whom he swallowed because his own parents had warned that he would be overthrown by his own child. When Zeus was born, however, Rhea hid him in Crete and tricked Cronus into swallowing a stone instead. Zeus grew up, forced Cronus to disgorge his brothers and sisters, waged war on Cronus, and was victorious. After his defeat by Zeus, Cronus became, according to different

²² **sundial**. (2008). Encyclopædia Britannica. *Encyclopaedia Britannica 2008 Deluxe Edition*. Chicago: Encyclopædia Britannica.

²³ That name means “quick-moving”

²⁴ Source [4]

²⁵ **anachronism**. (2008). Encyclopædia Britannica. *Encyclopaedia Britannica 2008 Deluxe Edition*. Chicago: Encyclopædia Britannica.

versions of his story, either a prisoner in Tartarus or king of the Golden Age.”²⁶

Hence Cronos as well as Chronos was connected to a celestial process with one year duration. His (that god's) relationship with agriculture gives us direct link between responsibility of that god and duration of a year because vegetation itself follows one year circle. For ancient people, it was the strongest circle of life in its native implementation. As it mentioned in the citation, “he was later identified with the Roman god *Saturn*”. Who was that god?

“**Saturn** Latin *Saturnus*, in Roman religion, the god of sowing or seed. The Romans equated him with the Greek agricultural deity Cronus. The remains of Saturn's temple at Rome, eight columns of the pronaos (porch), still dominate the west end of the Forum at the foot of the Clivus Capitolinus. It served as the treasury (*aerarium Saturni*) of the Roman state. Saturn's cult partner was the obscure goddess Lua, whose name is connected with *lues* (plague, or destruction); but he was also associated with Ops, another obscure goddess (perhaps of the earth's fertility), the cult partner of Consus, probably a god of the storage bin.

“Saturn's great festival, the *Saturnalia*, became the most popular of Roman festivals, and its influence is still felt in the celebration of Christmas and the Western world's New Year. The *Saturnalia* was originally celebrated on December 17, but it was later extended to seven days. It was the merriest festival of the year: all work and business were suspended; slaves were given temporary freedom to say and to do what they liked; certain moral restrictions were eased; and presents were freely exchanged. The weekday Saturday (Latin *Saturni dies*) was named for Saturn.”²⁷

Obviously Saturn had a link to the same circle of one year duration as well as his predecessor Cronus. Even modern day events based on one year circle are still valuable for modern people. Moreover, name of a week day, Saturday, means an event that happens ones in duration of each seven days - *duration of a week*.

As it clearly seen from the explanation and citations given above, all of the mentioned gods had *direct connections* to the duration of celestial phenomena as a day and a year (in general). Hence we have the following sequence of links to the duration of celestial events associated with a year: *Chronos, Cronus, Cronos, Kronos, khronos, Saturnus and Saturn*.

IV. NOTION OF TIME IN THE MIDDLE AGES

In the Middle Ages, such diversity of names related to the same property of celestial events (*duration*) needed creation of one common link that can be able to encompass all meanings of its predecessors. Moreover, it must be cleared from connection with ancient gods because such a link was undesirable for European population in Middle Ages. That happened because different God was worshiped in Middle Ages. Any attempt to

worship or even mention any name of another god (old, ancient etc.) became to *inexpiable sin* punishable by Catholic Church.

Notion of **Time** was born that way. It had a link to a recurrent processes and their duration but was free from any link to ancient gods and ancient theology. “*Time* Origin: Old English *tīma*, of *Germanic origin*; related to *tide*, which it *superseded* in *temporal senses*. The earliest of the current verb senses (dating from late Middle English) is ‘do (something) at a particular moment’”²⁸

In other words, earliest meaning of that word has reference to some action at the right moment. For example, they can say, “Hey! It is Time! (or it is high Tide!)”. So it is a right moment to set a sail and go out from the harbor because water is high and it is easy for a ship to do any maneuvers inside a harbor! Hence word “Time” have possessed its temporal senses *artificially* much later that the original meaning of that word, but the relationship between Chronos and Time still exist because both words have the link to recurrent physical processes. For instance, we can see following relation. Chronos was responsible for the duration of day circle in Ancient tradition. Time in its original meaning has relation for tide. What is tide?

“Tide is any of the cyclic deformations of one astronomical body caused by *the gravitational forces* exerted by others. The most familiar are the periodic variations in sea level on the Earth that correspond to changes in the relative positions of the Moon and the Sun.

“At the surface of the Earth the gravitational force of the Moon is about 2.2 times greater than that of the Sun. The tide-producing action of the Moon arises from the variations in its gravitational field over the surface of the Earth as compared with its strength at the Earth's centre. The effect is that the water tends to *accumulate* on the parts of the Earth's surface directly toward and directly opposite the Moon and to be *depleted* elsewhere. The regions of accumulation move over the surface as the position of the Moon varies relative to the Earth, mainly because of the Earth's rotation but also because of the Moon's orbital motion around the Earth. *There are approximately two high and two low tides per day at any given place*, but they occur at times that change from day to day; the average interval between consecutive high tides is 12 hours 25 minutes. The effect of the Sun is similar and additive to that of the Moon. Consequently, the tides of largest range or amplitude (spring tides) occur at New Moon, when the Moon and the Sun are in the same direction, and at Full Moon, when they are in opposite directions; the tides of smallest range (neap tides) occur at intermediate phases of the Moon.”²⁹

Hence, “there are approximately two high and two low tides per day at any given place”. Therefore, sum of *duration* of two tides is approximately equal to the *duration* of one day. In other words, key circle of duration associated with *Time* and *Chronos* (duration of a day) has relation to each other (rate) as $\frac{1}{2}$. I mean that *both circles* keep their *comparability* by *duration* because any *duration* is ever comparable with any other *duration* as a quantity that has *the same unit of measurement*. For instance,

²⁶ **Cronus**. (2008). Encyclopædia Britannica. *Encyclopaedia Britannica 2008 Deluxe Edition*. Chicago: Encyclopædia Britannica.

²⁷ **Saturn**. (2008). Encyclopædia Britannica. *Encyclopaedia Britannica 2008 Deluxe Edition*. Chicago: Encyclopædia Britannica.

²⁸ Source [4]

²⁹ **tide**. (2008). Encyclopædia Britannica. *Encyclopaedia Britannica 2008 Deluxe Edition*. Chicago: Encyclopædia Britannica.

mass is ever comparable with mass length is comparable with length and so on.

V. GALILEO'S INFLUENCE

There was one man who lived and worked in Middle Ages but unlike the other people had an interest in the field of natural philosophy. His name was *Galileo Galilei*. According to the modern source we have the following information about that man.

“**Galileo** (born Feb. 15, 1564, Pisa [Italy], died Jan. 8, 1642, Arcetri, near Florence) in full *Galileo Galilei*, was Italian natural philosopher, astronomer, and mathematician who made *fundamental contributions* to the sciences of motion, astronomy, and strength of materials and to the development of the *scientific method*. His formulation of (circular) inertia, the law of falling bodies, and parabolic trajectories marked the beginning of a fundamental change in the *study of motion*. His insistence that the book of nature was written in the language of mathematics changed natural philosophy from a verbal, qualitative account to a *mathematical* one in which *experimentation* became a recognized method for discovering the *facts of nature*. Finally, his discoveries with the telescope revolutionized astronomy and paved the way for the acceptance of the *Copernican heliocentric system*, but his advocacy of that system eventually resulted in an *Inquisition process against him*.”³⁰

The most famous experiment conducted by that person was an experiment with falling bodies. He used *clepsydra* to determine *duration* of each process of body fall. To make his point of view comparable with the experimentation, he used a device (*clepsydra*) to make measurement of duration of a body fall process. “**Clepsydra** also called **water clock** is an ancient device for measuring time by the gradual flow of water. One form, used by the North American Indians and some African peoples, consisted of a small boat or floating vessel that shipped water through a hole until it sank. In another form, the vessel was filled with water that was allowed to escape through a hole, and the time was read from graduated lines on the interior measuring the level of the remaining water. It may have been an invention of the Chaldeans of ancient Babylonia; specimens from Egypt date from the 14th century BC. The Romans invented a clepsydra consisting of a cylinder into which water dripped from a reservoir; a float provided readings against a scale on the cylinder wall. Clepsydras were used for many purposes, including timing the speeches of orators; as late as the 16th century, *Galileo* used a *mercury clepsydra* to time his experimental falling bodies.”³¹

Firs sentence of the citation mentioned above shows relation between the number of different notions: *time, water, clock, clepsydra, time measurement, flow of water*. What is the hash? That sentence makes perfect sense about how deep is going the *modern mess* in any attempt to explain anything that has reference to Time, but it is possible to remove all that trouble

using explanation given above about an attitude that rose steadily between the human mind and the surrounding world.

First of all, we need to understand that, clepsydra was a *physical device* that was used to indicate the *duration* of one physical process – gradually *flow of water* or running *water drops* from a reservoir. That process involved physical interaction between the *gravitational field* of the Earth and water remain in the reservoir. There is not *any other physical activity* involved in that process of interaction. It is well known that theory of gravitation was invented later and was described first hand only by Sir Isaac Newton (born December 25, 1642 [January 4, 1643, New Style], Woolsthorpe, Lincolnshire, England; died March 20 [March 31], 1727, London)³². Hence, Galileo died Jan. 8, 1642 and Sir Isaac Newton was born January 4, 1643 (about one year later). Obviously, Galileo was unable to perceive any concept of Newtonian gravitation. As a result, cause for water drops from the clepsydra's reservoir was *unknown for him*.

He has one more problem in his experiments. Sundials seemed useless for his research, because, unlike other people, that man liked to have measurements with duration significantly lesser than the duration of a day and even lesser than the duration of an hour. At the beginning of 17th century, such a device was still inaccessible. Hence, he used the only one kind of device that was relevant to his experiments and was able to demonstrate a physical process with *tiny duration* relatively to the *duration* of an hour. Moreover, he used clepsydra to determine the duration of a process of body fall without correlation between indication of the clepsydra and the city sundial (or any other sundial that was available for him). I mean that he made estimation only between *duration* of process of body fall and *duration* of physical process of clepsydra (that was connected to fall of the mercury drops). In other words, there was not any relationship between his experiments and location (or motion) of the Sun in the sky. More than that, there was not any *physical connection* between marks on a clepsydra's body and any phase of his experiment (the start and the stop moments of body fall).

Observing falling bodies, Galileo needed some units that were relevant to his experiments. He could use unit of length to determine the height of the tower that he used, but he needed one more unit that was comparable to the *duration* of body fall. The only acceptable tool for such measurement was a device that was able to make some events with regular intervals. They knew that device. It was sundial. The device produces a number of events during a day. Each event rises as soon as the pointer's shadow meets each hour mark, but Galileo's experiments were so fast that a sundial was useless for them. Hence, he had the only one way to achieve his goal by using different device that was able to generate events more frequently. Only clepsydra was able to do that.

The device can be used two ways. First way includes using of clepsydra with marks on its body (reservoir). As soon as a man opens a clepsydra, liquid begins to run out, and level of liquid falls down slowly. Obviously that process starts as soon as the measuring process begins. As soon as the measuring process was completed, a person stops liquid leaking from the clepsydra

³⁰ Galileo. (2008). Encyclopædia Britannica. *Encyclopaedia Britannica 2008 Deluxe Edition*. Chicago: Encyclopædia Britannica.

³¹ clepsydra. (2008). Encyclopædia Britannica. *Encyclopaedia Britannica 2008 Deluxe Edition*. Chicago: Encyclopædia Britannica.

³² Newton, Sir Isaac. (2008). Encyclopædia Britannica. *Encyclopaedia Britannica 2008 Deluxe Edition*. Chicago: Encyclopædia Britannica.

and difference between first level and the last level of liquid shows *duration of fluid flow*.

That is the main aspect of understanding of that process. A clepsydra was able to determine only *duration of its own physical process* of fluid flow. **That devise was not ever able to do direct measurement of duration of any other physical process.** Thus, any of *so called measurement* should be done *only artificially* by synchronizing of moments of start and stop leaking, with first and the end point of other measuring physical process, *by human hands*.

Therefore, Galileo created method of measurement in which *human activity was involved*. It was unique method of measurement because other methods need not such activity from humans. For instance, a measurement of mass involves only *direct physical interaction* between an object with given property (mass) and *physical mechanism of physical measuring device*. In that case, a man needs only to put an object on a mass measuring device (on a scale) and see indication of that device. Moreover, indication of a measuring device keeps *constantly* as long as mass of the object *does not change*. In other words, a physical measuring device *makes physical interaction with a measuring property* of an object.

It was possible to use mass of leaking liquid to make estimation of rate of *duration*. They can make measurement of mass of some liquid that got out from a clepsydra in two experiments. Rate on those masses gives precise information about rate of duration of two processes. That is an *alternative way* of using clepsydra. For example, in case of Galileo's experiments two clepsydras produce out same mass of liquid for the *duration* of falling of two different objects (bodies) because both objects fall from same altitude and have the same acceleration equal to *g*.

Hence Galileo was responsible for implementation of measurement of *duration* in physical experiments, but that way had one serious problem. Galileo produced no explanation for correlation between *duration* of physical processes and the notion of *Time*. From the one hand, he used a clepsydra to determine the duration of fluid flow from that device. From the other hand, he makes estimation of duration of body fall. After each observation, he made a comparison between *duration* of body fall and *duration* of liquid flow from a clepsydra, but he *was unable to explain* which material property is responsible for interconnection between *durations* of two different physical processes. There is not *any physical interaction* between those processes in any case, but Galileo need something that meets his point of view on *experimentation*.

As a result, he needed some property that he cannot see or describe or put into experiment, but that property must be responsible for interaction between *durations* of two independent physical processes to make them comparable by their *durations*. He used the notion of *Time* as a link to that property. From his point of view, that property makes a connection between any duration of any physical process by means of some *invisible interaction*, making them comparable to each other, but that property itself remains hidden for humans and stays *undetectable* for any direct measurement. Thus, *greatest delusion* of physics was created at its first step. Saying generally it was *first misstep*.

Hence that person (as well as any other of his followers) was unable to conduct any experiment that supports the *idea of*

physical reality of Time. That way stays in disagreement with *his own statement* - "*experimentation*" became a recognized method for discovering the *facts of nature*" (see above). In other words, he never conducted an experiment that shows *physical reality of Time*. It was a first step that brought word (*Time*) with questionable meaning in physics. Moreover, that word had not *any relation* to physical reality from the launch of *its usage in physics*.

As it mentioned above clepsydra was used widely in Middle Ages. Clepsydra appears as a devise with a constant flow of liquid or drops of liquid from the clepsydra's reservoir. Such devices were used for many years across Europe, and eventually flow of liquid from clepsydra was associated with some sort of "magical" property that all such devices share. As it mentioned above Galileo shared that *delusion* too. Any number of equally built clepsydras ever shows matching rate of flow from a device and the same rate of water level drop in a reservoir. There was not any analogue in the natural world for such process. Any clepsydra shows same rate of operation in a whole day and night at the top and the bottom of a tower inside and outside of a building and so on. Moreover, as soon as a clepsydra was put in a closed room under the ground, it shows the same *rate of operation* that was similar to any other identical clepsydra that remains on the surface of the Earth. Obviously such behavior of clepsydras seemed as some sort of *magic* for a people who lived in Middle Ages. What is that thing that keeps readings of an operating clepsydra ever equal to readings of any other twin operating clepsydra? That question overwhelmed those people.

Despite of such strangeness, operation of clepsydra is extremely easy. It uses only interaction between liquid in its reservoir and *gravitational field* of the Earth. Readings of two identical clepsydras were ever equal to each other because a clepsydra was ever used in an exceedingly thin layer relatively to the radius of the planet. That is modern point of view of course. For people living in the Middle Ages, the Earth was flat, and gravitation does not exist. Hence they have no chance to get a right answer on the question about the operation of clepsydra.

However, they produced some explanation for apparent facts. They believe that there is something (deep cause that cannot be reasonable for the human mind) that exists everywhere and causes the same readings for any of identically built clepsydras despite their location. In other words, all clepsydras were connected to each other by means of some sort of *interaction* that is *unnoticeable for a man*. That thing has the ability to penetrate everything without any trace of penetration and appears everywhere even in a closed room. It ever changes and flows, and that property causes change of reading of any clepsydra at the same rate. Constant flow of liquid from a clepsydra and flow of that thing looked for those people as *inevitable prove* for uniform flow of *that thing*. In other words, constant flow of fluid from a clepsydra *follows the movement of that thing*. As it can be easily understood "that thing" possessed unique *name* lately for short link to its distinguishing characteristic (*constant flow*). That name was *TIME*.

That was basis of *mind-shift* that I mentioned above. For the Ancient people, word "*Chronos*" has linked to a God. As a result, question about the real nature of *Chronos* had decided answer. *Chronos is one of the gods*, but word "*Time*" with its meaning originated in Middle Ages possessed *pointless link*. It was a link

to something that people were unable to understand. Hence they could not make *any definition for meaning of that word*. That is perfect evidence of their *incapability* to understand the meaning of that word. It was the greatest *failure* of the human mind.

That pointless connection with twisted meaning was inherited by science from Galileo's work. His example of calculation, where Time appears alongside with the *other physical properties of an objects*, leads to the foundation of mathematics that uses Time as one of *real property of the objects (processes)* and subsequently as *physical property of the Universe*. Obviously Galileo did not see any difference in the estimation of Time and any other property of an object in his experiments. He could determine the mass by a scale, volume by measurement using unit of length and subsequent calculation. Hence estimation of Time was natural to him. He had a device (clepsydra) that "tells" him information about the *passage of time* even if he had no idea about *the nature of that property*.

Personally, measurement of a property was *more notable* for Galileo than *knowledge* about the origin of measuring property. Moreover, he made a mistake taking all measurable properties as physical (real) properties of the objects involved to his experiments. Many years later Sir Isaac Newton used the same way in his famous work. He gave mathematical description of *gravitation*, but he never gives description or explanation of *physical origin* of that property. Hence *physical origin of gravitation* stays under question for many decades (*for today*).

That *delusion of Time* was lately imbedded in the body of growing science. Connection between measurement and physical property of an object become so strong that nobody was able to overcome that link. Obviously measurement has a strong relationship with mathematics because the calculation is impossible without measurement. That was one more aspect of science invented by Galileo. As soon as measurement system was involved in natural philosophy mathematical description of physical processes became possible. Hence measurement and calculation in science were spread widely following decades. And the most fundamental relation between research and calculation were realized in work named "*Philosophiae Naturalis Principia Mathematica*". "Newton's *Philosophiae Naturalis Principia Mathematica (Mathematical Principles of Natural Philosophy)*, 1687, was one of the most important single works in the history of modern science."³³ Obviously it supports Galileo's point of view on measurement of Time and calculation of physical processes that have reference to Time, but even Sir Isaac Newton as well as his predecessor Galileo never gave us any *satisfactory definition of Time!*

Gradually clepsydras become widely used in the Middle Ages. People try to make that device suitable for a wide usage. For example, they were able to create a big clepsydra to make it possible to indicate the passage of hours, but a big clepsydra had one big problem. As soon as they make big clepsydra, they try to use it, but before any usage of that device, it was necessary to calibrate clepsydra according to indication of some other device that shows the *duration* of some other process that was independent of readings of big clepsydra.

A sundial was the only one device that was able to produce such readings, but as it mentioned above a sundial was able to indicate only *seasonal hours*. (i.e. hours with different duration at different seasons). Moreover, *duration* of sun day has difference according to geographical latitude. For instance, duration of a day in North Italy is lesser in winter months and longer in summer months comparatively to the duration of same day in South Italy. As a result, a big clepsydra that was calibrated in Naples at summer months has incorrect indication in winter months. Moreover, a perfect clepsydra produced in *Venice* had false indication as soon as it was transported to *Reggio di Calabria (South Italy)*. A clepsydra becomes impractical with such behavior. It can not be used for measurement of *duration* that is longer than few hours.

Moreover, variable duration of an hour according indication of *seasonal hours* caused some difficulty too, and the worst thing was that sundials were unable to indicate hours at night. All those things led to the necessity of the invention of usable method to indicate hours with equal duration during the day and night. That was human decision that has the only one reason - human comfort and usable readings of that device at any moment of a day or night.

Ancient sundials indicate hours with *different* duration. According to their indication, each summer hour is longer than winter hour. I suppose that Galileo used clepsydra because of that inconsistency of sundial. If he used a sundial (or any other device based on indication of a sundial) each experiment with the *same duration* had *lesser measuring duration* in summer and *longer measuring duration* in winter. Obviously Galileo was unable to produce any accurate calculation for any experiment using such estimation of *duration*, but in common sense of the other people difference between duration of summer hours and winter hours raises no question because winter days have lesser duration than summer days. It was *obvious observation* for them.

To make correct estimation of his experiments he has to break the relationship between *variable duration* of sun hour and *constant duration* of some other process. Duration of that process must be independent of motion of the sun in the sky. And he found such process. That process appears as a result of interaction between gravity and liquid. Same process was measurable even at night because gravitational interaction between liquid and the Earth exist eternally. As soon as it was done, *logical link* between the notion of *Time* and *location of the Sun* in the sky *was broken*. Hence word "Time" and its implications become *more useless* than ever.

VI. LATE MIDDLE AGES

In late Middle Ages humankind continued experiments with mechanical devices. Some experiments were aimed to create a device that was able to provide mechanical process with *constant duration*. It was a next step in organized human life, but the creation of the device had one big problem. As soon as any device begins to count constant duration of any physical process, its indications become usable for everyday life. However, indication of that device becomes contrary to indication of *ancient seasonal hours* because indication of seasonal hours depends on duration of a *sun day*. Hence indications of any device that uses *constant duration process* and *seasonal hours*

³³ Newton, Sir Isaac. (2008). Encyclopædia Britannica. *Encyclopaedia Britannica 2008 Deluxe Edition*. Chicago: Encyclopædia Britannica.

were ever different. As soon as they use mechanical devices with *constant duration process* to estimation of *seasonal "hours"*, they have the following question. ***How it is possible to make unification between readings of two devices that use different principle of action to make "right" estimation of "hours"?***

That was not easy question because humankind never faced such problem ever before. To find an answer on that question, they need to make some technology that was able to do unification between process with *ever changing duration* and mechanical process with *constant duration*. Moreover, mechanical device is operational at night. Hence many questions arise for "night hours". What indication of "hours" must be at night? How many hours can be at night? Is the duration of "night hour" equal to the duration of "day hour"? (and so on...)

To produce mechanical device with *constant duration process* usable for indication of "hours" each hour must have the same duration as any other hour. Hence *duration* of a day was incomparable to estimation of that *duration*. They need to have different process in nature that has constant duration at day and night. That process was successfully found. It was the *duration* between any given noon and next noon. Despite of different angle between the horizon and the sun at noon of different days, *duration* between two subsequent noons *is ever constant*. Hence humankind turns again to celestial processes to create estimation of constant duration processes.

Moreover, celestial processes show one more useful aspect. Despite of different duration of days across a year, there are two specific days that have equal duration of day and night. Those are equinoxes. "Equinox is either of the two moments in the year when the Sun is exactly above the equator and day and night are of equal length; also, either of the two points in the sky where the ecliptic (the Sun's annual pathway) and the celestial equator intersect. The vernal equinox, marking the beginning of spring in the Northern Hemisphere, occurs about *March 21*, when the Sun moves north across the celestial equator. The autumnal equinox falls about *September 23*, as the Sun crosses the celestial equator going south"³⁴

If the duration of a day equal to the duration of a night at each equinox, then same number of "hours" can be used to estimation of *duration* for both processes. Moreover, *duration* of each hour becomes equal to the *duration* of any other hour at each equinox even for *seasonal hours*. Those combinations of durations become appropriate to be comparable with a device with *constant duration of mechanical process*. Hence *each mechanical device* can be calibrated with duration of one "hour" or *seasonal hour at the day of any equinox*. In that case, indication of mechanical device *must be adjusted* so as *duration* of twelve "hours" indication of that device becomes equal to the *duration* of a whole day of an equinox measured by *seasonal hours*. As a result, indication of another twelve "hours" becomes indication of *night "hours"* for that mechanical device and full *duration* between two subsequent noons becomes *twenty four hour duration*. Thus, standard duration and method of calculation for all hours during a day and a night was invented.

Everything went well, but that method of estimation and calculation for hours caused one more question. Ancient seasonal

hours begin its indication of hours as soon as the Sun rises above the horizon. Unlike seasonal hours, a device with *constant duration of mechanical process* begins its indication from noon. Hence variable difference in few hours appears between indication of *seasonal hours* and a *mechanical device*. They need to make one more step to find a solution of that matter, because mechanical device based on mechanical process with constant duration and was able to work at night it seems more useful than ancient seasonal hours. Thus, *mechanical device had priority*.

They had decision (*it was human discussion*) to begin calculation of "hours" each day from its noon. It was a *revolutionary* idea that stays in contrary with any previous human experience, to begin calculation of day hours from sunrise. To keep that system useful, they need to make estimation of noon (that is an event appears as soon as the sun crosses the celestial meridian). That procedure needs specific device and activity from the humans - *it was not as easy as estimation of beginning of sunrise*. Moreover, it led to recalibration of all sundials to make their indication equal to indication of mechanical devices. It was true innovation. However, new idea was widely accepted and gave way to the creation of clocks.

VII. MECHANICAL ESCAPEMENT CLOCKS

"The origin of the all-mechanical *escapement* clock is *unknown*; the first such devices may have been invented and used in monasteries to toll a bell that called the monks to prayers. The first mechanical clocks to which clear references exist were large, *weight-driven* machines fitted into towers and known today as *turret clocks*. These early devices struck only the *hours* and did not have hands or a dial.

"The oldest surviving clock in England is that at *Salisbury Cathedral*, which dates from 1386. A clock erected at Rouen, France, in 1389 is still extant, and one built for *Wells Cathedral* in England is preserved in the *Science Museum* in London. The Salisbury clock strikes the hours, and those of Rouen and Wells also have *mechanisms* for chiming at the quarter hour. These clocks are large, iron-framed structures driven by *falling weights* attached to a cord wrapped around a drum and regulated by a mechanism known as a verge (or *crown wheel*) escapement. Their errors probably were as large as a half hour per day. The first domestic clocks were smaller wall-mounted versions of these large public clocks. They appeared late in the *14th century*, and few examples have survived; most of them, extremely austere in design, had no cases or means of protection from dust."³⁵

It was a very long way to make mechanical device suitable for such purpose. People needed to reject prevailing point of view that was in power for few centuries, and all those efforts were fruitless from a *physical point of view*. Humankind still uses identical *delusion* that was created by Galileo. That delusion includes the idea of *physical reality of Time* despite their manmade multiple reforms of devices that show the *duration* of different physical processes. Once again measurement device used interaction between *force of gravity* and *physical process*

³⁴ **equinox.** (2008). Encyclopædia Britannica. *Encyclopaedia Britannica 2008 Deluxe Edition*. Chicago: Encyclopædia Britannica.

³⁵ **clock.** (2008). Encyclopædia Britannica. *Encyclopaedia Britannica 2008 Deluxe Edition*. Chicago: Encyclopædia Britannica.

caused by that interaction (the clocks were driven by *falling weights*, see above). That principle shows some equality in operation of a clepsydra and a clock. In case of clepsydra it uses *interaction* between the gravitation field of the Earth and liquid in its reservoir. In case of early built mechanical clocks, they used *interaction with the same force* but used *weights instead of liquid*.

As it shown above those devices were regulated by *crown wheels*. Those wheels make physical processes with more or less constant circle of *duration*. Hence it was appropriate to create a device that was able to make an *indication* of more or less regular physical process. Despite of *obvious relationship* between “indication” of such clocks and their *internal recurrent mechanical process* (rotation of *crown wheel*) humans still believed in “*magical Time*” that causes indication of a clock and its ability to determine not only duration of internal mechanical process but direct measure of *Time itself*. It was immense *delusion*.

However, it was quite acceptable for the general population of 14th century, because according to the divine doctrine, the God have separated the light from darkness and created day and night. So the *duration* of the day as well as *duration* of the night had reference to his divine power. As a result any attempt to say anything against divine nature of day or night was prohibited by Catholic Church that was in full power that time.

“About 1450, clockmakers working *probably* in southern Germany or northern Italy began to make small clocks driven by a spring. These were the first portable timepieces, representing an important landmark in horology. The time-telling dials of these clocks usually had an hour hand only (minute hands did not generally appear until the 1650s) and were exposed to the air; there was normally no form of cover such as a glass until the 17th century, though the mechanism was enclosed, and the cases were made of brass.

“About 1581 *Galileo* noticed the characteristic timekeeping property of the pendulum. The Dutch astronomer and physicist *Christiaan Huygens* was responsible for the practical application of the pendulum as a *time controller* in clocks from 1656 onward. Huygens's invention brought about a great increase in the importance and extent of clock making. Clocks, weight-driven and with short pendulums, were encased in wood and made to hang on the wall, but these new eight-day wall clocks had very heavy weights, and many fell off weak plaster walls and were destroyed. The next step was to extend the case to the floor, and the *grandfather clock* was born. In 1670 the long, or seconds, pendulum was introduced by English clock makers with the anchor escapement.”³⁶

Wait a minute! What is a *time controller* (see above)? What is it? How is it possible to make anything that controls *Time itself*?! That is another difficulty or disagreement. Any *mechanical controller* that can be implemented in a *mechanical device* is able only to control *mechanical processes* inside that device and **nothing more!** Hence, so called *time controller* is nothing more than a controlling device that creates mechanical process with more or less constant duration. This example clearly shows that *humans ever mistake any recurrent physical process*

with constant duration as Time itself. If they have a real time controller they can stop that controller and hold *every moving object* in its place like the Sun in the some point of the Sky, water stream in a river, birds flying in the sky and etc.

Obviously that is impossible. Hence so called *time controller* is nothing more than a *mechanical clock controller* that controls *mechanical operation* of a *mechanical clock*. The *duration* of any physical process is comparable to the *duration* of any other physical processes. As a result, we have plenty of them to make any possible physical device that calculates and indicates the duration of its *internal recurrent physical process*. In case of easiest mechanical clock its internal mechanism does that calculation mechanically. In other words it recalculate the number of revolution of a *crown wheel* to number of revolution of the hour hand or does any other activity like making sound and etc.

As it shown above, pendulum is another mechanical device that produces physical process with constant duration. The device can be useful to create another type of clock. Hence that is the *endless process of creation* of different kind of devices that are able to create and count their internal recurrent physical processes with constant duration (or near constant duration). That is cause and reason for great diversity of modern clocks from easiest pendulum clock to electronic and atomic clocks. However, in each clock counting mechanism of any kind keeps counting of *duration* of internal physical process. Hence so called “*timekeeping property*” means only *duration* property of *constant recurrent physical process* of any kind.

VIII. INNATE IDEA OF TIME

Here, appears dissection between *duration* as physical property of any *process* and abstract concept of Time as one of *innate idea*. “**Innate idea** in philosophy, an idea *allegedly inborn in the human mind*, as contrasted with those *received or compiled from experience*. The doctrine that at least certain ideas (*e.g.*, those of God, infinity, substance) must be innate, because *no satisfactory empirical origin* of them could be conceived, flourished in the 17th century and found in *René Descartes* its most prominent exponent. The theory took many forms: some held that a newborn child has an explicit awareness of such ideas; others, more commonly, maintained that innate ideas have some *implicit form*, either as a tendency or as a *dormant capacity for their formulation*, which in either case would require favourable experiential conditions for their development.

“John Locke's vigorous criticism later in the century was directed against innate principles (supposed axioms, both theoretical and practical, implanted in the mind by nature) and the innate ideas claimed as the terms of the principles. But Locke's empiricism had difficulty with certain key concepts, such as substance, “which we neither have nor *can have by sensation or reflection*,” and cause, about which he largely anticipated David Hume's difficulties in the 18th century. Locke seems to have shared some of the assumptions of his opponents (*e.g.*, that *if an idea is innate it cannot be wrong*) and to have sensed that the issue is one of logic (of the status of a *priori propositions*) and not of genetic psychology. Completing this distinction, the 18th-century philosopher *Immanuel Kant* replaced the doctrine of innate ideas with questions about a *priori concepts*, which he

³⁶ **clock**. (2008). Encyclopædia Britannica. *Encyclopædia Britannica 2008 Deluxe Edition*. Chicago: Encyclopædia Britannica.

characterized in terms not of their origin but of their *necessity as conditions of human experience of an objective world*. In the 20th century, Noam Chomsky argued the necessity for postulating innate ideas to explain the possibility of language.³⁷

Summarizing quotation mentioned above we have some number of characteristics of any *innate idea*. It is ever “*allegedly inborn in the human mind*”, “*contrasted from experience*”; It has not any “*satisfactory empirical origin*”; It has “*dormant capacity for its formulation*”; It “*cannot be wrong*”.

All of those aspects we can see in the idea of *Time*. That idea meets *all requirements of innate idea* because even modern sources have not suitable definition of Time. For example, “Time appears to be more *puzzling* than space because *it seems to flow or pass or else people seem to advance through it*. But the passage or advance seems to be *unintelligible*. The question of how many seconds per second time flows (or one advances through it) is obviously an *absurd* one, for it suggests that the flow or advance comprises a rate of change with respect to something else—to a sort of *hypertime*. But if this *hypertime* itself flows, then a *hyper-hypertime is required*, and so on, *ad infinitum*. Again, if the world is thought of as spread out in space–time, it might be asked whether human consciousness advances up a *timelike* direction of this world and, if so, how fast; whether future events pop into existence as the “now” reaches them or are there all along; and how such changes in space–time can be represented, since time is already within the picture.”³⁸

Such point of view produces *delusion* of reality of Time. Ancient people had their own way to hide delusion of innate ideas and make them compatible with the physical world. They created *depiction of innate ideas*. The best example of that way was a depiction of Chronos (the ancient god of Time) who “was usually portrayed through an old, wise man with a long, grey beard” (see above). As a result any concern about the nature of Time had easiest solution with answer: “Look! This is Chronos he rules the Time and he is Time itself!”

Until to now we have similar depiction of innate idea of Time. The same question is generally answered today the same way: “Look at the Clock. It shows Time!” Hence they usually mistake *changing indication* of a clock as a passage of *Time itself*. Moreover, Time, as innate idea, *cannot be wrong* (see above). That point of view caused implementation of Time in any area on knowledge and science even in physics as a *real property of Universe*.

IX. A DOUBLE DEVICE EXPERIMENT

To eliminate that *delusion*, we should conduct an easy thought experiment³⁹. I call it a *double device experiment*. There are *two thermometers* (marked “A” and “B”) in one water tank filled with some water and *two fully operable clocks* (marked “A” and “B”) with pendulums on the same table. The table is exposed in the open air. A person (the experimenter and

observer) begins the experiment. The person sees indication of both thermometer and writes down their indication in the log. Suppose the thermometers show indication of 21 and 21.1 degree of centigrade. Obviously the little difference in their indication is caused by their *precision*.

The person turned his attention for two clocks. Both clocks operate properly and show similar indication eight o'clock precisely. The person writes down indication of both clocks as 8:00 AM. It raises first question here. The clocks have not any indication of noon or midnight. As a result there is not any way to make a decision about 8:00 AM and 8:00 PM by indication of a pendulum clock. Hence the person is unable to have that information by indication of those devices. However, he had the decision of AM. How it was possible? There is the only one way to make such determination. The person *must* look outside to make estimation of Sun location. In case of morning (i.e. the rising Sun) he makes a decision of AM (from the Latin *ante meridiem*, meaning “before midday”) according to location of the Sun in the sky (before midday). Hence, estimation of a clock indication needs some extra activity from a person to be “correct”. Moreover, indication itself is not sufficient because any pendulum clock shows same indication *twice a day*. Obviously a person sitting in a room below ground level has no idea about right time because that person is *unable* to determine the location of the Sun in the sky and reach a conclusion about actual part of the day; is it before or after *midday*. Hence indication of a pendulum clock is *incomplete* at least relatively to day and night.

The experiment continues. The person withdraws the thermometer “B” from the water tank and puts it on the table. After 10 minutes of waiting both clocks show 8:10. The person takes indication of both thermometers and writes down that information to the log again. Thermometers “A” and “B” show 21 and 26 degree of centigrade accordingly. Why do two identical devices show different indications? The answer is extremely easy.

Both thermometers (as well as any other number of them) show matching *physical* property of a measuring thing. That is temperature. In case of the first stage of the experiment both thermometers show indication of thermal property of liquid in the same tank. That property has some measurable value as any other *physical* property of each thing. Both thermometers make measurement by means of *physical interaction* between *measuring property* of the water and the *same property* of they own. As a result thermal property of the water causes indication of both thermometers. Same indication of each thermometer (inside level of their precision) is caused by the same value of comparable measuring property of the water in the tank.

As soon as thermometer “B” was withdrawn from the tank physical interaction between the device and measuring property of the water in the tank *was broken* and that thermometer begins to determine property of thin layer of air on the table surface, because of the sun heat that property has a different value and the device immediately begins to change its indication. As soon as thermodynamic equilibrium was established between the thermometer and surrounding air, the device stops to change its indication, and it shows constant value of the measuring physical property.

³⁷ **innate idea**. (2008). Encyclopædia Britannica. *Encyclopaedia Britannica 2008 Deluxe Edition*. Chicago: Encyclopædia Britannica.

³⁸ **time**. (2008). Encyclopædia Britannica. *Encyclopaedia Britannica 2008 Deluxe Edition*. Chicago: Encyclopædia Britannica.

³⁹ *Gedankenexperiment* in German language

Ten minutes later when the clocks indicate 8:20 the person takes thermometer “B” from the table and puts it back to the water tank. After ten minutes of waiting he writes down information of temperature to the log again. It was 8:30 according indication of both clocks. Thermometers “A” and “B” show temperature of 23 and 23.1 degree of centigrade accordingly. Why the devices changed their indications?

That happened because the sun shining in the sky heats everything on the Earth surface. In case of the tank it warms by the sun rays and increases its temperature. That property changes same property of the water (*temperature*) in the tank, and it begins to increase its temperature too. Both thermometers have interaction with the same property of the water again. As a result both of them have similar indications (in level of their precision) but both indications have some difference from prior indication at 8:00 AM because measuring property has changed. Thermometers, as measuring devices, trace measuring *physical property* perfectly. Moreover, they need not any *additional activity from humans* to show correct indications.

After half-hour waiting the person began the next phase of the experiment. Both clocks show similar indication 9:00. The person understands that indication as 9:00 AM. He stops movement of the clock “B” pendulum. The clock stops its operation, and its indication was frozen at at 9:00. What happened? Why does measurement of that device display static information? Does it a “static time” or any other phenomenon of “fixed time”? The person must ask that question because unlike a thermometer a clock is *stoppable*.

A thermometer is an *unstoppable* device. Its indications have relation only to *specific physical property* of any measuring thing. Indication of a thermometer changes following variation of that property. Hence a thermometer becomes an *unstoppable device* because it shows indication of measuring property (temperature) *ever* because of *physical interaction* between a device and a *measuring physical property*. As soon as a measuring property (temperature) exists eternally, a thermometer makes its measurement continuously *without* any additional activity *from humans*. Hence, nobody is able to stop operation of a thermometer. The only one possible method for that is *destruction* of the device.

Unlike a thermometer, a clock is a *stoppable* device. What does it mean? Does it possible to a human to *break* interaction between *so called “flow of time”* and a measuring device as a clock? Why does not “*flow of time*” interact with a stopped pendulum clock? Is Time so smart to avoid interaction with a clock in such a condition? How it is possible for Time to identify a stopped clock and avoid interaction with a device in such a condition? Is it smart enough? Obviously that is impossible for any physical property to be “intelligent or smart or avoidable” and etc. For instance, *nothing* that was put in any liquid is able to avoid interaction with temperature (*as physical property*) of that liquid. “Time” looks extremely *doubtful* that way.

The experiment goes further. After waiting for 15 minutes when clock “A” indicates 9:15 the man brings the clock “B” back to operation. He pushed the pendulum, and the arms of the clock run to live again. Everything goes well except of a *little problem*. Indication of clock “B” now shows 15 minutes left from indication of clock “A”. More than that, clock “B” shows no desire to *speed up* its indication to meet indication of clock

“A”. Why does it happen? If “right Time” at the moment of evaluation equals to 9:15, why does clock “B” do nothing to achieve that indication? It is “*right Time*”, and “*a right clock*” “must ever show right Time”! But it does not. *That is the greatest failure of a clock*. Clock “B” has never “right indication” again does not matter how many “time” the observer likes to wait.

The bemused observer starts next phase of the experiment. He stops waving of clock “A” pendulum. To his surprise clock “B” run out and difference between indications of two clocks began to decrease. What did happen? Does “flow of time” forget the existence of clock “A” to “flow” only through clock “B”? Does a jammed pendulum stop moving the clock “through time”? Does it possible to control so called “time flow” and “time itself” by a pendulum of a clock??? Astonished observer falls in the chair next to the table. He was unable to make any agreement with those questions. His mind was helpless to confront such questions.

After quarter an hour, indications of both clocks look similarly to each other. Both devices indicate 9:15. The observer pushed the pendulum of clock “A” and brings it back to operation. Everything looks well, but there is a *small problem* AGAIN. Despite of equal indication of clocks and their synchronous operation, the person understands that both clocks have 15 minutes left *from his imagination* of so called “right moment of Time”. ***That is out of physics!*** In the field of physics any measuring device indicates the current value or a measuring property (physical property of course). That value cannot be treated in teams of right and wrong *imagination* of an experimenter because each physical experiment must be independent of any *human influence*. For that reason, show of any illusionist is not a *physical experiment*.

Despite of that contradictory, the person waits for noon measuring position of the Sun in the sky by sextant⁴⁰ and checks indication of both clocks at noon (maximal right ascension of the Sun). As he suspected both clocks indicate “wrong time” because they indicate 11:45 instead of 12 o’clock. To change indication of both devices and make them comparable to his *imagination* of “the right moment of Time”, “flow of time” and many other ideas from his mind, the person changes indication of both clocks *manually*.

After that procedure, indication of both clocks coincides with the person’s *innate idea* of Time because both devices show 12 o’clock at noon. As any other innate idea “Time” cannot be wrong from the experimenter’s point of view. If any device contradict his point of view the device has “wrong indication” of absolute and ever right “Time”. Hence indication of that device must be changed *manually*. That is a perfect example of *innate idea* but the person does not realize that and continue comparison between *his imagination* and indication of physical device instead of correlation between indications of two different *physical devices* (disregarding his own imagination).

Double device experiment was finished, but the experimenter has not any idea of his *delusion*. Whole experiment and behavior of any number of clocks shows same answer on the

⁴⁰ That is an “Instrument for determining the angle between the horizon and a celestial body such as the Sun” from **sextant**. (2008). Encyclopædia Britannica. *Encyclopædia Britannica 2008 Deluxe Edition*. Chicago: Encyclopædia Britannica.

old question. Nobody and nothing can make any measurement of any property that *never exists in the Universe*. Any number of clocks does not any synchronization to each other by themselves because there is nothing any property that propagates throughout the Universe and can be used to synchronization of any number of clocks (two or more). Unlike clocks, any other measuring device operates by means of *physical interaction* with a given *physical property of a thing* (object, substance, etc.) That interaction cannot be stopped. Moreover, it needs not any additional activity from humans. For instance, idea about using sextant to *improve indication of a thermometer looks odd even for a modern physicist*.

X. THE SOLUTION

Each clock, despite any principle of its operation, uses internal *physical process* and counting mechanism (in modern clocks). That mechanism recalculates duration of internal recurrent physical process of a device to indication of the *same device*. To make an indication of two or more number of clocks equal to each other each of them must have internal recurrent process with the same *duration*.

Otherwise, in case of different duration of that processes, the clocks must have different counting mechanisms to recalculate *duration* of their internal processes to the same *duration* that coincides with duration of some other process or so called "standard process". Moreover, any clock needs some human activity for its synchronization with a clock that has "correct indication". That is result of logical outgrowth of *innate idea of Time on indication of a physical device*. Hence so called "synchronization between clocks" means only synchronization between their indications and *human's idea of absolute and ever correct Time*.

That mater was unknown for ancient people. They used the only one kind of "time displaying" device. It was *sundial*. That device, as described above, has behavior, as a measuring device, equivalent to behavior of thermometer. It needs not any additional activity from humans to keep "correct" indication. It operates ever and has correct indication ever because it uses direct interaction with physical property of *measuring process*. That is location of the Sun in the sky. It was the first idea of *ever correct Time*. Such precision cannot be reached in any other type of "time-indicating" device because all of them need (sooner or later) "*synchronization*" with location of the Sun in the sky!

Moreover, sundial, as well as a thermometer, was *unstoppable* in its operation. As soon as the Sun rises above the horizon a sundial begins its operation and *never stops it* until sunset. More than that, if anyone hides a sundial from the Sun rays by anything and removes that thing later, a sundial comes back to correct operation again as soon as the Sun illuminates a device. Any idea of "adjustment" of sundial indication *looks odd even for an ancient people*.

That ancient *delusion* still roots deep in the human mind and reaches its full prosperity in *time-dependent* core of human philosophy.

Retraction of that delusion from that core makes it *time-independent one*. That new *time-independent core* gives way for a new generation of scientific researches and *time-independent theories*. First step on that way was already done by publication

of Z-Theory⁴¹ recent year. That theory uses *time-independent* core to make explanation and calculation for a number of well known facts, phenomena and observations. Many of them become explainable only in a *time-independent way*.

XI. THE ANSWERS

Now it is possible to give answers on some questions that intrigued humankind for centuries.

What is Time?

Logical Definition: Time is a logical link *in human mind* to any physical process that has *observable duration*.

Physical Definition: Time does not exist (and never existed) as a *physical property of the Universe*.

Mathematical Definition: Time means a *rate of durations* between any two *different physical processes*.

Philosophical Definition: Time is ancient *innate idea* of humankind.

Common Definition: Time is a link between indication of a clock and *duration of its own internal recurrent physical process*.

What is "Now"?

"Now" is a point in the Universe from where an observer (object, body, etc.) *makes interaction* with surrounding Universe.

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⁴¹ Source [1]

Relation of Microfinance with Women Empowerment

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Abstract- Microfinance programmes are currently being promoted as a key strategy for simultaneously addressing both poverty alleviation and women's empowerment. The objective of this study has been to understand the role played by microfinance in the development and empowerment of women in the areas of Rural Karnataka, and also analyze the steps being taken by the NGOs to empower the women in these areas.

I. INTRODUCTION

Microfinance in India

“Where once the poor were commonly seen as passive victims, microfinance recognizes that poor people are remarkable reservoirs of energy and knowledge. And while the lack of financial services is a sign of poverty, today it is also understood as an untapped opportunity to create markets, bringing people in from the margins and give them the tools with which they can help themselves.”⁴²

Microfinance as defined by Reserve Bank of India (RBI) is “the provision of thrifts (saving), credit and other financial services and products of very small amounts to the poor in rural, semi-urban and urban areas for enabling them to raise their income levels and improve their living standards”

The role prescribed for financial sector in India to achieve developmental goals dates to pre independence days. There were many sectors that needed to be identified and improved, like more information should be provided about the services and products offered through microfinance programs (Microloans, Savings Accounts, weir transfer and remittance, etc.), the savings sector, where in the people not able to earn a fixed income, were helped in choosing a savings plan for themselves. The credit rates were to be looked into and made feasible for the low income holders to be able to afford to take a loan and improve their standard of living or to support their trade/agricultural activities.

The agriculture credit department was set up in 1935 by the Reserve Bank of India to promote rural credit. In its early days, the government of India sought to promote rural credit by strengthening the cooperative institutions. The need to replace costly informal credit with institutional credit was strongly felt as the All India Rural Credit Survey report of 1954 found that informal sources accounted for 70% of rural credit usage, followed by cooperatives (6.4%) and commercial banks (0.9%).⁴³

⁴² Kofi Annan

2 Bottom of Pyramid: Solution for social and economic development.

⁴³³ World Bank Engendering Development:

The government initiated the Integrated Rural Development Programme (IRDP) in 1980-81. The objective of IRDP was to direct subsidized loans to poor self employed people through the banking sector. The National Bank for Agriculture and Rural Development (NABARD) was established in 1982. In the same year the government established Development of Women and Children in Rural Areas (DWARCA) scheme as a part of IRDP. It was around this time that the first Self Help Groups (SHGs) started emerging in the country mostly as a result of NGO activities. The NGO MYRADA was one of the pioneers of the concept of SHGs in India. These SHGs were large enough for the bank to have transactions. The SHGs in turn were also very responsive and flexible to the needs of their members. The SHGs were a step in that direction. Thus, seeds were sown for the modern microfinance sector in India to emerge.

As the Small Scale industries form the foundation for the development of growth in employment, the Small Industries Development Bank of India SIDBI Foundation for Micro Credit (SFMC) was launched by the Bank in January 1999 for channelizing funds to the poor in line with the success of pilot phase of Micro Credit Scheme. MFIs are provided annual need based assistance. One of the unique features of the scheme is the comprehensive Capacity Building Support being provided to the MFIs/ NGOs to expand their operations as well as to increase their efficiency.

II. WOMEN EMPOWERMENT

In India and other Asian countries the majority of SHGs consist of women because, in these countries, Self Employment through Microfinance was perceived as a powerful tool for emancipation of women. It has been observed that gender equality is a necessary condition for economic development. The World Bank reports that societies that discriminate on the basis of gender are in greater poverty, have slower economic growth, weaker governance, and lower living standards.³

The NGOs support the SHGs and these SHGs specially concentrate on the development of women in the rural area with the help of the SHGs. The total population of women in India is 496,453,556 out of which 135,565,591 stay in rural areas, where the development rate is slow when compared to the urban area. Hence they require many such upliftment programs to improve their standard of living. It is also seen that the literacy rate among women in India is 53.7% that is 224,154,081 are literate out of the total women population of 496,453,556 and the literacy rate in the rural India is 46.1% these statistics show that the NGOs should provide microfinance services in the rural areas.

To provide such microfinance services in the less developed regions the development of Grameen Bank took place. The origin can be traced back to 1976 when Professor

Through Gender Equality in Rights and Resources

Muhammad Yunus, Head of the Rural Economics Program at the University of Chittagong, launched an action research project to examine the possibility of designing a credit delivery system to provide banking services targeted at the rural poor. The Grameen Bank Project (Grameen means "rural" or "village" in Bangla language) came into operation with the following objectives:

- Extend banking facilities to poor men and women.
- Eliminate the exploitation of the poor by money lenders.
- Create opportunities for self-employment for the vast multitude of unemployed people in rural Bangladesh.
- Bring the disadvantaged, mostly the women from the poorest households, within the fold of an organizational format which they can understand and manage by themselves.

Number of Branches (Cumulative)

Up to 2004, the cumulative number of branches was 1,358. Up to 2008, this figure reached 2,539. It represents an increase of 86.97% from 2004 to 2008 and an average annual growth of 17.39% during the five-year period. Growth of number of branches in 2008 is 2.34% over the previous year.

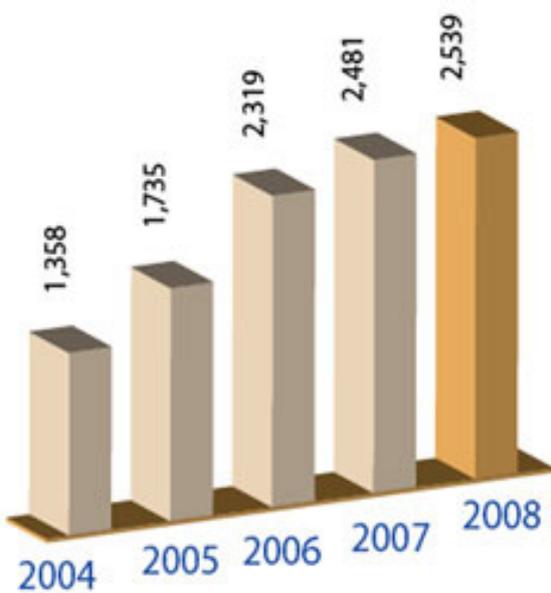


Chart 1: Number of Branches
Source: <http://www.grameen.com/index.php>

Number of Villages Covered (Cumulative)

Up to 2004, the cumulative number of villages covered was 48,472. In 2008, this figure stood at 83,566. It represents an increase of 72.40% from 2004 to 2008 and an average annual growth of 14.48% during the five-year period. Concurrently, with the increase in the number of branches there was a 3.58% increase in the number of villages covered compared to the previous year 2007

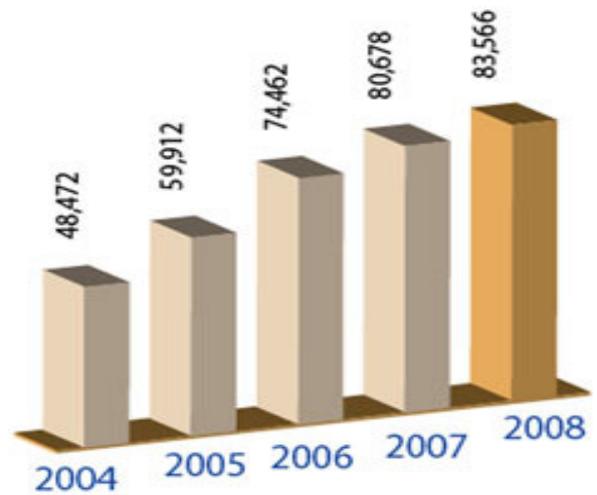


Chart 2: Number of Villages Covered
Source: <http://www.grameen.com/index.php>

Number of Borrowers per Branch (year-end)

In 2008, the number of borrowers per branch (year-end) was 2,460, a 0.89% decrease compared to the previous year. In 2007, the number stood at 2,482, a 3.39% decrease compared to the previous year.

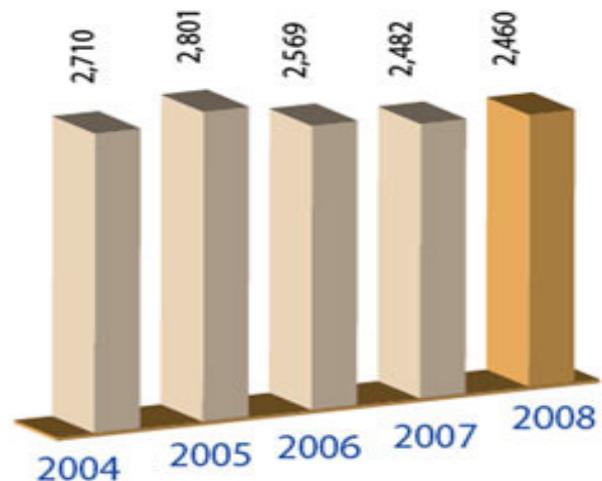


Chart3: Number of Borrowers per Branch
Source: <http://www.grameen.com/index.php> (last 5yrs of Grameen Bank)

Growth of Membership (Cumulative)

Up to 2004, the cumulative number of members was 4.06 million. In 2008, this figure stood at 7.67 million. It represents an increase of 88.94% from 2004 to 2008 and an average annual growth of 17.79% during the five-year period.

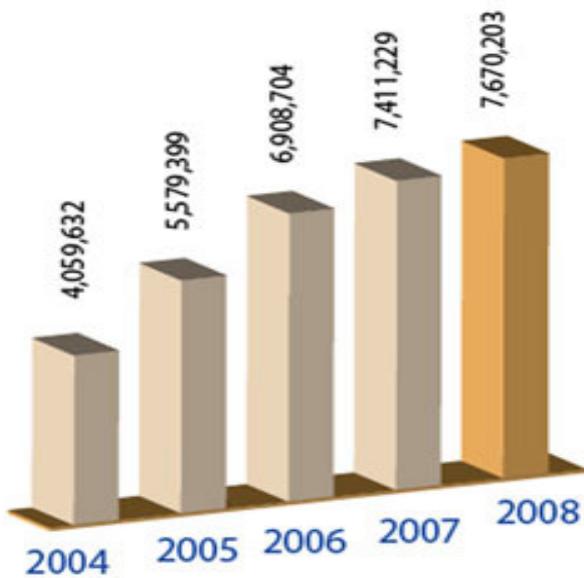


Chart4: Growth of Membership

Source: <http://www.grameen.com/index.php>

Percent of Women Members

Historically, the majority of members of Grameen Bank have been women. The years under consideration are no exception. The percent of women members throughout 2002 to 2003 was within close proximity of the 95% mark, from 2004 to 2005 is 96%, in 2006 to 2007 is 97% and in 2008 it remain same i.e., 97%.

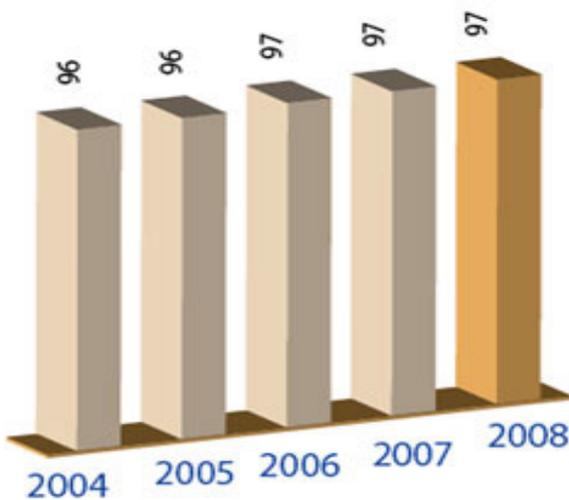


Chart 5: Percent of Women Members

Source: <http://www.grameen.com/index.php>

III. ANALYSIS OF A NGO

A study was conducted at a NGO in Bangalore, which operates in Gulbarga, Mysore and Mandya districts. A sample size of 50 groups was taken, and the study shows that out of 682 members 650 are women this indicates that the NGOs focus is on women development. Out of these 650 women 320 women are literate, that is 49% of the women in the groups can read and write, but the level of literacy is unknown. These NGOs should provide microfinance services in these areas and also work towards increasing the literacy among the women by opening schools for the children and also by providing adult education.

A study conducted on the above NGO reveals the relations between the various characteristics of the groups and the different aspects that can be considered while providing microfinance benefits to these groups. The main criteria of relations are the age of the group, i.e., for how many years these groups have been functioning and the literacy rate among the group members.

a. Age- Literacy:

The SHGs that have been active for more than 2yrs have more members who are literate; the literacy among these groups is between 60-100% whereas the groups that have been functioning for less than 2yrs have literacy of only 30-59%. This analysis shows that the groups that have been associated with the organization for longer period of time have improved on its literacy rate. All the SHGs have at least 2% of the members are literate and it is ensured that all the group leaders are capable of reading and writing to be able to communicate effectively with the agents.

Table1: Crosstab of Age of the SHG and the Literacy rate

Source: Author

Table 2: Chi-Square test of Age of SHG and Literacy Rates.

Source: Author

Table 3: Symmetric measures test to check the strength of the assumption

Source: Author

The assumption is that the literacy rate among the women will improve as the SHGs work for a longer period of time with the organization, the null hypothesis is positive and the value of assumption is greater than the required minimum value. The strength of the assumption is also above average. The literacy rate to the number of years the SHG has been active is $\mu = 0.060$

b. Age-Level of Savings:

A group which has been functioning for more than 2yrs shows more than 62% in the level of their savings. Whereas the group that have been functioning for less than 2yrs have a saving of only 10%, where as the groups that exists only from past one yr have a saving of 12% . This indicates that the SHGs that have

been active for more than 2yrs have better savings and have benefited from the savings plan of the organization.

The level of savings also influences the desire of the members to continue to be a part of the SHG. The analysis shows that when the savings are more than 90% about 68% of the members are willing to continue in the SHG. When the saving is above 90% about 8% of the total amount of the interest earned on the savings is saved by the group and 2% is shared by the group among themselves.

Table 4: Crosstab of Age of SHG and Levels of Savings
Source: Author

Table 5: Chi-Square test of Age of SHG and Levels of Savings
Source: Author

The null hypothesis assumes that the level of savings will increase as the SHGs works for a longer time with the organization. Null hypothesis: The increase in the level of savings to the SHG being active for a longer period of time is $\mu = 0.261$

c. Age- Utilization of Savings:

The loans lent out to these SHGs are used for various activities based on the needs of the members of the group. The group leader helps decide as to how the loan amount will be distributed and used. The money is used for activities like, agricultural and irrigation purposes or for petty business activities. The money generated after investing the loan amount into these activities is used for the repayment of the interest amount and the rest are set aside for savings.

The study reveals that the SHGs that are functioning for more than 2yrs utilize the savings completely. 100% utilization of these savings will lead to optimum usage of the purpose of the loan and fulfill the needs of the members of the group. The SHGs that have been functioning for less than 2yrs utilize their savings only up to 50-100% this proves that the more experienced group is, the better are the saving plans and utilization of these are made to the fullest.

Table 6: crosstab of Age of SHG and Utilization of Savings
Source: Author

Table 7: Chi-Square test of Age of SHG and Utilization of Savings
Source: Author

Table 8: Symmetric measures test to check the strength of the assumption
Source: Author

The null hypothesis assumes that the longer the SHGs functions the more it will be able to save and utilize the savings made by them. The symmetric measures show that

the strength of the assumption is very good. Null hypothesis: Better utilization of the Savings to age of the SHG is $\mu = 0.150$

d. Literacy- Awareness about Bank:

In order to be able to perform the bank procedures literacy is required. Members who come under the 60-100% literate category are very comfortable performing the bank related activities; about 48% of the members come under this category. These members help the other less-literate or illiterate members who also constitute 48% of the group, with the bank procedures like pass book entry, saving ac details, documents and forms entry, etc. and explain to them the savings plans and benefits of savings.

Table 9: Crosstab of Literacy rate and Awareness about the Banks
Source: Author

Table 10: Symmetric measures test to check the strength of the assumption
Source: Author

The null hypothesis assumes that the higher the literacy rate is the more will be the awareness about the banking procedures among the members of the SHGs. The strength of this assumption is also well above the average.

The various tools that microfinance offers are:

- I. Microcredit
- II. Savings A/c
- III. Insurance facilities
- IV. Fund Transfers

Microfinance helps in Women Empowerment by providing:-

Ability to save and access loans- the loans provided to the SHGs is distributed among the members of the group; this money is utilized in agriculture and small businesses. Independent incomes and modest savings have made women self confident and helped them to fight poverty and exploitation.

Opportunity to undertake an economic activity- with the money provided the members cultivate their lands or start small business, this gives them a chance to undertake economic activities.

Awareness- the members are more aware about local issues in and outside their village, they are familiar with the MFI procedures and the savings a/c helps them to learn about the banking transactions. This builds their confidence and spreads awareness.

Skills enhancement- in order to be able run the small scale business or become an entrepreneur the women develop various skill sets, that help them in conducting these business and earning money.

Decisions making within the household- with the generation of income through these businesses, the women are able to have a better hold on their family and also can take a

stand and present their opinion. This builds their status in the family.

Role in community development activities- the SHGs allot group oriented tasks to the members, these tasks are usually related to development of the society and enhancing the lives of the people in the community.

IV. CONCLUSION

The role prescribed for financial sector in India to achieve the women developmental goals can be met by the means of Microfinance, an increase in the growth of membership in the Grameen Bank of 88.94% from 2004 to 2008 and an average annual growth of 17.79% during the five-year period indicates that the rural financing being supported and spread through the SHGs is being appreciated and is effective. These SHGs are achieving tremendous success in educating the rural women about the benefits of saving money and helping them to become financially independent. They are also creating awareness about the banking system and procedures and developing entrepreneurial skills among the women which helps them to earn a living and improve their standard of living.

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Appendix

Table1: Crosstab of Age of the SHG and the Literacy rate

Table 2: Chi-Square test of Age of SHG and Literacy Rates.

**age of SHGs * Literacy
Crosstabulation**

		Literacy			Total	
		60-100%	30-59%	<30%		
age of SHGs	> 2yrs	Count	21	16	2	39
		% within age of SHG	53.8%	41.0%	5.1%	100.0%
		% within Literacy	95.5%	61.5%	100.0%	78.0%
		% of Total	42.0%	32.0%	4.0%	78.0%
1-2 yrs	Count	1	4		5	
		% within age of SHG	20.0%	80.0%		100.0%
		% within Literacy	4.5%	15.4%		10.0%
		% of Total	2.0%	8.0%		10.0%
<3 yrs	Count		6		6	
		% within age of SHG		100.0%		100.0%
		% within Literacy		23.1%		12.0%
		% of Total		12.0%		12.0%
Total	Count	22	26	2	50	
		% within age of SHG	44.0%	52.0%	4.0%	100.0%
		% within Literacy	100.0%	100.0%	100.0%	100.0%
		% of Total	44.0%	52.0%	4.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.034 ^a	4	.060
Likelihood Ratio	11.606	4	.021
Linear-by-Linear Association	4.437	1	.035
N of Valid Cases	50		

a. 7 cells (77.8%) have expected count less than 5. The minimum expected count is .20.

Table 3: Symmetric measures test to check the strength of the assumption

Symmetric Measures

	Value	Approx. Sig.
Nominal by Nominal Contingency Coefficient	.391	.060
N of Valid Cases	50	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Table 4: Crosstab of Age of SHG and Levels of Savings

**age of SHGs * Level of savings
Crosstabulation**

		Level of savings		Total	
		.00	> =90%		
age of SHGs	> 2yrs	Count	8	31	39
		% within age of SHGs	20.5%	79.5%	100.0%
		% within Level of savings	100.0%	73.8%	78.0%
		% of Total	16.0%	62.0%	78.0%
1-2 yrs	Count		5	5	
		% within age of SHGs		100.0%	100.0%
		% within Level of savings		11.9%	10.0%
		% of Total		10.0%	10.0%
<3 yrs	Count		6	6	
		% within age of SHGs		100.0%	100.0%
		% within Level of savings		14.3%	12.0%
		% of Total		12.0%	12.0%
Total	Count	8	42	50	
		% within age of SHGs	16.0%	84.0%	100.0%
		% within Level of savings	100.0%	100.0%	100.0%
		% of Total	16.0%	84.0%	100.0%

Table 5: Chi-Square test of Age of SHG and Levels of Savings

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.686 ^a	2	.261
Likelihood Ratio	4.387	2	.112
Linear-by-Linear Association	2.323	1	.127
N of Valid Cases	50		

a. 3 cells (50.0%) have expected count less than 5. The minimum expected count is .80.

Table 6: Crosstab of Age of SHG and Utilization of Savings

age of SHGs * Utilisation of Savings
Crosstabulation

		Utilisation of Savings		Total	
		>100%	50-100%		
age of SHGs	> 2yrs	Count	38	1	39
		% within age of SHGs	97.4%	2.6%	100.0%
		% within Utilisation of Savings	79.2%	50.0%	78.0%
		% of Total	76.0%	2.0%	78.0%
1-2 yrs	Count	4	1	5	
		% within age of SHGs	80.0%	20.0%	100.0%
		% within Utilisation of Savings	8.3%	50.0%	10.0%
		% of Total	8.0%	2.0%	10.0%
>3 yrs	Count	6		6	
		% within age of SHGs	100.0%		100.0%
		% within Utilisation of Savings	12.5%		12.0%
		% of Total	12.0%		12.0%
Total	Count	48	2	50	
		% within age of SHGs	96.0%	4.0%	100.0%
		% within Utilisation of Savings	100.0%	100.0%	100.0%
		% of Total	96.0%	4.0%	100.0%

Table 7: Chi-Square test of Age of SHG and Utilization of Savings

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.793 ^a	2	.150
Likelihood Ratio	2.489	2	.288
Linear-by-Linear Association	.113	1	.737
N of Valid Cases	50		

a. 4 cells (66.7%) have expected count less than 5. The minimum expected count is .20.

Table 8: Symmetric measures test to check the strength of the assumption

Symmetric Measures

	Value	Approx. Sig.
Nominal by Nominal Contingency Coefficient	.108	.745
N of Valid Cases	50	

- a. Not assuming the null hypothesis.
- b. Using the asymptotic standard error assuming the null hypothesis:

Table 9: Crosstab of Literacy rate and Awareness about the Banks

Literacy
* Awareness abt the banking procedure
Crosstabulation

		Awareness abt the banking procedure		Total	
		> 80% members have delt with banks	30-80%		
Literacy	60-100%	Count	20	2	22
		% within Literacy	90.9%	9.1%	100.0%
		% within Awareness abt the banking procedure	47.6%	25.0%	44.0%
		% of Total	40.0%	4.0%	44.0%
30-59%	Count	20	6	26	
		% within Literacy	76.9%	23.1%	100.0%
		% within Awareness abt the banking procedure	47.6%	75.0%	52.0%
		% of Total	40.0%	12.0%	52.0%
<30%	Count	2		2	
		% within Literacy	100.0%		100.0%
		% within Awareness abt the banking procedure	4.8%		4.0%
		% of Total	4.0%		4.0%
Total	Count	42	8	50	
		% within Literacy	84.0%	16.0%	100.0%
		% within Awareness abt the banking procedure	100.0%	100.0%	100.0%
		% of Total	84.0%	16.0%	100.0%

Table 10: Symmetric measures test to check the strength of the assumption

Symmetric Measures

	Value	Approx. Sig.
Nominal by Nominal Contingency Coefficient	.115	.718
N of Valid Cases	49	

- a. Not assuming the null hypothesis.
- b. Using the asymptotic standard error assuming the null hypothesis.

Trend in Behavioral Finance and Asset Mobilization in Mutual Fund Industry of India

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Abstract- Lessons learnt during recession have indeed put a lot of pressure in making key decisions among the rational investors. Rational investors now need more data and have to spend more time in making key investment decisions. Mutual funds have been a favourable investment opportunity and have been trusted as a safe investment.

This paper tries to analyze some of the key issues noted below:

- To understand the growth and the potential of Mutual Fund industry and analyze its success.
- An exhaustive cross performance study of Mutual fund industry by analyzing around 1025 mutual fund schemes of India.
- Performance analyses of various mutual fund schemes and its contributions to assets management during the study period (2002-2009).
- Insight about the performance of the mutual fund under short term and long term period and
- Investor's behavior in allocating their investments among various assets available in the market compared to Mutual funds in the changing economic Scenario.

The paper would thus be exhaustive study in the field of Mutual funds performance and the progress of Mutual funds in India.

I. INTRODUCTION

As the financial market become more sophisticated and complex, investors need a financial intermediary who provides the required knowledge and professional expertise on successful investing. Today investment is not restricted to share market or to buy some government shares which would give some tax benefits, rather it has taken the form of mutual fund which provides a high growth rate along with investor's protection along with tax benefits. Thus, mutual funds have imparted much needed liquidity into the financial system and have provided an alternative to the dominant role of banking and financial institutions in the market. There are various types of schemes available to the Indian investors, one of the classifications is of open ended schemes and close ended schemes. In open ended schemes the investors have an option to redeem and buy units at any time from the fund itself, while the close scheme did not have any option like that, but to facilitate liquidity in the market they enlist these funds on stock exchange so that the investor can buy and sell the securities any time of the year.

There are lots of mutual funds schemes in Indian market and the basic question to every investor is to which fund to invest?

There is no as such constant rule for that, as there are different types of investors with different kind of risk tolerance, financial conditions, financial goal.etc in short every investor is different and thus the funds for every investor is also different. To know which fund to invest? Investor can have information from the offer document or key information memorandum which is being provided along with the application form by the issuer of mutual fund schemes.

Offer document or KIM is prepared keeping in relation with the rules and regulations laid down by SEBI for the safety of investors. As per SEBI guidelines an offer document must contain the information regarding the performance of the mutual fund schemes in the past year as well as the future plans; where the fund wants to invest and other various investment strategies of the fund.

II. INVESTMENTS OPTIONS

Every investment options has its strength and weakness, few options will give low return and few will give superior returns as well as the investment options also differs on growth and liquidity and mutual funds had combined all the advantages of investing in each alternatives while dispensing with the shortcomings. Though the existence of the mutual fund is not so long in India but, in comparison to banks and various insurance companies they are attracting small investors at a large scale.

III. WHAT TO LOOK INTO A MUTUAL FUND SCHEME?

As per the regulation of SEBI, an abridged offer document contains useful information for the investors relating main features of the scheme, risk factors, initial issue expenses and recurring expenses to be charged to the scheme, entry or exit loads, sponsor's track record, educational qualification and work experience of key personnel including fund managers, performance of other schemes launched by the mutual fund in the past, pending litigations and penalties imposed, etc. but if the investor require any further information he can ask the mutual fund firm to provide with the same.

An investor can have an idea of the performance of the mutual fund by knowing the NAV of the mutual fund. The NAVs is disclosed on a daily basis, investors can have an access to the NAV on Web site of Association of Mutual Funds in India, and also it is published in the newspaper on a daily basis. NAV of a

scheme varies day by day as they are the market value of the securities held by the scheme.

The last thing which should be looked into a mutual fund is that which scheme suits the investment objectives of yours. Investors should always keep a track of the records of the various schemes of mutual fund and should be always informed about the performance of the schemes. The investors can use BSE Sensitive Index, S&P CNX Nifty, etc. and based on that investors can decide about entering the market or exit. A mutual fund should always be selected on the basis of its merit considering performance track record of the mutual fund, service standards, professional management, it should be never be selected on any rumor in the market.

There are two type of needs for investment; investment needs and protection needs. Investment in any shares or any bond will not serve both the purposes. Mutual funds considering all these in mind provide a wide range of scheme, dealing with different type of investors in respect of risk tolerance, financial conditions and their age group and their financial goal. Mutual fund is the only one armor in the field of investments. It can form the core foundation of any investment as it can be for long term or short term, high risk or low risk, for any type of client; it may be a single investor, corporate or any institutional investor. Considering the vast area of investment, mutual funds provide with a large number of funds like; sector funds, equity funds,

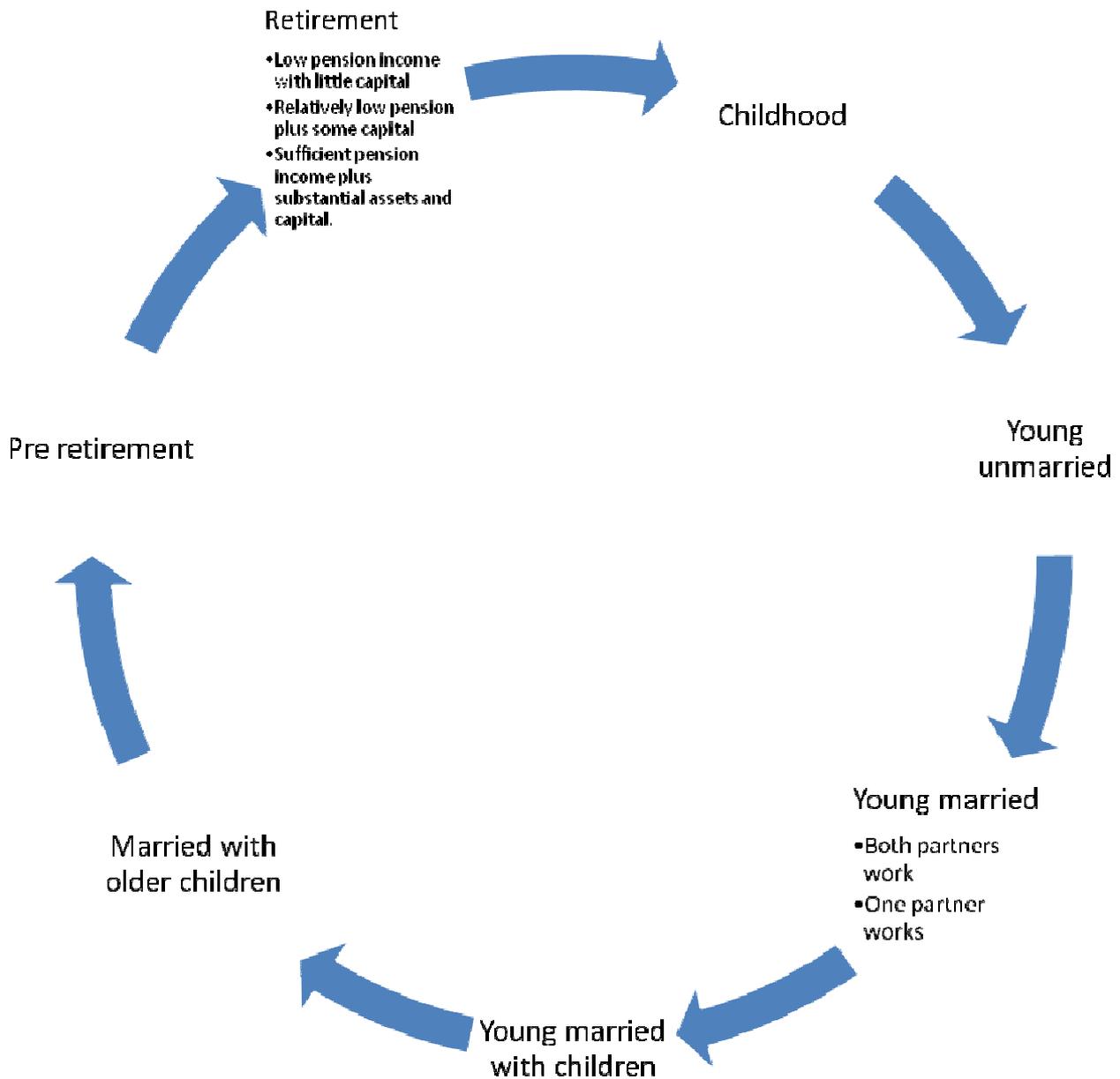
income funds, gilt funds, money market funds, balanced funds, ELSS funds, gold ETFs and other ETFs.

These funds differ in respect of liquidity, risk aversion, return potential, tax efficiency and other investor's financial need.

How to judge which mutual fund for which age group? Or which mutual fund suits the best for the investment needs for different investors?

Investors can be categorized on the basis of life cycle and wealth cycle. The life cycle of investors can be sub-divided in 7 different stages. This life cycle does not provide any kind of static relationship between the needs and desire for any specific kind of mutual fund scheme, but it does provide the knowledge of the ways that an individual investment desire can be met. As there are two types of needs based on investment; protection need and investment needs. The life cycle gives a relation between the needs of any person at different stages of life keeping the other factors same.

There are various other factors which have a considerable effect on the needs of investment of any individual investment strategy, they are like wealth or financial ability of the investor, financial goal as well as risk tolerance for the market fluctuations.



IV. LIFE CYCLE OF INVESTORS

Each different stage require a different financial planning depending upon various factors like clients goal, current resources and future potential income of investor, level of risk tolerance which depends not only on market conditions but also on resources availability and financial goal of investors, tax situation of the investor. Depending upon all these conditions different allocation of assets are done. A client's need keeps changing with his current resources as well as future needs, financial market conditions led to change in the investor's investment policy. Thus, an investor needs to review the progress of the current investment as well as other alternatives available in the market.

Among of all the various mutual fund schemes available in India only gilt funds, income funds and growth funds are being

considered most by various mutual fund companies. As most of the investment and protection needs of investors are found out in these schemes, these schemes constitute around 75% of the mutual fund market share.

An investor is also judged on the basis of financial condition or wealth. On basis of financial condition an investor can be in five stages;

- e. Accumulation stage
- f. Transition stage
- g. Reaping stage
- h. Intergenerational transfer stage
- i. Sudden wealth stage.
- j.

The wealth cycle can also be formulated in a graph, but as there is no any kind of relation between various stages, thus it does not form any structure of any cycle.

Figure 1 wealth cycle stage of an investor

Wealth cycle

Accumulation stage

Reaping stage

Intergenerational transfer stage

Transition stage

Sudden wealth stage

When mutual fund started in India the major investment schemes were income funds, growth funds, gilt funds, balanced funds, ELSS funds as well as liquid/money funds, with its initial year only the income funds and growth funds were mostly liked by the investors which remains the same choice of the investors today.

Income funds:

Unlike gilt funds they are quite high on default risk as in the past there had been defaults regarding payment of interest amount plus principal amount, though they are high on default risk but in the same time they also provide a regular fixed income to the investors. They distribute maximum of their surplus of their investments and though they suffer from high fluctuation risk they are less risky than equity funds.

There are various types of debt/income funds in India like diversified funds, focused funds, high yield funds, which suit different investors and their different kind of needs.

Equity funds:

It has higher risk than the gilt funds as well as from income funds but in the same time they also provide higher return to the investors. It did not provide any fixed income to the investors but led to the appreciation of the value of capital invested.

There is different kind of equity funds available; depending upon risk measurement they are as follows;

V. Aggressive growth funds – funds which directly invest in the companies which are not researched and which are providing higher returns (blue chip companies).

VI. Growth funds – these are the funds which invest for three to five years only.

VII. Specialty funds – these are more volatile funds than the income funds/debt funds.

VIII. Diversified funds – funds invest only in equities and very less is being invested in the liquid market.

IX. Equity index – less diversified but more risky funds, these funds have to be taken care of by tracking performance of the funds.

X. Value funds – invests only in low P/E ratio funds or low market value ratios companies, these funds find the companies which are undervalued and wait for the situation when their value will increase.

XI. Equity income fund – these funds invest in power or utility funds as their price does not fluctuate and give higher dividend to the investors.

Measurement of performance of funds:

A performance of a fund can be measured by various techniques but the best way and the easiest way is to find the NAV values of the fund. Among the various techniques of calculating NAVs, here are some.

Change in NAV:

NAVs can be calculated in percentage and in absolute terms.

In absolute terms = (NAV at the end) - (NAV at the beginning).

In percentage terms = (absolute change in NAV/ NAV at the beginning)* 100

It is the most commonly used by investors for the evaluation of the performance having an advantage that is easily understood and applies to any type of fund. The evaluation should always be in terms of the investment objective of the fund. Though it also suffers from few limitations as it cannot be considered as comprehensive, it cannot be used effectively in terms of income funds and withdrawal plans.

Total return:

While the shortcomings of NAV (no-inclusion of dividend) is taken care of, this has also some limitations like it ignores the fact that distributed dividends also get re-invested if received during the year as well as while measuring the performance must be interpreted in the light of market conditions and investment objectives of the fund.

{(distributions + change in NAV)/ NAV at the beginning of the period}*100

Total return with dividends reinvested:

{(1+div/ex-d NAV)*end NAV} – begin NAV/ Begin NAV *100

This formula states that when a dividend is again reinvested in the fund then its value does not remain the same as it is also invested and there will be a return on the dividend too, thus it should be also taken in consideration. This situation may arise in any funds which gives monthly returns/ quarterly returns. While evaluating the performance of the mutual funds few things should be taken care of like expense ratio, income ratio, portfolio turnover rate, transaction costs, fund size, cash holdings. These ratios also play an important part in the fund's performance. Suppose the fund shows that it had high returns on the investment but what if the expense ratio is also quite high in comparison to other funds in the same scheme, this also says that may be portfolio turnover of the funds is quite high and because of that these expenses are rising.

Mutual funds provides a return which is more than the bank deposits and less than the secondary market of any stock exchange, now they are emerging as a new strategy in the area of investment.

Drawbacks of mutual funds:

- [1] Mutual funds respond in respect of stock market and as the entire market will fall the mutual fund value will also fall. Thus it gives that no investment is risk free.
- [2] As they are managed by fund managers, thus they charge amount for their services in terms of fees and commissions which are charged in name of load.
- [3] The funds are not tax free, thus if you make profit and receive income from the funds then you will have to pay for the taxes also.
- [4] The biggest gamble is taken as the money is being managed by the fund managers and your fund performance depends upon the performance of the performance of the mutual fund manager.

Study:

Every investor is different in terms of risk, few like to take the risk and few like to averse it. As already mentioned in the paper that behaviour of every investor towards market is different, depending upon the financial ability and as well as the financial goal. The dependency to measure the performance of any mutual fund scheme cannot be just evaluated by the NAV values it also depends upon the risk dependency for that fund or what is the happiness derived from the investment taking in consideration the amount of risk that investment has.

Suppose an investor is wealthier in relative to another investor he would take bigger risk in the market while the investor with the little one would surely go for the risk aversion. Risk taking is like a gamble where you take a bet and wait for the return, and the return may give you high return or it may give you huge losses. Many investors did not like to take a bet in the stock market; many did not have sound knowledge to take any position in the market, for those investors mutual funds provide a nice opportunity to invest in the various fund schemes and indirectly to take the market return without taking the risk directly in the stock market.

Mutual funds collect the money from the individual and then invest in the various sectors of the market, thus looking in the offer document of the various schemes the investor can have an idea that what will be done with the investor's money and depending upon the information the investors can deposit the money in the respective funds.

Risk aversion is the major advantage that attracts the investors. Risk aversion can also be defined in terms of absolute risk aversion and relative risk aversion.

Absolute risk averse type of investors can be distinguished in terms that, investors having more wealth would like to be less risk averse in terms of investors who would be having less wealth. Explanation can be like this that people who would be having more money would like to take the bet in the market fluctuations as even the loss would not hamper much of their living standards but in the same time an investor who is having less money would not like to go for the risk and will keep money in some safe deposit where he could be sure of the safety that the value of money will not depreciate as a loss in the value of the money may lead to a drastic change in the living standard of the investor.

Even this cannot be taken as any firm strategy to be built up any scheme as what is more money or what is less money cannot be defined and even though it can be formulated it cannot be said that it will remain the same for every investor.

Money can be compared as less or more in terms of relatedness with other investors but in that sense the idea of absolute risk aversion will go wrong. In relative risk aversion the investor with more money or wealth will be more risk averse than the investor with the less money. It can be explained in the way that when a person having a large sum of money suppose around 20 million invested in the market and there is another investor with only 1000 invested in the market and in the same time if there is a fall in the market by 50%, then the loss for the investors will be 10 million and 500 respectively. Obviously the loss for the former investor will give him a bigger shock and it will create a drastic change in the living standard of the investor where the other investor with a loss of only 500 will not be affected in his standard of living by the same very much. Thus it shows that absolute risk averse and relative risk averse follows opposite paths.

As there is variance in the types of investors also now the problem arises that how to define the most suitable return for an investor and what should be the strategy for the investor to look into an investment option?

The investment can be done up on the utility derived from the investment, it works same like the diminishing marginal utility theory. Based on the various level of risk aversion any investor can select any market for investment of its money. Like if the investor likes to speculate the market he can invest money in the stock market, but if he likes to take a medium risk and to take a little safer position he would like to invest the same in any mutual fund schemes, and if the investor does not believe in the market he would not at all invest anywhere and would like to keep the money safe in the bank, though there is a misconception in the market about the bank deposits, that they are risk free but even they are risky as they may go down if the whole economy goes down.

The biggest difficulty for any investor is that to where to invest the money, and the answer is that it can be done by keeping the risk level in the mind as well as various performance measures like utility concept, Sharpe ratio, Treynor's ratio, Jensen methods which give you the value of the investments.

There are two types of mutual funds, one is open ended and the other is close ended schemes.

Open ended schemes:

The study is under following constraint:

- Period of study is taken from April 2002 to June 2009.
- Only specified schemes were taken into account

During the study period it is observed that there had been a substantial growth under the various mutual fund schemes. Though the maximum volume of fund is managed under the income scheme followed by growth and latter followed by liquid/money market schemes but if we check the no. of times there had been growth in the funds then it had been found that income funds had grown by just six times of their figure of what they have been in the month of April 2002 and all the three

(income, growth, and liquid) funds constitute only around 31 times of their value but the major growth have been in the field of ELSS schemes were the average growth in the number of

times is more than 37 times. We can also found that there had been a consecutive growth in the ELSS schemes (figure 3).

Table 1; Total assets under management during the period April 2002 to June 2009(Rs. in crores)

schemes	2002	2003	2004	2005	2006	2007	2008	2009
Income	36912	61961	57714	42,338	29,006	70,180	150,283	239,118
Growth	9006	10048	20690	40,666	80,263	105,352	108,736	119,491
Balanced	15264	2697	3644	4,373	6,173	9,023	11,837	13,260
Liquid/money	10138	20139	63015	60,875	108,776	91,201	92,239	111,215
Gilt	3972	4793	5746	4,317	2,566	1,963	2,180	5,480
ELSS	418	412	439	918	4,706	10,346	11,975	15,669
Total	75710	100050	151248	153,487	231,490	288,065	377,250	504,233

Source: AMFI newsletter

Table 2; % Growth of various mutual funds during April 2002 to June 2009

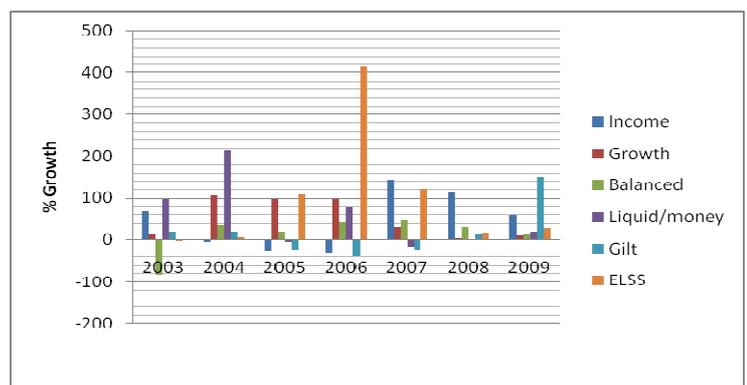
schemes	2003	2004	2005	2006	2007	2008	2009
Income	67.8614	-6.85431	-26.6417	-31.4894	141.9499	114.1394	59.11181
Growth	11.57006	105.9116	96.54906	97.37127	31.25849	3.212089	9.890928
Balanced	-82.331	35.11309	20.00549	41.16167	46.1688	31.18697	12.02163
Liquid/money	98.64865	212.9003	-3.39602	78.68747	-16.1571	1.138145	20.57264
Gilt	20.66969	19.88316	-24.8695	-40.5606	-23.4996	11.05451	151.3761
ELSS	-1.43541	6.553398	109.1116	412.6362	119.847	15.74522	30.8476
Total	32.14899	51.17241	1.48035	50.82059	24.4395	30.96003	33.66017

Source: AMFI newsletter

Source: Author

Though there is a growth in income funds under open ended scheme but it is from the period from April 2007 and during the same period the growth in ELSS is more than 400% now as there starts a growth in terms of income funds after April 2007 in the same period ELSS schemes had given a slow decline in their growth rate forming an inverse relationship with the income funds. The average growth rate in the income fund under open ended scheme is 45%, while average growth rate of ELSS scheme for the same is more than 99% where the total growth during the period for all the schemes is around 33%. There is a considerable decrease in the growth schemes during the period from April 2008, which also says that during recession the investors have given more preference to gilt funds and liquid/money market funds as they may want more safe and secure money and not relying on the market fluctuations.

Figure 3 Growth of various schemes under April 2002 to June 2009



Source: Author

It can be observed that there is a considerable increase in the total number of open ended schemes every year. Whereas there is considerable growth under growth funds followed by the income funds while other funds could not make any mark though there is increase in the number of funds.

Figure 2 Open ended schemes

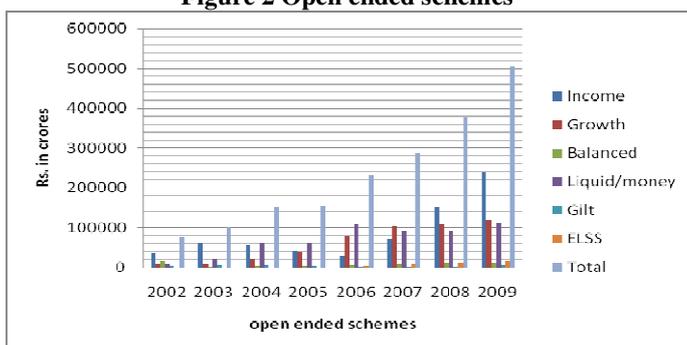
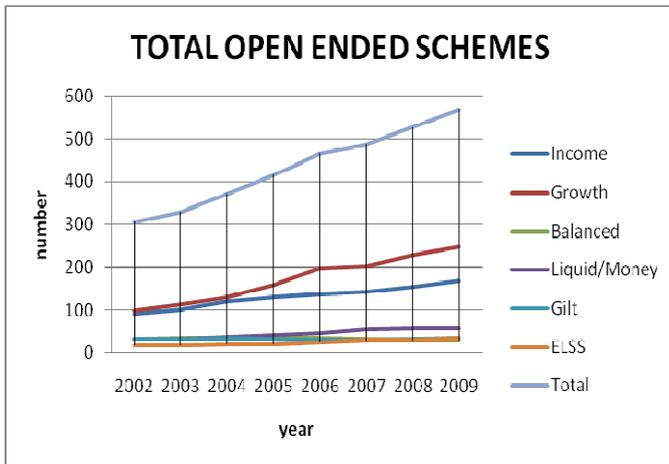


Figure 4 Total open ended schemes during April 2002 to June 2009



Source: Author

Close ended schemes:

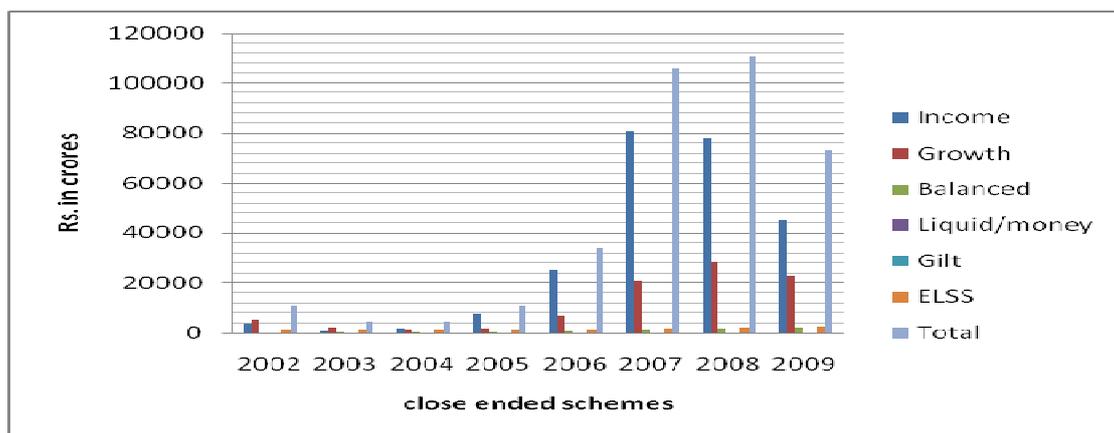
What we see in the open ended schemes is much lack in close ended schemes; one reason may because of immobility to could not sell it to the issuers any time before the fund mature. Though there had been a meager growth but the market is captured by the income funds and followed by the growth funds, the presence created by the ELSS schemes in the open market is not felt in the close ended market.

Table 3. Total assets under management during period of April 2002 to June 2009. (Rs. In crores)

schemes	2002	2003	2004	2005	2006	2007	2008	2009
Income	3931	757	1717	7,549	25,107	80,733	77,532	44,973
Growth	5387	2133	1179	1,795	6,933	21,016	28,269	23,039
Balanced	218	706	738	694	788	1,772	2,261	2,400
Liquid/money	0	0	0	0	0	0	0	0
Gilt	0	0	0	0	0	0	0	0
ELSS	1095	963	963	1,021	1,216	1,987	2,468	2,560
Total	10631	4559	4597	11,059	34,044	105,508	110,530	72,972

Source: AMFI newsletter

Figure 5 Total assets under management during April 2002 to June 2009 under closed ended scheme

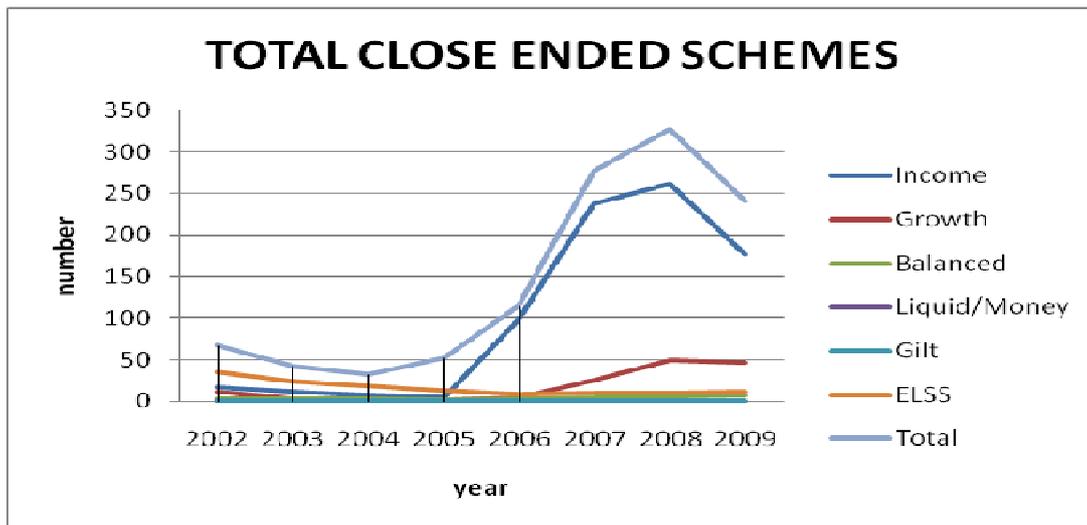


Source: Author

The close ended market is not so developed in the Indian market scenario. Thus, it is not having a greater impact in terms of market share in comparison of the open ended schemes, then also this market saw a tremendous growth during the period from 2005 to 2008, when the number of schemes rose up to a level of

more than 300 schemes from just 50, but with the hit of recession the investors loose the hope in the closed secondary market and thus tit lead to the sudden downfall in the number of the schemes under this type of funds.

Figure 6 Total close ended schemes during April 2002 to June 2009



Source: Author

Total schemes

The total schemes gives a cumulative overview of the market consists of open ended and close ended schemes together. There had been a considerable average growth of around 30% in the mutual fund investment market during the year from April 2002 to June 2009, but a considerable change is their in the pattern of holding the market growth in terms of total assets under management as ELSS and income funds constitute 55% and 36%

of average growth during the period where as the market is mostly captured by liquid and growth funds which constitute around 56% and 45% of the average growth in the market over the period. Though the growth is substantial in the long run in growth and liquid/money market funds but the market is captured by income funds in terms of total assets under management, which is around 50%.

Table 4 Total assets under management during study period of April 2002 to June 2009. (Rs. In crores)

schemes	2002	2003	2004	2005	2006	2007	2008	2009
Income	55205	62871	59431	49,887	54,113	150,913	227,815	284091
Growth	14393	12181	21869	42,461	87,196	126,368	137005	142530
Balanced	15482	3403	4382	5,067	6,961	10,795	14,098	15,660
Liquid/money	10138	20139	63015	60,875	108,776	91,201	92,239	111,215
Gilt	3972	4793	5746	4317	2,566	1,963	2,180	5,480
ELSS	1513	1375	1402	1,939	5,922	12,333	14,443	18,229
Total	100703	104762	155845	164,546	265,534	393,573	487,780	577,205

Source: AMFI newsletter

Table 5 % Growth of total schemes

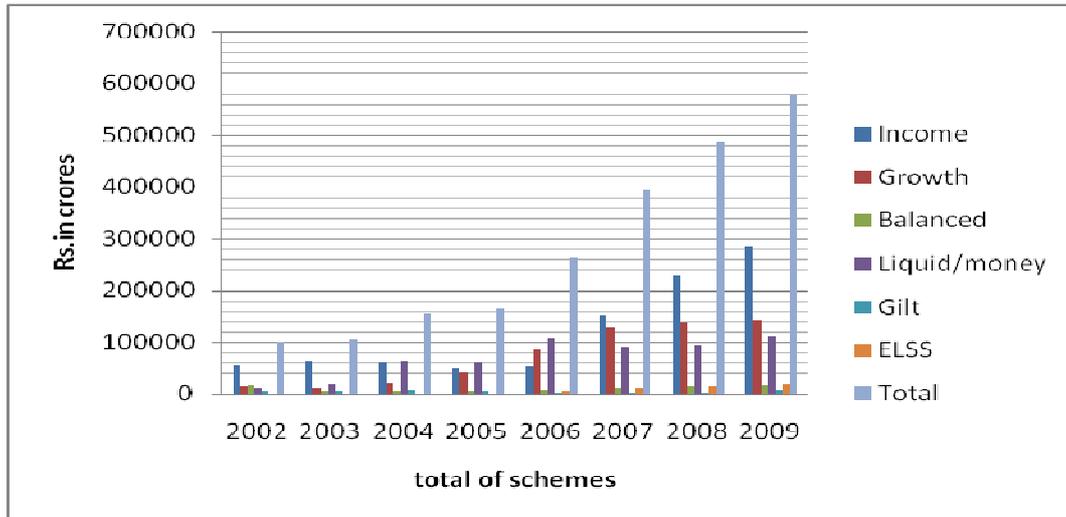
Schemes	2003	2004	2005	2006	2007	2008	2009
Income	13.88642	-5.47152	-16.059	8.471145	178.8849	50.95784	24.7025
Growth	-15.3686	79.5337	94.16068	105.3555	44.92408	8.417479	4.0327
Balanced	-78.0196	28.76873	15.63213	37.37912	55.07829	30.5975	11.07959
Liquid/money	98.64865	212.9003	-3.39602	78.68747	-16.1571	1.138145	20.57264
Gilt	20.66969	19.88316	-24.8695	-40.5606	-23.4996	11.05451	151.3761
ELSS	-9.12095	1.963636	38.30243	205.4152	108.2573	17.10857	26.21339
Total	4.030664	48.761	5.583111	61.37372	48.21944	23.93635	18.33306

Source: AMFI newsletter

Figure 7 & 8 gives an overview of the trend analysis of the total assets under management, which states that there is a continuous growth in terms of income funds assets mobilization

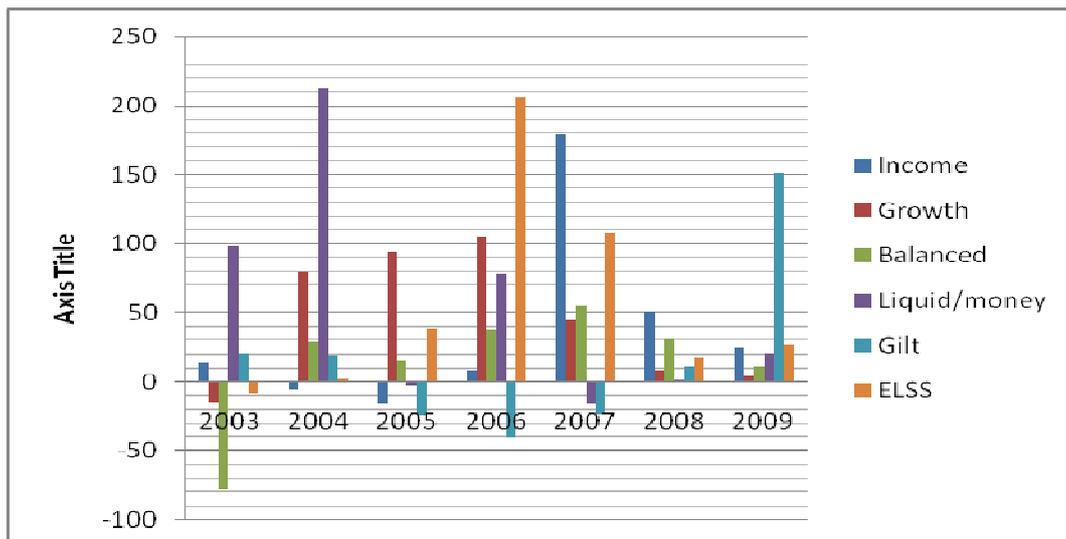
in the market where as growth % says that there is decrease in the growth of the income funds as well as ELSS are decreasing in terms of growth rate over the years.

Figure 7 Total assets under management during April 2002 to June 2009



Source: Author

Figure 8 Growth in total mutual fund schemes in %

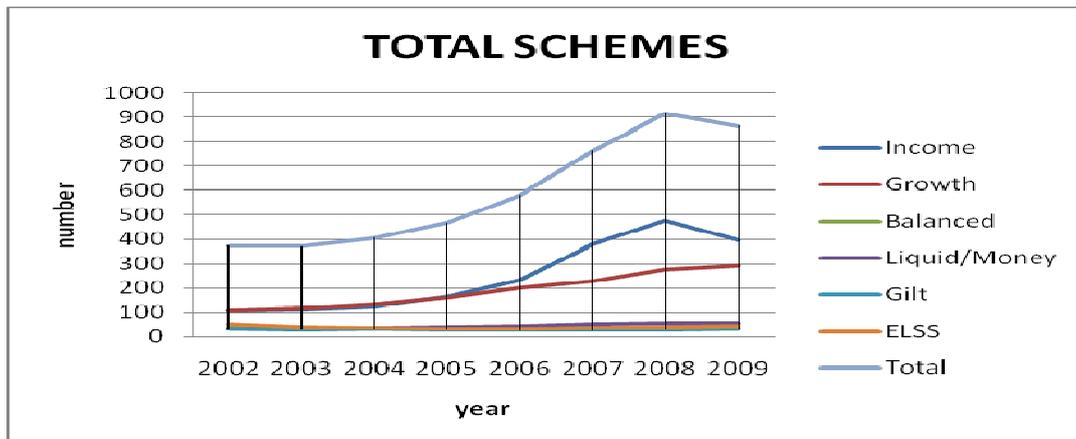


Source: Author

There have been a growth in the number of schemes under income and growth funds but the other schemes like balanced funds, ELSS funds or gilt funds there has not been any new schemes which can be related with the negative growth of the

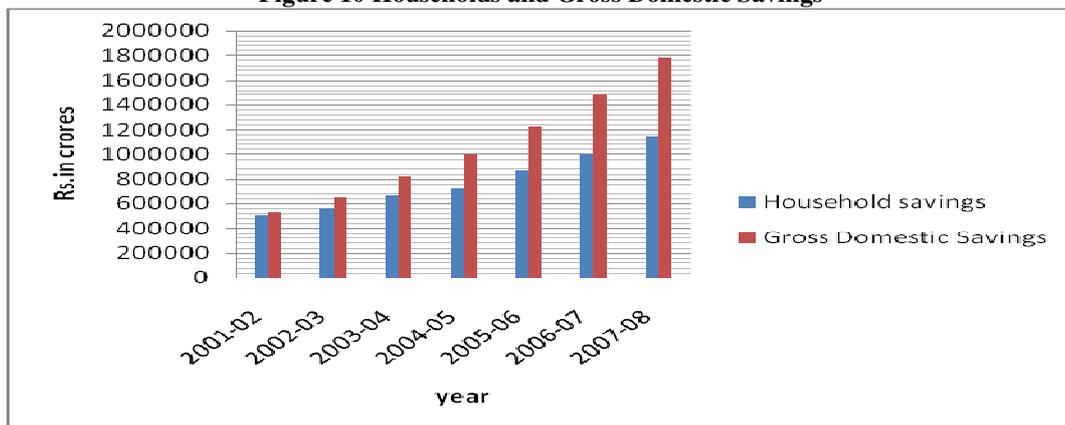
schemes under the following period. It is observed that there is decline in the trend of the total number of schemes launched which may be due to the negative growth of close ended schemes.

Figure 9: Total schemes during April 2002 to June 2009



Source: Author

Figure 10 Households and Gross Domestic Savings



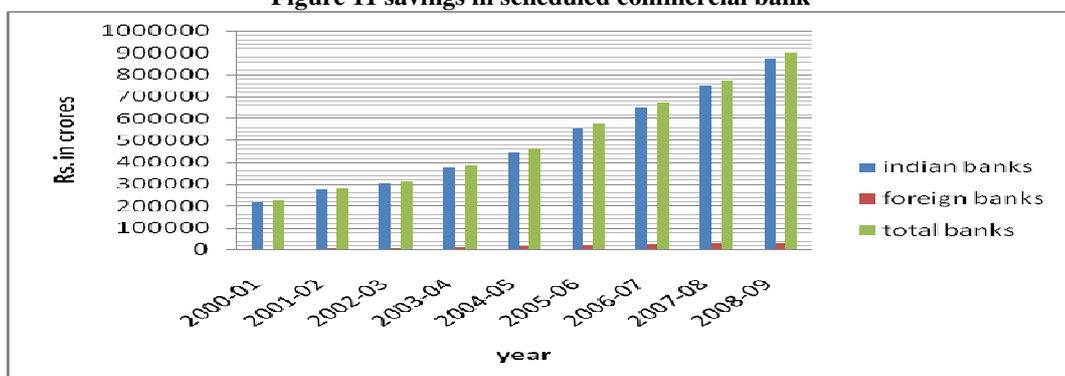
Notes: 1) 2006-07 data are provisional. 2) 2007-08 data are based on quick estimate.

Sources: Central Statistical Organisation (CSO)

The number of schemes may be going down but as we have observed that there is a continuous growth in the fund under income and growth funds which can be related to the mobilisations of savings by the household sector which is major constituted by the middle income groups who in major deposit their savings in the banks. The market is constituted with both

the Indian banks and foreign banks, but the Indian investors are having more faith in the Indian banks as their maximum savings is in Indian banks (figure11.) here the data is taken only for the scheduled banks. The savings in the foreign banks shows that today still, the market is more for the Indian banks, though there is growth in the foreign banks but it is very minimal.

Figure 11 savings in scheduled commercial bank

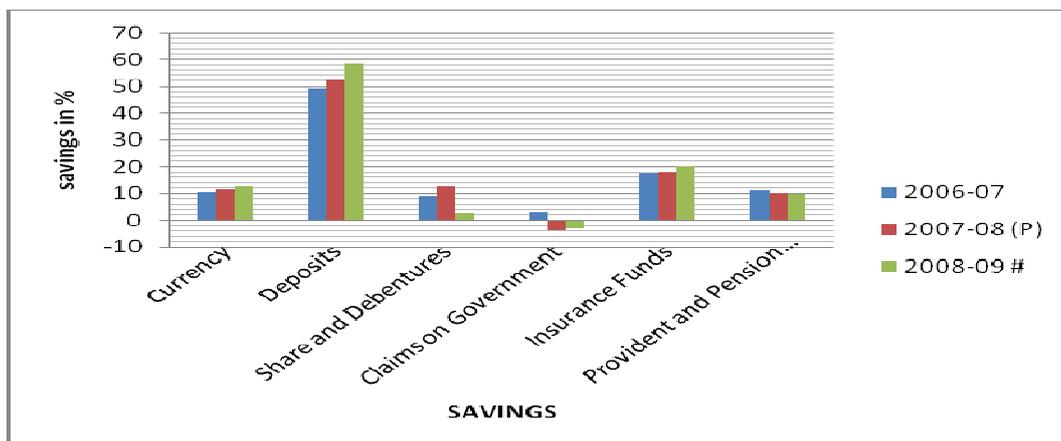


Note : Data are of weekly frequency till 1984-85 and fortnightly frequency thereafter. The data comprises of only scheduled bank.
Source: Reserve Bank of India.

Even the deposits does not give the distribution of the conclusive figure of the deposit pattern of the investors behaviour, there is huge differentiation on the pattern of the deposit in the Indian market among the investors. The Indian investor is divided into sections like

1. Currency
2. Deposits
 - a. With banks
 - b. With non-banking companies
 - c. With cooperative banks and societies
 - d. Trade debt
3. Shares and debentures
 - a. Private corporate business
4. Claims on government
 - a. Investment in government securities
 - b. Investment in Small savings
5. Life insurance funds
 - a. Life insurance funds
 - b. Postal insurance
 - c. Statue insurance
6. Provident and Pension Funds

FIGURE 11:. % Savings in various deposit schemes.

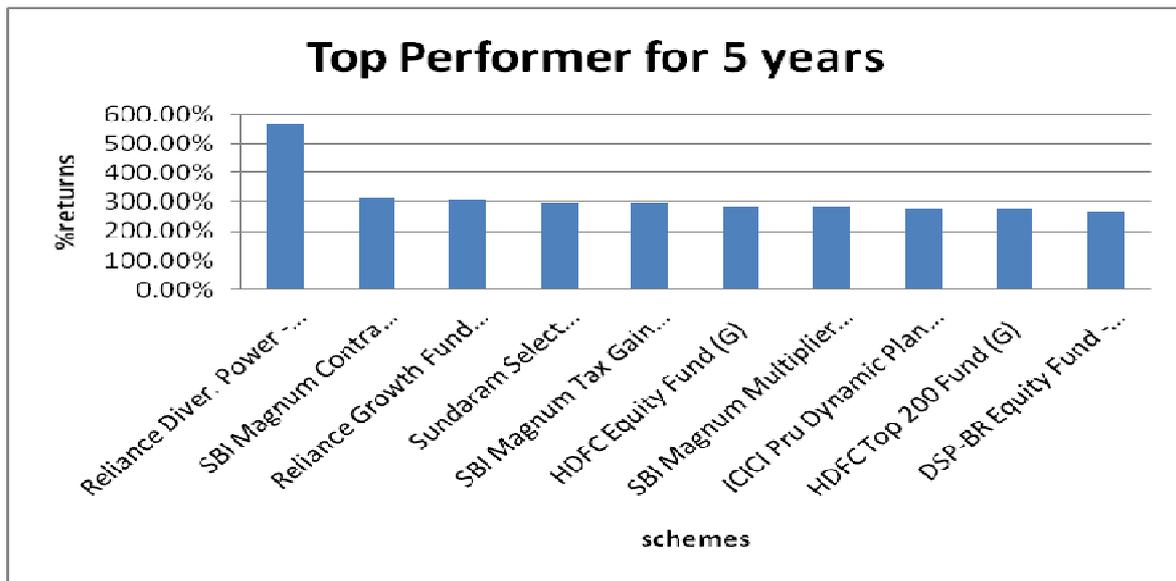


P: Provisional. #:Preliminary estimates.
 Note: Components may not add up to the totals due to rounding off.
Source: Reserve Bank of India

Here it can be observed that there is tremendous growth in deposits which comes as a major source from the middle class households who does not want to deposit money in some risky assets or in stock market as they are having a income where they have to make various plans for their future thus they are not willing to go for the risky returns from the market and kept their money mainly in banks where they can be assured of their savings as well as with minimum return. Which can be verified from the fact that after savings in the bank accounts, the Indian investors opt for the insurance funds where they can give a security to them as well as their family members in any unforeseen circumstances and along with that it can be observed savings in the Insurance is followed by pension and provident funds.

Looking on the average performance 1025 mutual fund schemes available in India for the last 5 years, it is observed that the top 10 performers were from Equity diversified funds, which are also growth funds. During the observations it is found that the average return were more than 300% for the schemes, and under the growth funds Reliance Diversified Power funds have outperformed in comparison to others. His also suggest that making portfolio in the growth funds would have been more benfitable to the investors. And the top performer mutual fund are SBI, Reliance and ICICI. HDFC also has come up with the equity fund schemes which have provided with a return of around 300%.

Figure 12; Top 10 mutual fund performers for 5 years

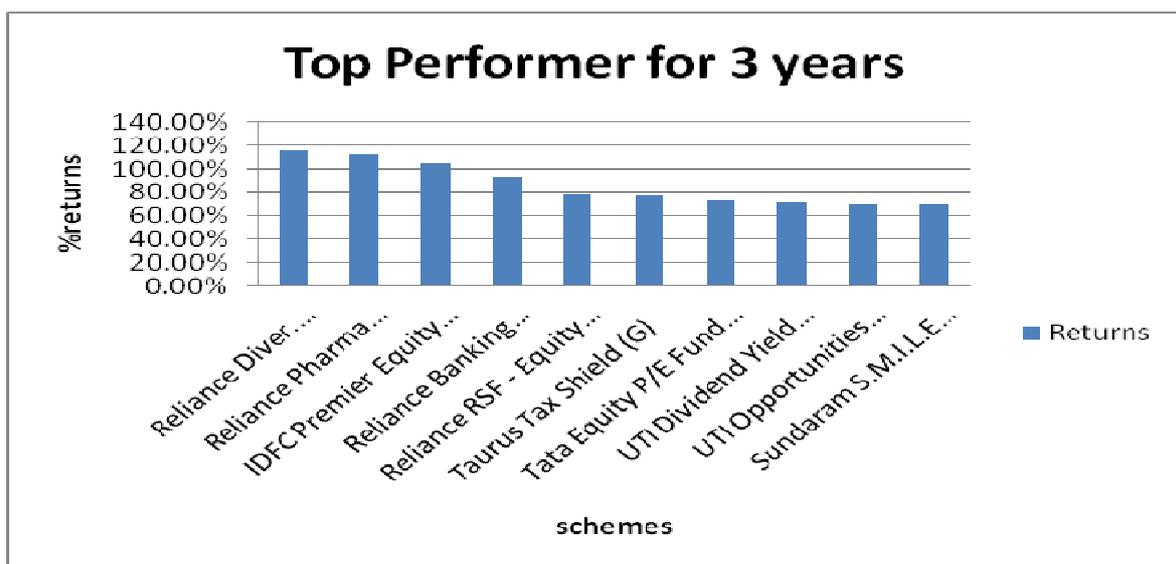


Source: <http://www.moneycontrol.com/mutualfundindia/>

If we compare the top 10 performers in the mutual fund sector we observed that the funds which performed best in the market in the last three years, are the same funds which have best performed in the last 5 years, it also shows that in the long run these 10 mutual funds have performed well than any other funds. But considering the cumulative return for three years it is observed that they have provided return of maximum 110% and as low as 70% which suggests that during the period of last two

years or right to say that during the period of recession these growth funds have provided nominally high returns. The performance of three years is captured by Reliance mutual fund, which has constituted more than 25% of the return as well as the market among the top 10 performers with few new market players like UTI, TATA equity and Taurus.

Figure 13; Top 10 mutual fund performer for 3 years.



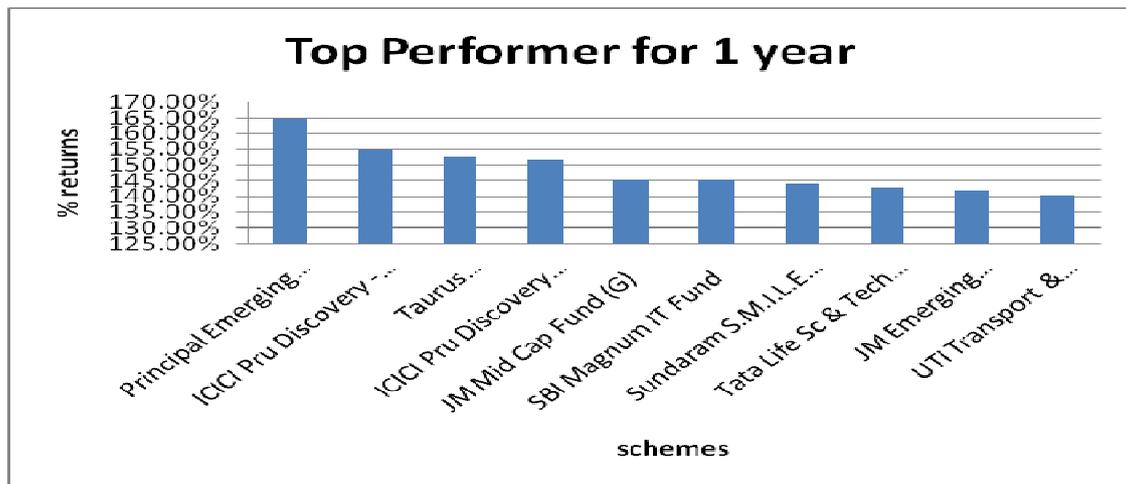
Source: <http://www.moneycontrol.com/mutualfundindia/>

When compared on an yearly of past 1 year performance data, it is observed that the top performers have changed completely, where the funds have managed to provide a return of

around 165% and a minimum of return is 140%, where the market players range from UTI, TATA, ICICI, Taurus and SBI. This

also suggests no any mutual fund can give a steady return either in terms for short period or long period.

Figure 14; Top 10 mutual fund performers for 1 year.



Source: <http://www.moneycontrol.com/mutualfundindia/>

If we look into the information in table 6 we observe that the mutual fund schemes which covers around 0.67% of the total mutual fund assets managed by the industry. As well as we also found that the average return is negative in the years which are struck by recession which is around negative 2.18% but the

significant result which have been found is that all the mutual fund schemes which have out performed are form growth type. Which also suggest that the growth types of mutual funds are being liked more by the investors during the last five years.

Table 6; list of last top 10 performers in mutual fund sector.

Top 10 perfromers	Asset (rs. Cr)	NAV	1 yr	2 yr	3 yr	5 yr
Reliance Diver. Power - RP (G)	5785.43	80.7	107	-2.6	30.1	46.5
SBI Magnum Contra Fund (G)	3372.4	57.05	102	-3.4	14.2	33.6
Reliance Growth Fund - RP (G)	6564.87	439.79	113.1	-3	17.1	33.4
Sundaram Select Midcap -RP (G)	1780.76	139.64	139.2	-1.7	13.8	32.5
SBI Magnum Tax Gain (G)	5386	59.05	97.6	-7.5	9.1	32.7
HDFC Equity Fund (G)	5395.96	234.5	121.2	2.8	16.4	31.1
SBI Magnum Multiplier Plus (G)	1114.8	76.7	98.3	-6.1	11.5	31.5
ICICI Pru Dynamic Plan (G)	1814.92	92.86	90.5	-0.5	11.3	30.8
HDFC Top 200 Fund (G)	6066.31	182.45	106.4	3.6	17.6	30.9
DSP-BR Equity Fund - RP (D)	1631.51	54.15	90.5	-3.4	15.7	30.6
avg. returns	3891.296		106.58	-2.18	15.68	33.36

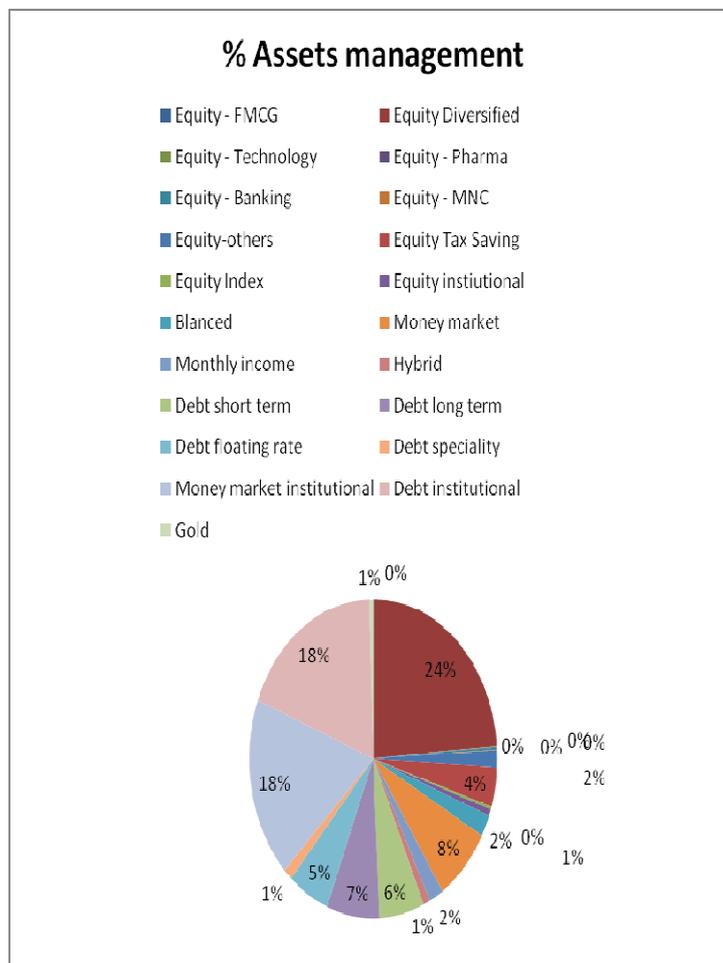
Source: moneycontrol.com

On comparing top 10 mutual funds schemes holdinhg of the total assets, it can be observed that these schemes hold more than Equity FMCG, Equity Technology, Equity Pharma, Equity banking, Equity MNC. The total assets comaprison with the total assets mobilisation shows that sectors like Equity diversified hold the major portion with 23% followed by Debt institutional and Money Market institutional hold 18% of the total assets management. Which also shows the prefrerence of the investors during the period.

mutual fund schemes	% assets
Equity - FMCG	0.018833
Equity Diversified	23.66329
Equity - Technology	0.082591
Equity - Pharma	0.076247
Equity - Banking	0.251721
Equity - MNC	0.067609
Equity-others	1.730666

Equity Tax Saving	3.984631
Equity Index	0.290537
Equity instiutional	0.679146
Blanced	2.18445
Money market	7.580237
Monthly income	1.86473
Hybrid	0.896273
Debt short term	5.834547
Debt long term	6.860531
Debt floating rate	5.420283
Debt speciality	1.159086
Money market institutional	18.34275
Debt institutional	18.49861
Gold	0.513235
Total	1.00%

Total assets management by different mutual fund schemes:



Source: moneycontrol.com

V. CONCLUSION

Based on the above study, it is observed that the investors are shifting from depositing their money from bank deposits to

mutual funds which can be observed by the increasing of the assets mobilisation of various mutual fund sectors among of which equity diversified and debt and money market are also in demand by the investors as they constitute the major sector

investments. It is also observed that the mutual fund schemes are not static with any particular schemes which can give every year a same consistency in the returns, though it depends upon the efficiency how the fund is managed by the mutual fund manager. Which indirectly lies on the experience of the fund manager as

well as the interpretation of the manager about the future. Thus, in result the mutual fund schemes cannot give you steady returns but in medium term period based on the study it can be said that growth funds have captured the market with their performance.

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A Study on Market Potential for Mangalam Newspaper Private Limited, Kottayam

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Abstract- The project report is a study on “A STUDY ON MARKET POTENTIAL IN MANGALAM NEWSPAPER WITH SPECIAL REFERENCE TO KOTTAYAM DISTRICT, KERALA” Mangalam publications are one of the leading publishing institutions in India. Various studies have been conducted to find out the factor, which determine current market situation Mangalam can be increased only by introducing more and more attractive features and improve the paper quality. The sample size used in this study is 100. The sampling technique used in this study is convenient sampling. In case of data collection, the primary and secondary data's were used. Questionnaire is used for collecting primary data. Secondary data were collected from past records and other library reference available with the area of study. The simple percentage analysis is used for this study.

Index Terms- Market potential, competition, quality, customer satisfaction

I. INTRODUCTION

In addition, the published research work also provides a big weight-age to get admissions in reputed varsity. Now, here we enlist the proven steps to publish the research paper in a journal. In today's world, there are a large number of information media modes available for the general public. Among them newspaper holds a unique niche. Newspaper is the most popular and traditionally evolved media type. Newspaper media has to compete with other media and also they have to compete with each other. Thus there exists a tough competition among them. In order to survive in this competition, Newspaper should increase its readership, its reach and penetration. The opinions of each reader about newspaper are different and it depends on the services that the newspaper provides. Identify the market potential of newspaper simply means that collecting opinion of general public about number of people reading the newspaper their reasons for reading habit and the features that they like most etc. Thus in order to improve the quality and circulation of newspaper, it is necessary to identify the market potential.

II. ABOUT THE COMPANY

This enterprise was started by Mr. M. C. Varghese, a social worker and a connoisseur of arts. This has grown up to a reasonably well established publishing house with an annual

turnover of about 15 crore a year. Mangalam has about 300 employees and agents and others numbering about 2000 depend on them directly. Various publications are Mangalam Weekly, Mangalam Daily Newspaper, Kanyaka Balamangalam, Cinema Mangalam and Kalichepu. Apart from various operational outlets in Kerala, Mangalam also have some outside Kerala operation. They are the New Delhi, Mumbai, Chennai, and Bangalore

III. OBJECTIVES OF THE STUDY

- To find the market potential of Mangalam daily newspaper
- To find out the readership of Mangalam in Kottayam district.
- To collect the opinion regarding supplements this is associated with the newspaper.

IV. SCOPE OF THE STUDY

Mangalam publications are one of the leading publication industries in the state of Kerala. It has been regularly coming- out with various kinds of newspapers for all segments of the community. Mangalam daily newspaper is a leading daily newspaper published from Mangalam group. The scope of the study was to found out the present specific position of Mangalam daily newspaper' has in the mind of its readers and the methods to be adopted in the years to come to make it most leading daily newspaper in the segment of newspaper publication industry.

V. LIMITATIONS OF THE STUDY

Some of the respondents are not willing to give an interview, while some other was refused in answering all the questions. As the respondents were scattered all around the distinct difficulty was experienced in getting and the time factor involved are very high. The researcher collected the details only from 100 responds compared with population the sample size is small so it may not reveal the exact option of the respondents. Time factor is also another limitation of this study.

VI. METHODOLOGY

The study is a descriptive one. The main aim behind the study was to identify the market potential of Mangalam. Through the study, collect the opinion of the readers about Mangalam and

other newspapers. The respondents are personally contacted and the data are collected through schedules.

VII. SOURCE OF DATA

PRIMARY DATA

Primary data are those data, which are being collected by the researcher for the first time. They are the information received directly from general public, to whom the study was conducted. In this study, primary data was collected with the help of schedules.

SECONDARY DATA

The secondary data is collected through published and unpublished sources. Unpublished sources include, discussions held with unit chief, circulation manager, assistant circulation manager etc. of Mangalam. Information has also been collected from internet, editorials of newspapers, libraries etc.

VIII. SAMPLING PROCEDURE

The sampling procedure used for the study is stratified sampling. Stratified sampling is a type of probability sampling. In this type of sampling, the entire population in which the study is conducted is divided into sub universe of homogeneous group. It is called strata and the sample is drawn from each of the strata. From each strata the researcher selects the sample randomly.

**Table no. 1
Age group of respondents**

S:No	Age	No. of respondents	Percentage
1	Below 20	18	18
2	20-40	32	32
3	40-60	22	22
4	Above 60	28	28
	Total	100	100

Source: Primary Data

Interpretation:

It is clear from the above table that 32% of the respondents are in the age group of 20-40 years. 28% of the respondents are in the age group of above 60. 22% of the respondents is in the age group of 40-60 and the rest 18% of the respondents are below 20 years.

**Table no: 2
Sex wise classification**

S: No	Sex	No. of respondents	Percentage
1	Male	70	70
2	Female	30	30
	Total	100	100

Source: Primary Data

Interpretation:

From the above table it is clear that 70% of the respondents are male and 30% are female. So that most of the respondents are male.

**Table no: 3
Occupation of respondents**

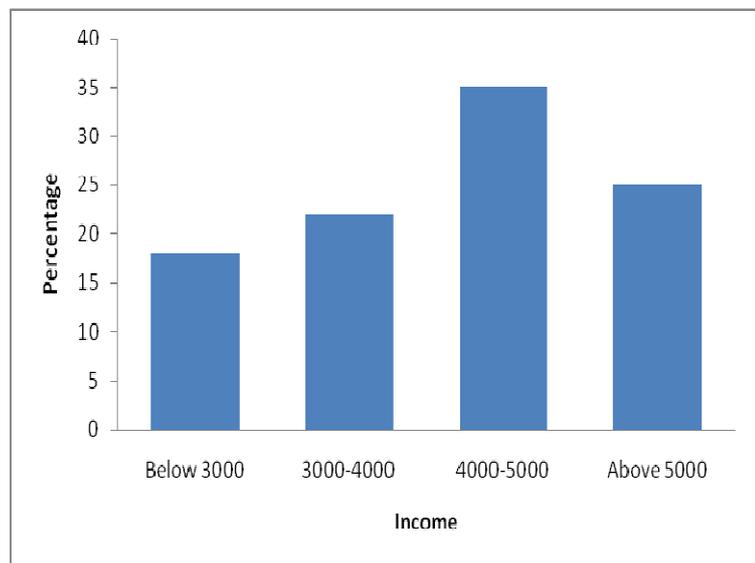
S:No	Occupation	No. of respondents	Percentage
1	Agriculture	30	30
2	Business	25	25
3	Professional	22	22
4	Others	23	23
	Total	100	100

Source: Primary Data

Interpretation:

It is clear from the above table that 30% of the respondents are agriculturist, 25% of the respondents are doing business, 22% of the respondents are professionalists and 23% of the respondents are doing other type of jobs. So that most of the respondents are doing agriculture.

**Chart: 1
Monthly Income**



Source: Primary Data

Interpretation:

It is clear from the above chart that 35% of the respondents are in the salary of 4000-5000, 25% of the respondents are in the salary above 5000, 22% of the respondents are in the salary 3000-4000 and the rest 18% of the respondents are in the salary below 3000. So that most of the respondents are in the income level of 4000-5000

Table no: 4
Do you subscribe Mangalam News paper

S: No	Opinion	No. of respondents	Percentage
1	Yes	65	65
2	No	35	35
	Total	100	100

Source: Primary Data

Interpretation:

It is clear from the above table that 65% of the respondents are the subscriber of Mangalam News paper and 35% of the respondents are not the subscriber of Mangalam News paper. So that most of the respondents are the subscriber of the Mangalam newspaper.

Table no: 5
What makes you to subscribe Mangalam News paper?

S: No	Opinion	No. of respondents	Percentage
1	Truthfulness	20	20
2	Reliability	6	6
3	Impartiality	44	44
4	No political bias	30	30
	Total	100	100

Source: Primary Data

Interpretation:

It is clear from the above table that 20% of the respondents are subscribe Mangalam News paper due to its truthfulness ,6% of the respondents are subscribe Mangalam News paper due to its Reliability,44% due to impartiality,30% due to no political bias.

Table no:6
How do you know about Mangalam News paper?

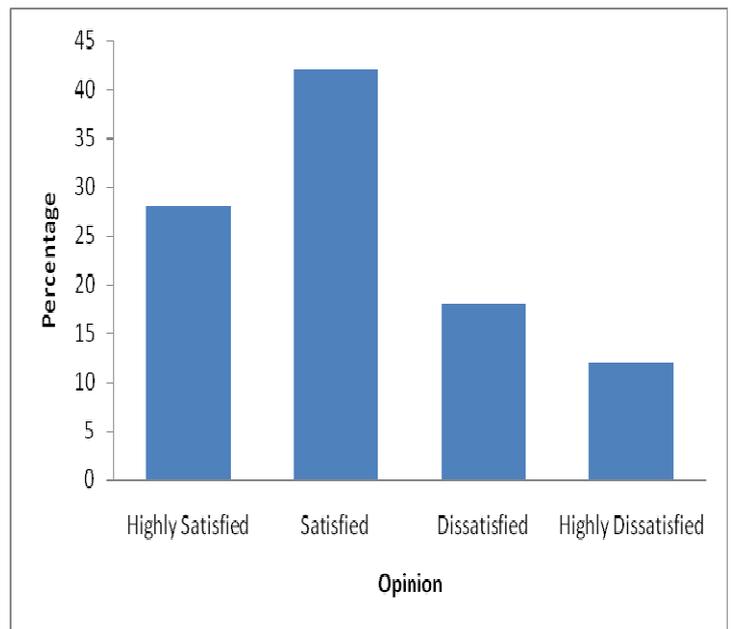
S:No	Opinion	No. of respondents	Percentage
1	Self	50	50
2	Relatives	24	24
3	Friends	18	18
4	Others	8	8
	Total	100	100

Source: Primary Data

Interpretation:

It is clear from the above table that 50% of the respondents know about Mangalam by self, 24% by relatives, 18% by friends and the remaining 8% by other method.

Chart: 2
What is your opinion about the quality of the News Paper?



Source: Primary Data

Interpretation:

It is clear from the above chart that 42% of the respondents are highly satisfied with the quality of the news paper, 28% of the respondents are satisfied with the quality of news paper, 18% of the respondents are dissatisfied with the quality of the news paper, and the remaining 12% of respondents are highly dissatisfied with the quality of the paper.

Table no: 7
Modes of purchase

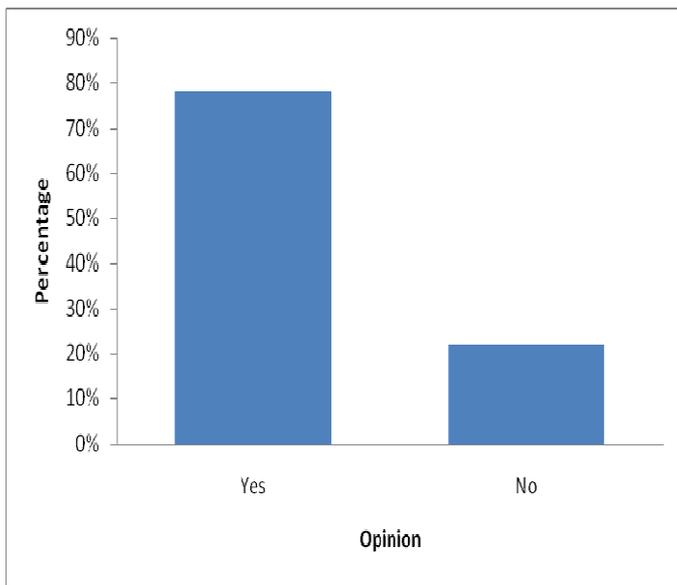
S:No	Purchase Mode	No. of respondents	Percentage
1	Buy from shop	16	16
2	Borrow from Neighbor	18	18
3	Lend it from library	14	14
4	Through Newspaper agent	52	52
	Total	100	

Source: Primary Data

Interpretation

It is clear from the above table that 52% of the readers through news paper agent, 18% of the readers borrow from the neighbors, 16% of the readers buy the newspaper from the shop 14% readers lend it from library.

Chart: 3
Are you willing to maintain long term relationship with Mangalam News paper?

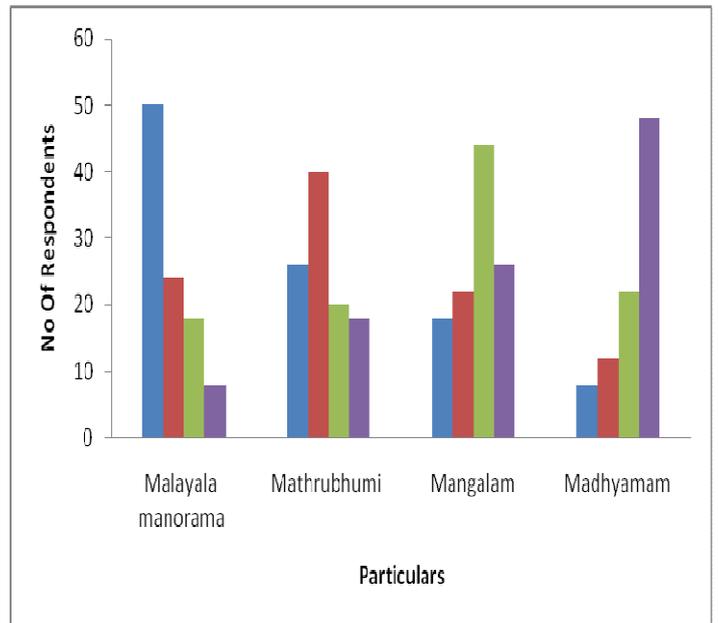


Source: Primary Data

Interpretation

It is clear from the above chart that 78% of the respondents are willing to maintain long term relationship with Mangalam newspaper and 22% of the respondents are not willing to maintain long term relationship with Mangalam newspaper

Chart: 4
Ranking accordance to the preference of newspaper



Source: Primary Data

Interpretation:

It is clear from the above chart that 50 respondents preferred Malayalammanorama as 1st, 40 respondents ranked Mathrubhumi 2nd, 44 respondents ranked Mangalam 3rd and Madhyamam is ranked 4th by 48 respondents.

Table no: 8
Do you have any expectations related to Mangalam Newspaper

S: No	Opinion	No. of respondents	Percentage
1	Yes	80	80
2	No	20	20
	Total	100	100

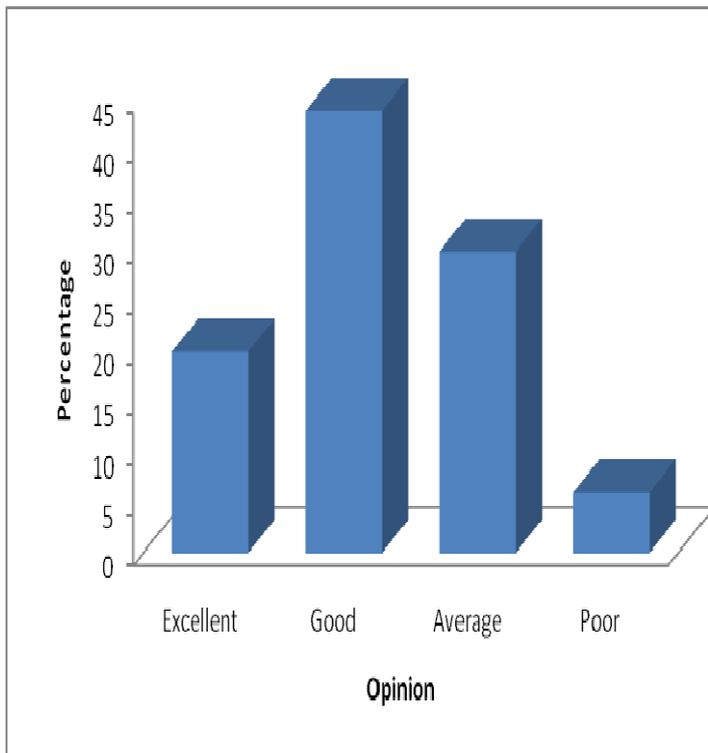
Source: Primary Data

Interpretation:

From the table it shows that 80% of the customers have expectations related to Mangalam News paper and 20% of the customers have no expectations related to Mangalam Newspaper. So that most of the customers have the expectations related to Mangalam Newspaper.

Chart: 5
How do you rate Mangalam News paper?

column is attractive. So that most of the respondent's opinion is that sports column is more attractive.



Source: Primary Data

Interpretation:

The above chart shows that 44% of the customers are rate Mangalam News paper as good and 30% of the customers are rate Mangalam as average and 20% of the customers are rate Mangalam as excellent and other 6% of the customers are rate Mangalam as poor. So that most of the customers rate Mangalam as good.

Table no: 9
Which information column is attractive?

S:No	Opinion	No. of respondents	Percentage
1	Sports	58	58
2	Classifieds	18	18
3	Education	8	8
4	Others	16	16
	Total	100	100

Source: Primary Data

Interpretation:

From the above table it is clear that 58% of the respondent's opinion is that sports column is more attractive and 18% of the respondent's opinion is that classified column is attractive and 16% of the respondent's opinion is that other information column is attractive and 8% of the respondent's opinion is that education

Chart: 6
Are you satisfied with the supplement?

Source: Primary Data

Interpretation:

From the table it shows that 58% of the respondent's are not satisfied with the supplement and 42% of the respondent's are satisfied with the supplement. So that most of the respondent's are not satisfied with the supplement.

Table no: 10
Are you satisfied with the Classified?

S: No	Opinion	No.	of Percentage
1	Yes	28	28
2	No	72	72
	Total	100	100

Source: Primary Data

Interpretation:

From the table it shows that 72% of the respondent's are not satisfied with the classified and 28% of the respondent's are satisfied with the classified. So that most of the respondent's are not satisfied with the classified.

IX. FINDINGS

- 1) The determinant factor is selecting a particular newspaper and age groups of the respondents are dependent.
- 2) The kind of newspaper which read and the occupational level of respondents are dependent.
- 3) 70% of the readers are male. This explains that men community must more concentrate to promote and popularize this newspaper.
- 4) Age between 20 - 40 has got maximum readers coming to 32%. The maximum readership is between the age group of 20-40.
- 5) 35% of the respondents are having monthly income between 4000-5000.
- 6) 30% of the respondents are agriculturist.
- 7) 65% of the respondents are the subscriber of the Mangalam newspaper.
- 8) 44% of the respondents are subscribing Mangalam newspaper due to impartiality.
- 9) 50% of the respondents know about the Mangalam newspaper by self.
- 10) 42% of the respondents are satisfied with the quality of the newspaper.
- 11) 52% of the customers got the newspaper through newspaper agent.

- 12) 78% of the respondents are willing to maintain long term relationship with Mangalam newspaper.
- 13) Mangalam daily is ranked 3rd position among the newspapers in Kottayam.
- 14) 80% of the respondents have expectation from Mangalam newspaper.
- 15) 44% of the respondent's rate Mangalam newspaper is good.
- 16) 58% of the respondent's opinion is sports column is more attractive.
- 17) 58% of the respondents are not satisfied with the supplement of Mangalam.
- 18) 72% of the respondents are not satisfied with the classified of Mangalam newspaper.

- 3) With the existing constraints of printing the publisher can try to improve the paper quality and printing style to have more circulation.
- 4) To add more sports news, educational news and local news.
- 5) To add more pages in the Sunday special publication.
- 6) Newspaper will be delivered at proper time.
- 7) The Mangalam publication should concentrate more on its features and news of the newspaper. They have to increase the quality of the newspaper to complete with its competitors.

XI. CONCLUSION

The Mangalam newspaper has got very response from its readers. Most of the readers prefer the newspaper for its cost. If Mangalam publication can follow the suggestions given by the respondents to increase the sales, improve quality and add the more features news then it will reach the No.2 position with recent years.

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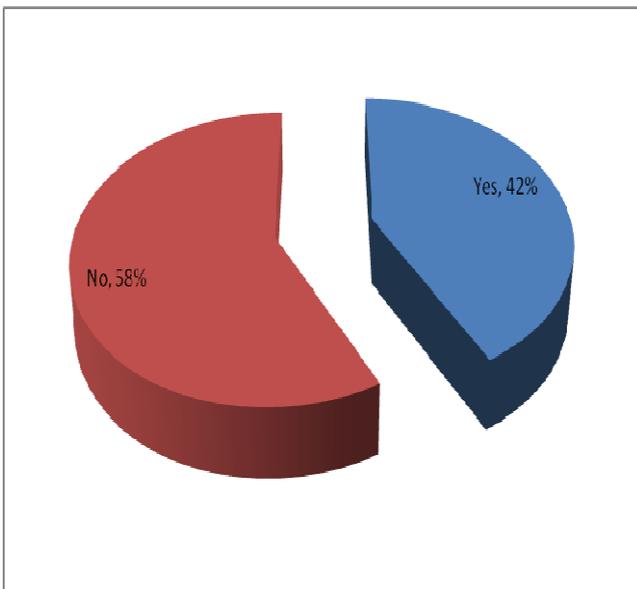
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X. RECOMMENDATIONS

- 1) Effective advertisement through television should be telecasted to improve sales.
- 2) Informative article should be added.



Seismic Hazard Analysis of District Headquarters Dhamtari and Kanker of Chhattisgarh State, India: Deterministic Method

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Abstract- Seismic Hazard analysis is a method of quantifying the area in terms of topographical and seismological data. In the present paper seismic hazard analysis has been presented using deterministic method. Method is good enough for measuring dynamic ground motion parameters which will help in design process. Dhamtari and Kanker are two District Headquarters of the state of Chhattisgarh. In the present study DSHA has been applied to these District Headquarters sites to assess the maximum Peak Ground Acceleration (PGA).. The observed values of peak ground acceleration for Dhamtari and Kanker sites are **0.05 g** to **0.11 g**. Beuro of Indian Standard has specified these sites in seismic Zone II. This fact has been verified in the present study.

Index Terms- Earthquakes, Fault Map, Deterministic seismic hazard analysis, Peak Ground Acceleration.

I. INTRODUCTION

Earthquakes present a threat to people and the facilities they design and build. Seismic hazard analysis (SHA) is the evaluation of potentially damaging earthquake related phenomenon to which a facility may be subjected during its useful lifetime. Seismic hazard analysis is done for some practical purpose, typically seismic-resistant design or retrofitting. Although strong vibratory ground motion is not the only hazardous effect of earthquakes (landslides, fault offsets and liquefaction are others), it is the cause of much wide spread damage and is the measure of earthquake hazard that has been accepted as most significant for hazard resistance planning.

The Earthquakes in India occur in the plate boundary of the Himalayas region as well as in the intra-plate region of peninsular India (P I). Devastating events have occurred in P I in the recent past, which must be considered as a severe warning about the possibility of such Earthquake in the future. Engineering approaches to Earthquake resistant design will be successful to the extent that the forces due to future shocks are accurately estimated at location of a given structure. Earthquakes are low probability events, but with very high levels of risks to the society. Hence, either under estimation or over estimation of seismic hazard will prove dangerous or costly in the end Earthquakes present a threat to people and the facilities they design and build. Seismic hazard analysis (SHA) is the evaluation of potentially damaging earthquake related phenomenon to which a facility may be subjected during its useful lifetime. Seismic hazard analysis is done for some practical purpose, typically seismic-resistant design or retrofitting. Although strong vibratory ground motion is not the only hazardous effect of earthquakes (landslides, fault offsets and liquefaction are others), it is the cause of much wide spread damage and is the measure of earthquake hazard that has been accepted as most significant for hazard resistance planning. Earthquake-resistant design seeks to produce structures that can withstand a certain level of shaking without excessive damage. That level of shaking is described by a design ground motion, which is usually determined with the aid of a seismic hazard analysis. Deterministic seismic hazard analyses involve the assumption of some scenario, viz (i) the occurrence of an earthquake of a particular size at a particular location, (ii) for which ground motion characteristics are determined.

In practice, DSHAs often assume that earthquakes of the largest possible magnitude occur at the shortest possible distance to the site within each source zone. The earthquake that produces the most severe site motion is then used to compute site specific ground motion parameters. Deterministic method is the technique in which a single estimate of parameters is used to perform each analysis. To account for uncertainty, several analyses may be conducted with different parameters. For assessment of PGA, of District Headquarters Dhamtari and Kanker sites have been considered for this study. The present study details of these District Headquarters sites are as follows:

1.1 Location of Study Area

Dhamtari and Kanker are two major district headquarters of Chhattisgarh State and can be located $20^{\circ} 42'$ latitude, $81^{\circ} 34'$ longitude and $20^{\circ} 15'$ latitude, $81^{\circ} 32'$ longitude (as shown in Figure 1.2). It is identified as the rapid developing cities in, Chhattisgarh State with infrastructure facilities and thick population density.

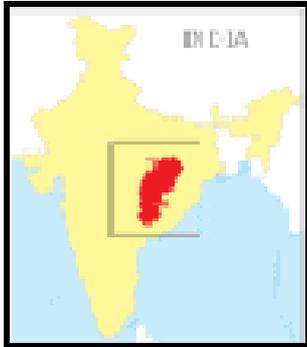


Figure 1.1 (a) Chhattisgarh State



Figure 1.1 (b) District Headquarters Dhamtari and Kanker

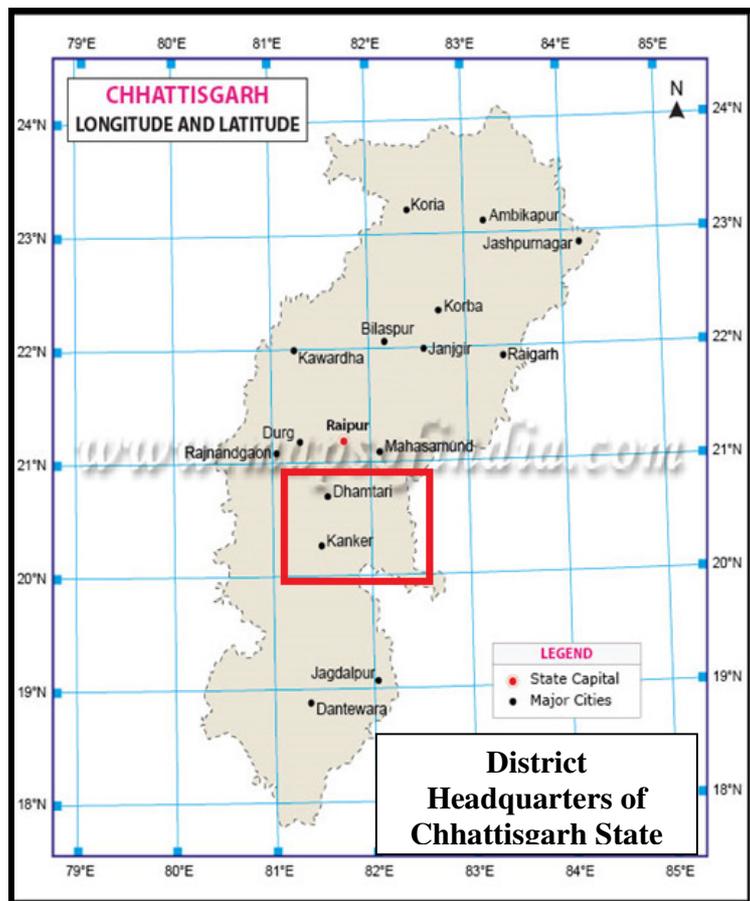


Figure 1.2 Chhattisgarh State District Headquarters Latitude & Longitude

II DETERMINISTIC SEISMIC HAZARD ASSESSMENT (DSHA)

The DSHA can estimate in the following steps:

- Seismic Sources
- Earthquake- recurrence- frequency.
- Deaggregation of Seismic Hazard.
- Ground motion attenuation.
- Estimation of PGA

2.1 Seismic Sources

- A circular region of 300 km radius has to be assumed around the site.
- Seismicity information has to be collected (i.e Epicenter, Magnitude) inside the 300 km radius.
- Different faults in this 300 Km. radius region have to be identified, length of the fault and their shortest distances from the site have to be worked out.
-

2.1.1 Earthquake History of Study Area

Most of the earthquakes happened in India are in northern part of Indian sub continent. These are happened due upward movement of Himalayan region. The earthquake data prior to 1827 is not available. The available data is from 1847- 2011. And earthquake data is available for mostly active regions of India. Damages caused due to Latur 1993 and Bhuj earthquake 2001 highlighted the importance of seismic mitigation and preparedness. However, due to non availability of earthquake data United States Geological survey was collected with radial search of 300 Km. The collected earthquake data is as shown in Appendix I and Appendix II for Dhantari and Kanker district headquarters. Recorded earthquake events, from USGS web site Sources. The past records show earthquake magnitudes Mw of 3 to 6.7 are available. A historical record of past Earthquake, in the region, is the one of the most important tool. Because, these records are useful to asses the region seismicity. It has been observed that Earthquake of less then 3.0 magnitudes is not posing any serious problems to the civil Engineering structures, and it also very difficult to recognize their occurrence by human beings. Hence, for DSHA is it good enough to collect the information of past Earthquakes ≥ 3 magnitude.

2.2. Earthquake Recurrence Frequency

Earthquake Recurrence relationship has to be worked in the following steps:

- Earthquake information for region has to be collected over a long period from various historical records.
- All the data has to be arranged as per the number of Earthquakes that exceeded various magnitude values ($m=0, 1, 2, 3,$)
- Suitable Earthquake Recurrence Relation has to be used, which appropriately characterize the seismicity of the region.

2.3. Deaggregation of Seismic Hazard

1. In DSHA, the basic idea is to foreshadow on each of the causative fault, the magnitude of an Earthquake, which may be exceeded in say 100 years or 1000 years.
2. M_{100} has to be worked out for each fault.
3. Using the Regional Recurrence Relation, it is easy to find the above magnitudes for the region, but not for individual faults.
4. The potential of a fault to produce an Earthquake of a particular magnitude would depend on the length of the fault itself.
5. $N_i (m_0)$ on any individual fault may be to be proportional to the length of the fault itself. Weightage $W_i = L_i / \sum L_i$.
6. The 'b' value of any fault is to be same as the regional 'b' value.
7. The value of m_{max} for each fault is to be fixed up by finding the most probable magnitude of the largest past event that can be associated with the fault. This value is increased by 0.5 and taken as m_{max} . In case, only the highest intensity value is known, the event magnitude is taken as $m = 2/3(I_0) + 1$.

2.4. Ground Motion Attenuation

- Attenuation may be described as the way in which strong motion parameters decay with distance from the source.
- This depends on the source properties (M, focal depth, fault type and size), as well as on the regional properties (frequency dependent damping, layering, anisotropy etc.).
- The property of the site (hard rock, soft soil, valley and mountain) also influences the ground motion attenuation.

For the present study attenuation relationship⁵ suggested by R N Iyengar & S T G Raghukant, (Applicable for peninsular India, under bed rock condition) has been used.

$$\ln(\text{PGA}/g) = C1 + C2(m-6) + C3(m-6)^2 - \ln(R) - C4(R) + \ln \epsilon$$

Where,

C1= 1.6858,

C2= 0.9241,

C3= 0.0760,

C4= 0.0057,

R= Hypo central distance,

m= magnitude,

$\ln \epsilon = 0$ (for DSHA).

2.5. Estimation of Peak Ground Acceleration (PGA)

The PGA, which can be exceeded with 50 % probability, is to be calculated from the attenuation equation. In DSHA, the maximum among these values is to be taken as the design basis acceleration depending on the acceptability of this value based on other seismological considerations.

This PGA value could be a reference value for further work.

III APPLICATION OF DSHA

Deterministic seismic hazard analysis (DSHA) has been applied to Dhamtari and Kanker sites using the following steps: A region of 300 km radius around both Dhamtari and Kanker sites were considered and all the faults having ≥ 25 km length has been marked. This region is shown in Figure 3.1 and Figure 3.2 respectively.

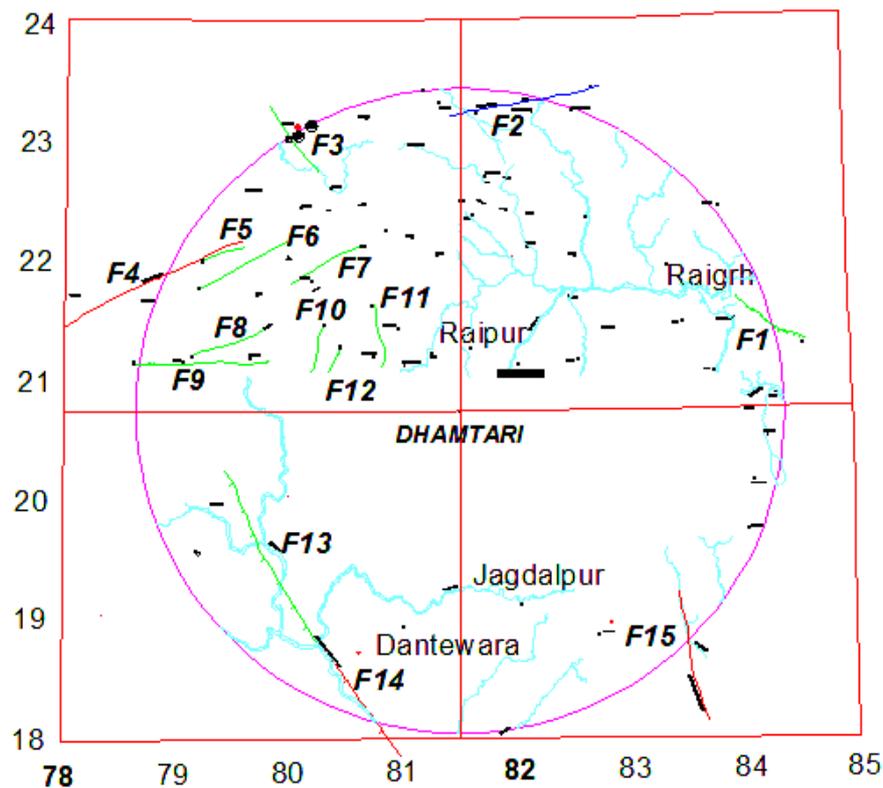


Figure 3.1 Fault considered for Deterministic Seismic Hazard Analysis of District Headquarter Dhamtari

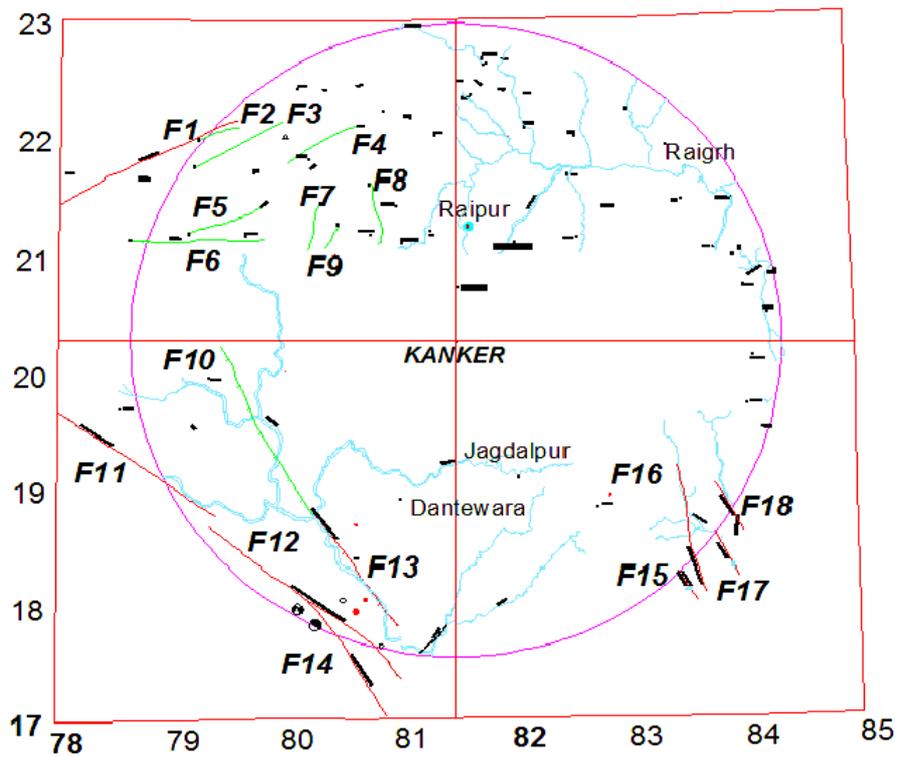


Figure 3.2 Fault considered for Deterministic Seismic Hazard Analysis of District Headquarter Kanker

With the help of different literature available and websites 67 and 101 Nos. of Earthquakes in the magnitude range $3 \leq M_w \leq 6.7$ for Dhamtari and Kanker sites over the period from 1846 to 2012 (166) years and 1827 to 2012 (185) years have been collected. The same is presented at Appendix I and Appendix II respectively.

MAGNITUDE RECURRENCE RELATIONSHIP FOR DISTRICT HEADQUARTER DHAMTARI

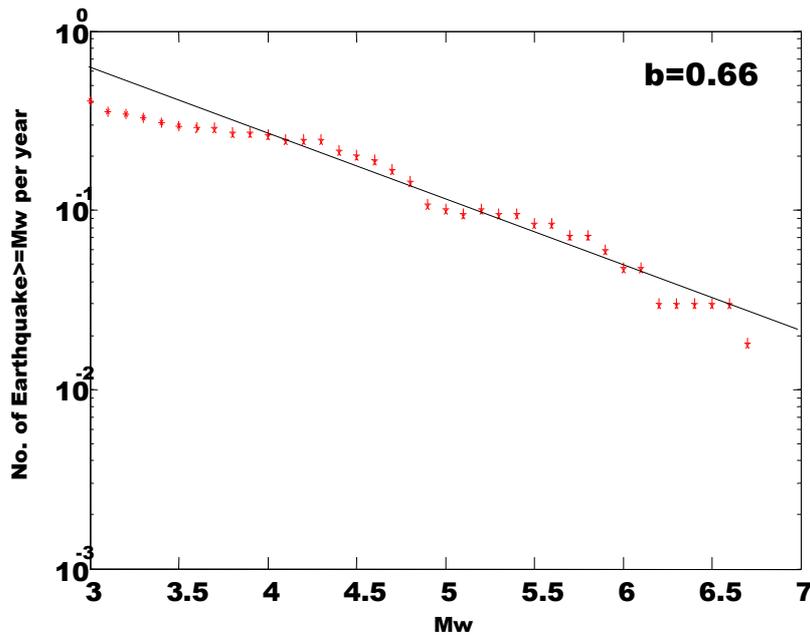


Figure 3.3 Magnitude-Recurrence Relationship for District Headquarter Dhamtari

MAGNITUDE RECURRENCE RELATIONSHIP FOR DISTRICT HEADQUARTER KANKER

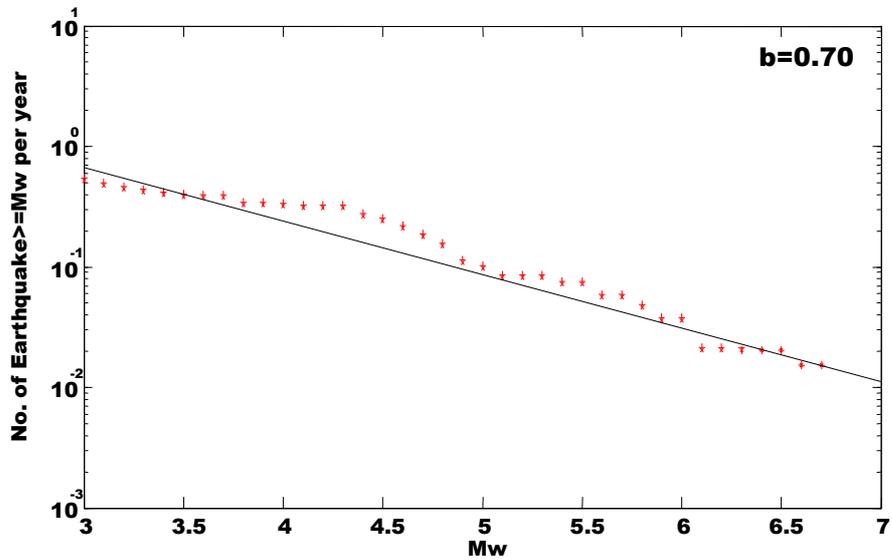


Figure 3.4 Magnitude-Recurrence Relationship for District Headquarter Kanker

With the help of different literature available and websites 67 and 101 Nos. of Earthquakes in the magnitude range $3 \leq M_w \leq 6.7$ for Dhamtari and Kanker sites over the period from 1846 to 2012 (166) years and 1827 to 2012 (185) years have been collected. The same is presented at Appendix I and Appendix II respectively. From these collected 67 and 101 numbers data of Earthquakes with magnitude $3 \leq M_w \leq 6.7$ for Dhamtari and Kanker sites over the periods 166 years and 185 years has been arranged as per the number of Earthquakes that exceeded various magnitude values. Magnitude-frequency data for Dhamtari and Kanker sites have been presented in Table 3.1 and Table 3.2 (Appendix III) respectively. From the data of magnitude and frequency, construct a recurrence relation between magnitude and frequency of Earthquakes for a seismic source and obtained the values of “a and b”.

COMPLETENESS TEST OF EARTHQUAKE DATA FOR DISTRICT HEADQUARTER DHAMTARI

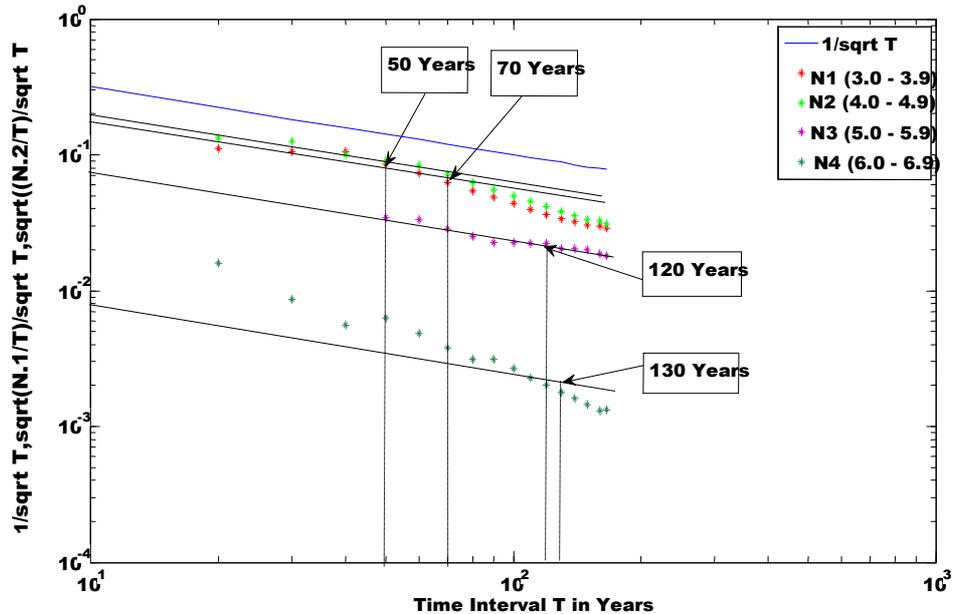


Figure 3.5 Completeness test of earthquake data for District Headquarter Dhamtari

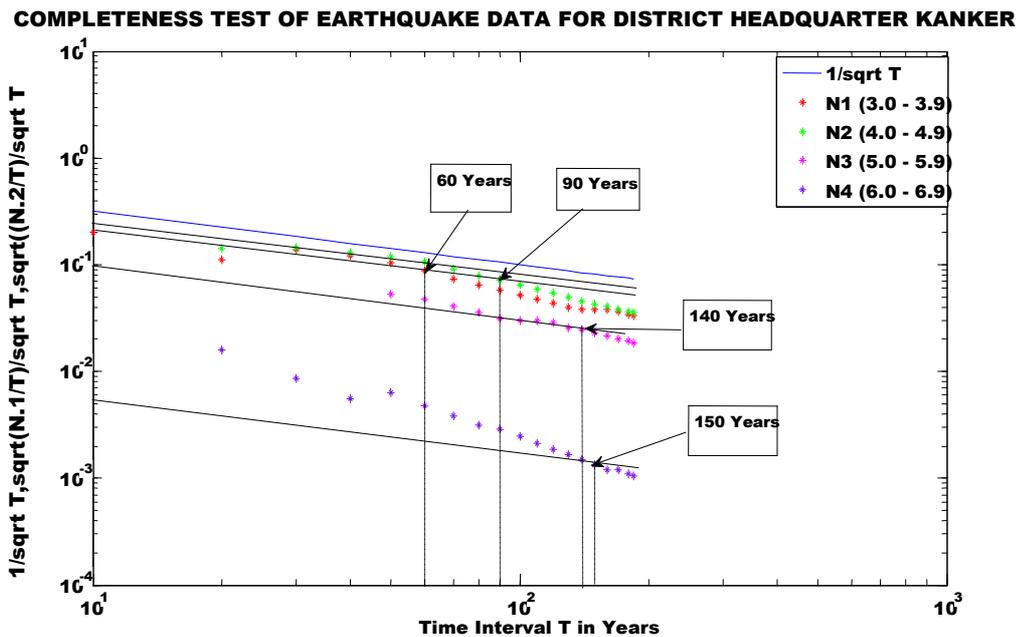


Figure 3.6 Completeness Test of Earthquake Data for District Headquarter Kanker

The above relationship for Dhamtari and Kanker sites have been shown in Figure 3.3 and Figure 3.4 respectively. In the Figure, the values of ‘b’ are showing steep slopes, therefore ‘completeness analysis’ have been performed.

Earthquakes data for completeness test for Dhamtari and Kanker sites have been presented in Table 3.2 and Table 3.3 (Appendix III) respectively.

Completeness test of Earthquakes data for Dhamtari and Kanker sites has been shown in Figure 3.5 and Figure 3.6 respectively. It has been observed for Dhamtari (from the Table 3.1 below) that 3.0 magnitude will be completed in 50 years time interval while 6.7 magnitude will complete in 130 years, and for Kanker it has been observed (from the Table 3.2 below) that 3.0 magnitude will be completed in 60 years time interval while 6.7 magnitude will complete in 150 years.

Table 3.1 Activity Rate and Interval of Completeness at District Headquarter Dhamtari

Magnitude Mw	No. of Events \geq Mw	Complete in interval (year)	No. of Events per year \geq Mw
3.0	67	50	1.3400
4.0	44	70	0.6285
5.0	17	120	0.1417
6.7	3	130	0.0230

Table 3.2 Activity Rate and Interval of Completeness at District Headquarter Kanker

Magnitude Mw	No. of Events \geq Mw	Complete in interval (year)	No. of Events per year \geq Mw
3.0	101	60	1.6834
4.0	63	90	0.7000
5.0	19	140	0.1357
6.7	3	150	0.0200

Using completeness analysis, Regional Recurrence Relationship has been obtained for: Distract Headquarter Dhamtari

$$\text{District Headquarter Dhamtari} \quad \text{Log}_{10} (N) = 2.1000 - 0.5288 M_w \dots (3.1)$$

$$\text{District Headquarter Kanker} \quad \text{Log}_{10} (N) = 1.6830 - 0.5200 M_w \dots (3.2)$$

The same is shown in Figure 3.7 and Figure 3.8 for Distract Headquarter Dhamtari and Kanker respectively.

REGIONAL RECURRENCE RELATIONSHIP FOR DISTRICT HEADQUARTER DHAMTARI

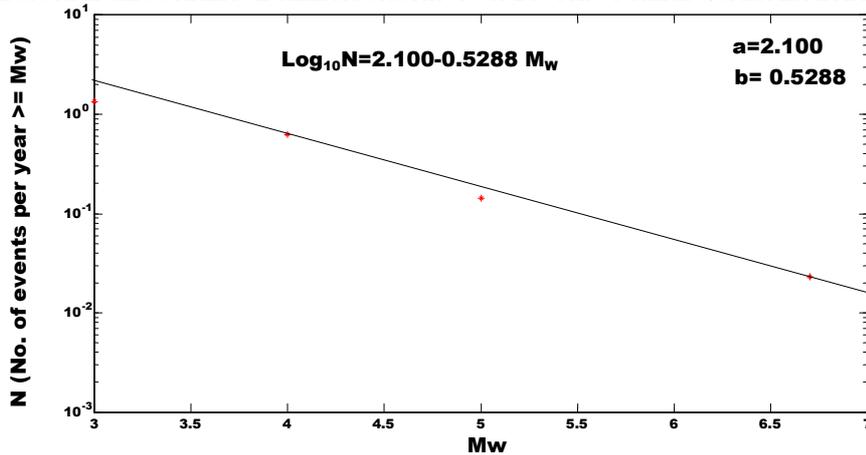


Figure 3.7 Regional Recurrence Relationship for District Headquarter Dhamtari

REGIONAL RECURRENCE RELATIONSHIP FOR DISTRICT HEADQUARTER KANKER

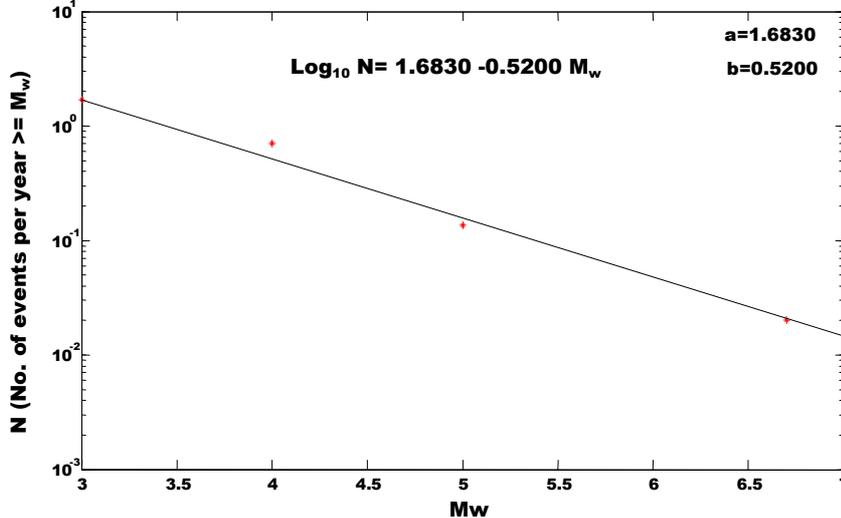


Figure 3.8 Regional Recurrence Relationship for District Headquarter Kanker

Lengths of all the 15 numbers faults, around the Dhamtari and 18 numbers around the Kanker having length of 25 km or more are considered for Deterministic Seismic Hazard Analysis (DSHA), were measured. Hypo-central distance (by considering the focal depth as 10 km), weightage and maximum potential magnitude (M_u) is obtained for each fault and has been presented in Table 3.7 for Dhamtari and in Table 3.8 (Appendix III) for Kanker respectively.

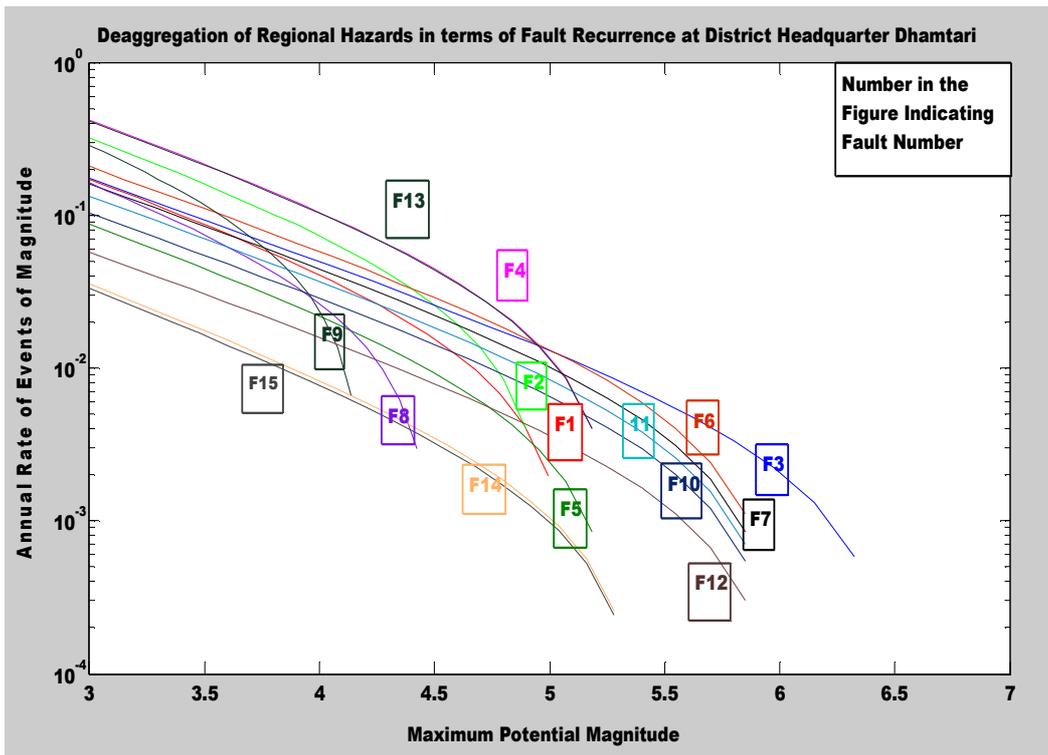


Figure 5.9 Deaggregation of Regional Hazards in terms of Fault Recurrence at District Headquarter Dhamtari

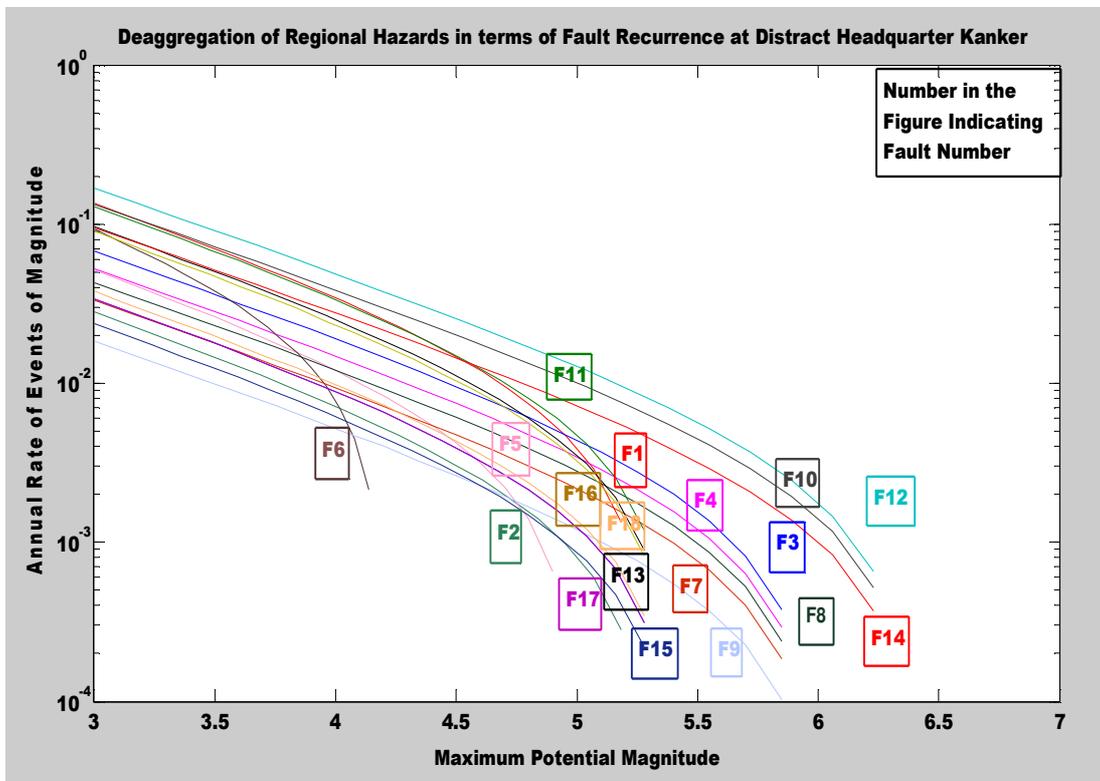


Figure 5.10 Deaggregation of regional hazards in terms of fault recurrence at District Headquarter Kanker

M_{100} has been obtained by generating the fault deaggregation record. In this study all the faults having ≥ 25 km lengths are considered. Fault deaggregation for Dhamtari and Kanker have been shown in Figure 3.9 and Figure 3.10 respectively.

IV RESULT & CONCLUSION

Regional Recurrence Relationship obtained for Dhamtari and Kanker sites have been presented in Equation No 3.1 & 3.2. Obtained “b” values are 0.5288 and 0.52 respectively. Hence, the both the sites are situated in less seismic active zone. Deterministic Seismic Hazard Analysis has been applied to the District Headquarters Dhamtari and Kanker sites, Values of P.G.A. for M_{100} Earthquakes have been presented in Table No.3.9 & Table No.3.10 (Appendix III) respectively. Maximum values of Peak Ground Acceleration (P.G.A.) for Dhamtari Site has been obtained due to fault No. 11 (length 58 km, Distance 83.799 km) is equal to 0.01305g. Maximum value of Peak Ground Acceleration (P. G. A.) for Kanker Site has been obtained due to fault No. 8 (length 58 km, Distance 116.039 km) is equal to 0.00313g. As per IS 1893:2002(Part-1) the District Headquarters region have been categorized as zone II and corresponding P.G.A. is equal to 0.1g. Hence, this fact has also been verified from the present study.

APPENDIX-I

Listing of Earthquake Events around Distract Head Quarter Dhamtari

(Latitude 18° 0'-24° 0', Longitude 78° 0'-85° 0')

S No.	Year	Month	Date	Latitude	Longitude	Int	Ms	Mb	Mw	Depth	Source
1	1846	5	27	23	80	Vi			6.5		OLD, NEIC, UKOLD
2	1858	10	12	18.3	84	V			4.3		OLD, NEIC
3	1859	8	24	18.1	83.5	V			3.7		OLD, NEIC, UKGSI
4	1860	2	25	19.4	84.9	V			4.3		OLD, NEIC
5	1861	11	13	18.11	83.5	Iii			3		UGS
6	1868	9	30	24	85	Vii			5.7		OLD, NEIC, UKOLD
7	1871	9	27	18.3	83.9	Iii			3		UGS
8	1872	11	22	18.86	80	Vi			5		UGS
9	1878	12	10	18.3	83.9	Iv			3.7		UGS
10	1897	6	22	19.4	84.9	Vii			5.5		HNS, NEIC, UKSTA
11	1903	5	17	23	80		5		5.5		TRI, NEIC, UKTRI
12	1917	4	17	18	84		5.5		5.8		ISS, NEIC, UKIMD
13	1927	6	2	23.5	81		6.5	6	6.7		GR
14	1927	6	2	24	82				6.5		NEIC, UKCH
15	1954	1	5	18	81.8		4		4.5		IMD
16	1954	1	5	18	81.3				4		NEIC, UKIMD
17	1957	8	25	22	80		5.5	5.5	5.8		SHL, NEIC, UKSHL
18	1958	11	1	22	85				4		SHL, NEIC, UKIMD
19	1959	8	9	18.1	83.5		4.1		4.7		RAO, UKRAO
20	1959	12	23	18.1	83.5		4.3		4.8		RAO, UKRAO
21	1963	5	8	21.7	84.9			5.2	5.3	33	CGS
22	1963	5	8	22.5	84.5				6		NEIC, UKRR
23	1965	4	29	23.5	84				4		NEIC
24	1968	11	14	21.8	78		4.2		4.8		IMD, NEIC, UKHYB
25	1969	4	14	18	80.5			5.2	5.3		IMD
26	1969	4	15	18	80.7			4.6	4.6	33	ISC
27	1969	4	14	18.1	80.5				6		UKTS
28	1969	3	26	22.6	78.1		4.2		4.8		IMD
29	1969	4	14	18	80.5				6		USC
30	1969	4	14	18	80.5	Vi			5.7	33	USC
31	1973	7	12	23.2	80		4		4.6		IMD
32	1973	7	12	23.1	79				3.7		NEIC, UKHYB

33	1975	4	24	18.7	80.7		3		3		INR, NEIC, UKHYB
34	1975	7	3	18	79.5		3.2		3.2		INR
35	1975	9	15	18.4	79.2		3.2		3.2		INR, NEIC, UKHYB
36	1975	7	3	18.5	79.5				3.2		UKHYB
37	1977	9	30	18.08	81.5		3.3		3.3		GBA
38	1979	8	29	18.24	81.3		3		3		GBA
39	1979	4	22	18.5	80.8		3.5		4.7		INR
40	1981	12	4	18.16	81.4		3		3		GBA
41	1981	12	16	18.57	80.7		3.3		3.3		GBA
42	1982	10	14	20.39	84.4			4.7	4.7		ISC
43	1983	4	8	18.17	81.3		3		3		GBA
44	1984	4	24	18.27	78.8		3.4		3.4		GBA
45	1984	4	27	18.16	79.4		3.4		3.4		GBA
46	1984	6	20	20.4	78.5		3.7		4.3		GBA
47	1985	1	6	20.22	78.4		4.2		4.8		GBA
48	1985	9	27	19.39	78.9		3		3		GBA
49	1986	4	9	18.34	82		3.1		3.1		GBA
50	1986	1	19	20.94	84.9			4.4	4.4	33	ISC
51	1987	4	18	22.53	79.2			4.8	4.8	20	ISC
52	1987	4	18	22.35	79.3			4.9	4.9	33	GSPDE, UKHYB
53	1990	6	9	18.1	80.5		4		4.6		CVR
54	1995	3	27	21.66	84.6			4.4	4.4	21	ISC
55	1995	3	27	21.67	84.6			4.6	4.6	10	GSPDE
56	1996	2	12	22.62	82.7				4.3	33	MLDMIV, UKHYB
57	1997	5	21	23.07	80			6	6.7	36	CGS
58	1997	5	21	23.08	80			6	6.7	36	NEIC, GS
59	1997	6	4	23.14	80				3.9	33	MDHYR, PDE, NEIC
60	1998	3	9	22.49	78			4.3	4.3	10	GSPDE, NEIC
61	2000	10	10	23.8	82.7			4.5	4.5	33	GSPDE, NEIC
62	2000	10	16	23.28	80.3			4.7	4.7	33	GSPDE, NEIC
63	2001	6	12	22.22	83.9			4.8	4.8	33	GSPDE, NEIC
64	2007	3	21	23.9	84.8				3.3	39	JHAR., IMD
65	2007	4	13	22.70	83.2				3.1	10	RAIG., IMD
66	2010	1	25	21.5	76.9				3.0	10	AMRA., MAH.,IMD
67	2011	2	8	22.5	79.6				3.5	12	SEONI,MP,IMD

Appendix -II
 Listing of Earthquake Events around Distract Head Quarter Kanker
 (Latitude 17° 0" - 23° 0" Longitude -78° 0" - 85° 0")

S No.	Year	Month	Date	Latitude	Longitude	Int	Ms	Mb	Mw	Depth	Source
1	1827	1	6	17.7	83.4	V			4.3		OLD, NEIC, UKOLD
2	1843	3	12	17.5	78.5	Iv			3.7		OLD, NEIC, UKOLD
3	1846	5	27	23	80	Vi			6.5		OLD, NEIC, UKOLD
4	1853	2	21	17.7	83.3	Iv			3.7		UGS, NEIC
5	1853	2	21	17.7	83.4	Iv			3.7		UKOLD
6	1858	8	24	17.8	83.4	Iv			3		OLD, NEIC
7	1858	10	12	18.3	84	V			4.3		OLD, NEIC
8	1859	8	24	18.1	83.5	V			3.7		OLD, NEIC, UKGSI
9	1860	2	25	19.4	84.9	V			4.3		OLD, NEIC
10	1861	11	13	18.11	83.5	Iii			3		UGS
11	1869	12	19	17	82.3	V			3.7		OLD, UKOLD
12	1869	12	19	17.9	82.3	V			3.7		UKOLD
13	1870	12	19	17.7	83.4	V			3.7		OLD, UKGSI
14	1871	9	27	18.3	83.9	Iii			3		UGS
15	1872	11	22	18.86	80	Vi			5		UGS
16	1878	12	10	18.3	83.9	Iv			3.7		UGS
17	1897	6	22	19.4	84.9	Vii			5.5		HNS, NEIC, UKSTA
18	1903	5	17	23	80		5		5.5		TRI, NEIC, UKTRI
19	1917	4	17	18	84		5.5		5.8		ISS, NEIC, UKIMD
20	1927	6	2	23.5	81		6.5	6	6.7		GR
21	1927			17.7	83.4				4.3		NEIC, UKGUR
22	1954	1	5	18	81.8		4		4.5		IMD
23	1954	1	5	18	81.3				4		NEIC, UKIMD
24	1957	8	25	22	80		5.5	5.5	5.8		SHL, NEIC, UKSHL
25	1958	11	1	22	85				4		SHL, NEIC, UKIMD
26	1959	8	9	18.1	83.5		4.1		4.7		RAO, UKRAO
27	1959	12	23	18.1	83.5		4.3		4.8		RAO, UKRAO
28	1963	12	5	17.3	80.1		3.7		4.3	33	CGS/IMD
29	1963	5	8	21.7	84.9			5.2	5.3	33	CGS
30	1963	5	8	22.5	84.5				6		NEIC, UKRR
31	1965	4	29	23.5	84				4		NEIC
32	1968	7	29	17.6	80.8		4.5		5		GUB, NEIC, UKGUB
33	1968	7	27	17.6	80.8				4.5		NEIC, UKGUB
34	1968	11	14	21.8	78		4.2		4.8		IMD, NEIC, UKHYB
35	1969	4	13	17.81	80.7			5.3	5.5	25	ISC
36	1969	4	14	18	80.5			5.2	5.3		IMD
37	1969	4	15	18	80.7			4.6	4.6	33	ISC
38	1969	4	18	17.9	80.6		4.1		4.7		INR
39	1969	4	19	17.9	80.6		4.3		4.8		INR
40	1969	7	26	17.9	80.6		4		4.6		INR
41	1969	8	30	17.9	80.6		4.5		5		INR
42	1969	9	15	17.6	80.5		3.8		4.4		IMD, NEIC, UKIMD
43	1969	4	13	17.9	80.6				5.7		NEIC, UKTS
44	1969	4	14	18.1	80.5				6		UKTS
45	1969	3	26	22.6	78.1		4.2		4.8		IMD
46	1969	4	14	18	80.5				6		USC
47	1969	4	14	18	80.5	Vi			5.7	33	USC
48	1970	7	28	17.9	80.6		4		4.6		INR

49	1973	7	12	23.2	80		4		4.6		IMD
50	1973	7	12	23.1	79				3.7		NEIC, UKHYB
51	1975	4	24	18.7	80.7		3		3		INR, NEIC, UKHYB
52	1975	7	3	18	79.5		3.2		3.2		INR
53	1975	9	15	18.4	79.2		3.2		3.2		INR, NEIC, UKHYB
54	1975	7	3	18.5	79.5				3.2		UKHYB
55	1977	9	30	18.08	81.5		3.3		3.3		GBA
56	1978	5	1	17.45	80.6		3.1		3.1		GBA
57	1979	8	29	18.24	81.3		3		3		GBA
58	1979	4	22	18.5	80.8		3.5		4.7		INR
59	1980	3	30	17.5	81.8	V		4.4	4.4	54	ISC
60	1980	3	31	17.46	81.8				4.5	33	ISC
61	1980	3	30	17.16	82			4.5	4.5	33	GSPDE, CAT, NEIC
62	1981	12	4	18.16	81.4		3		3		GBA
63	1981	12	16	18.57	80.7		3.3		3.3		GBA
64	1982	10	14	20.39	84.4			4.7	4.7		ISC
65	1982	1	14	17.43	78.4		3.5		4.7	2	RAS
66	1982	2	24	17	80.4		3.1		3.1		CVR
67	1982	1	14	17.5	78.6				3.1		UKHYB
68	1983	4	8	18.17	81.3		3		3		GBA
69	1983	6	30	17.9	78.5			4.9	4.9	33	ISC
70	1983	6	30	17.6	78.5				4.5		UKHYB
71	1984	3	28	17.27	83.3		4.2		4.8		GBA
72	1984	8	23	17.16	82.6		3.4		3.4		GBA
73	1984	4	24	18.27	78.8		3.4		3.4		GBA
74	1984	4	27	18.16	79.4		3.4		3.4		GBA
75	1984	6	20	20.4	78.5		3.7		4.3		GBA
76	1985	9	7	17.82	81.7		3.2		3.2		GBA
77	1985	1	6	20.22	78.4		4.2		4.8		GBA
78	1985	9	27	19.39	78.9		3		3		GBA
79	1986	1	10	17.26	81		3.2		3.2		GBA
80	1986	4	9	18.34	82		3.1		3.1		GBA
81	1986	6	2	17.96	81.8		3		3		GBA
82	1986	1	19	20.94	84.9			4.4	4.4	33	ISC
83	1987	2	16	17.48	83.1		3.1		3.1		GBA
84	1987	4	18	22.53	79.2			4.8	4.8	20	ISC
85	1987	4	18	22.35	79.3			4.9	4.9	33	GSPDE, UKHYB
86	1990	6	9	18.1	80.5		4		4.6		CVR
87	1995	12	18	17.94	82.8			4.3	4.3		ISC
88	1995	3	27	21.66	84.6			4.4	4.4	21	ISC
89	1995	3	27	21.67	84.6			4.6	4.6	10	GSPDE
90	1996	2	12	22.62	82.7				4.3	33	MLDMIV, UKHYB
91	1997	5	21	23.07	80			6	6.7	36	CGS
92	1997	5	21	23.08	80			6	6.7	36	NEIC, GS
93	1997	6	4	23.14	80				3.9	33	MDHYR, PDE, NEIC
94	1998	3	9	22.49	78			4.3	4.3	10	GSPDE, NEIC
95	2000	10	10	23.8	82.7			4.5	4.5	33	GSPDE, NEIC
96	2000	10	16	23.28	80.3			4.7	4.7	33	GSPDE, NEIC
97	2001	6	12	22.22	83.9			4.8	4.8	33	GSPDE, NEIC
98	2007	3	21	23.9	84.8				3.3	39	JHAR., IMD
99	2007	4	13	22.70	83.2				3.1	10	RAIG., IMD

100	2008	5	29	17.7	82.6				3.7	5.0	VISHA., IMD
101	2011	2	8	22.5	79.6				3.5	12	SEONI,MP,IMD

Appendix-III

Table 3.1

Magnitude-Frequency Data of District Headquarters Dhamtari
 Observation Period– 166 years [1846-2012]

S.No.	Moment Magnitude M_w	No. of Earthquake $\geq M_w$	No. of Earthquake $\geq M_w$ per year
1	3.0	67	0.403608
2	3.1	59	0.355416
3	3.2	57	0.343368
4	3.3	54	0.325296
5	3.4	51	0.307224
6	3.5	49	0.295176
7	3.6	48	0.289152
8	3.7	48	0.289152
9	3.8	45	0.271080
10	3.9	45	0.271080
11	4.0	44	0.265056
12	4.1	41	0.246984
13	4.2	41	0.246984
14	4.3	41	0.246984
15	4.4	36	0.216864
16	4.5	34	0.204816
17	4.6	32	0.192768
18	4.7	28	0.168672
19	4.8	24	0.144576
20	4.9	18	0.108432
21	5.0	17	0.102408
22	5.1	16	0.096384
23	5.2	16	0.102408
24	5.3	16	0.096384
25	5.4	14	0.096384
26	5.5	14	0.084336
27	5.6	12	0.084336
28	5.7	12	0.072288
29	5.8	10	0.072288
30	5.9	8	0.060240
31	6.0	8	0.048192
32	6.1	5	0.048192
33	6.2	5	0.030120
34	6.3	5	0.030120
35	6.4	5	0.030120
36	6.5	5	0.030120
37	6.6	3	0.030120
38	6.7	3	0.018072

Table 3.2

Magnitude - Frequency of District Headquarter Kanker
 Observation Period– 185 years [1827-2012]

S.No.	Moment Magnitude M_w	No. of Earthquake $\geq M_w$	No. of Earthquake $\geq M_w$ per year
1	3.0	101	0.545945
2	3.1	92	0.497297
3	3.2	86	0.464864
4	3.3	81	0.437837
5	3.4	78	0.421621
6	3.5	75	0.405405
7	3.6	74	0.400000
8	3.7	74	0.400000
9	3.8	64	0.345946
10	3.9	64	0.345946
11	4.0	63	0.340540
12	4.1	60	0.324324
13	4.2	60	0.324324
14	4.3	60	0.324324
15	4.4	51	0.275675
16	4.5	47	0.254054
17	4.6	41	0.221621
18	4.7	35	0.189189
19	4.8	29	0.156757
20	4.9	21	0.113513
21	5.0	19	0.102703
22	5.1	16	0.086486
23	5.2	16	0.086486
24	5.3	16	0.086486
25	5.4	14	0.075676
26	5.5	14	0.075676
27	5.6	11	0.059459
28	5.7	11	0.059459
29	5.8	9	0.048649
30	5.9	7	0.037838
31	6.0	7	0.037838
32	6.1	4	0.021622
33	6.2	4	0.021622
34	6.3	4	0.021622
35	6.4	4	0.021622
36	6.5	4	0.021622
37	6.6	3	0.016216
38	6.7	3	0.016216

Table 3.3

Earthquake Distribution by Time and Magnitude for District Headquarter Dhamtari

Time	Time Interval T in year	No. of Cumulative Earthquakes occurred in the time interval T				Rate of occurrence of Earthquake /year for the Magnitude			
		3-3.9 M _w	4-4.9 M _w	5-5.9 M _w	6-6.9 M _w	3-3.9 M _w (N1)	4-4.9 M _w (N2)	5-5.9 M _w (N3)	6-6.9 M _w (N4)
2002-2012	10	4	1	0	0	0.40	0.10	0	0
1992-2012	20	5	7	0	2	0.25	0.35	0	0.10
1982-2012	30	10	14	0	2	0.334	0.467	0	0.067
1972-2012	40	18	16	0	2	0.450	0.400	0	0.050
1962-2012	50	18	20	3	5	0.360	0.400	0.060	0.100
1952-2012	60	19	25	4	5	0.317	0.417	0.067	0.084
1942-2012	70	19	25	4	5	0.271	0.357	0.057	0.071
1932-2012	80	19	25	4	5	0.237	0.312	0.050	0.062
1922-2012	90	19	25	4	7	0.211	0.278	0.045	0.078
1912-2012	100	19	25	5	7	0.190	0.250	0.050	0.070
1902-2012	110	19	25	6	7	0.173	0.227	0.054	0.063
1892-2012	120	19	25	7	7	0.158	0.208	0.058	0.058
1882-2012	130	19	25	7	7	0.146	0.192	0.053	0.053
1872-2012	140	20	25	8	7	0.143	0.178	0.057	0.050
1862-2012	150	21	25	9	7	0.140	0.167	0.060	0.047
1852-2012	160	23	27	9	7	0.144	0.168	0.056	0.044
1846-2012	166	23	27	9	8	0.138	0.162	0.054	0.048

Table 3.4

Time	Time Interval T in year	No. of cumulative Earthquakes occurred in the time interval T				Rate of occurrence of Earthquake /year for the Magnitude			
		3-3.9 M_w	4-4.9 M_w	5-5.9 M_w	6-6.9 M_w	3-3.9 $M_w(N1)$	4-4.9 $M_w(N2)$	5-5.9 $M_w(N3)$	6-6.9 $M_w(N4)$
2002-2012	10	4	0	0	0	0.400	0	0	0
1992-2012	20	5	8	0	2	0.250	0.400	0	0.100
1982-2012	30	17	19	0	2	0.567	0.634	0	0.067
1972-2012	40	24	27	0	2	0.600	0.675	0	0.050
1962-2012	50	27	35	7	5	0.540	0.700	0.140	0.100
1952-2012	60	27	40	8	5	0.450	0.667	0.134	0.083
1942-2012	70	27	40	8	5	0.384	0.579	0.116	0.071
1932-2012	80	27	40	8	5	0.337	0.500	0.100	0.062
1922-2012	90	27	41	8	6	0.300	0.456	0.089	0.067
1912-2012	100	27	41	9	6	0.27	0.41	0.09	0.06
1902-2012	110	27	41	10	6	0.245	0.377	0.099	0.055
1892-2012	120	27	41	11	6	0.225	0.347	0.097	0.05
1882-2012	130	27	41	11	6	0.208	0.315	0.085	0.046
1872-2012	140	28	41	12	6	0.200	0.293	0.086	0.043
1862-2012	150	32	41	12	6	0.213	0.273	0.080	0.040
1852-2012	160	37	43	12	6	0.231	0.268	0.075	0.037
1842-2012	170	38	43	12	7	0.223	0.252	0.070	0.041
1832-2012	180	38	43	12	7	0.211	0.239	0.067	0.039

1827-2012	185	38	44	12	7	0.205	0.238	0.065	0.038
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Earthquake Distribution by Time and Magnitude for District Headquarter Kanker

Table 3.5

Rate of Occurrence of Magnitude of District Headquarter Dhamtari

Time Interval T in year	$\frac{1}{\sqrt{T}}$	$\frac{\sqrt{(N_1/T)}}{\sqrt{T}}$	$\frac{\sqrt{(N_2/T)}}{\sqrt{T}}$	$\frac{\sqrt{(N_3/T)}}{\sqrt{T}}$	$\frac{\sqrt{(N_4/T)}}{\sqrt{T}}$
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10	0.3162	0.2000	0.1000	0.0000	0
20	0.2236	0.1118	0.1323	0.0000	0.015811
30	0.1826	0.1055	0.1248	0.0000	0.008628
40	0.1581	0.1061	0.1000	0.0000	0.00559
50	0.1414	0.0849	0.0894	0.0346	0.006325
60	0.1291	0.0727	0.0834	0.0334	0.00483
70	0.1195	0.0622	0.0714	0.0285	0.003807
80	0.1118	0.0544	0.0624	0.0250	0.003112
90	0.1054	0.0484	0.0556	0.0224	0.003103
100	0.1000	0.0436	0.0500	0.0224	0.002646
110	0.0953	0.0397	0.0454	0.0222	0.002282
120	0.0913	0.0363	0.0416	0.0220	0.002007
130	0.0877	0.0335	0.0384	0.0202	0.001771
140	0.0845	0.0320	0.0357	0.0202	0.001597
150	0.0816	0.0306	0.0334	0.0200	0.001445
160	0.0791	0.0300	0.0324	0.0187	0.001311
166	0.0776	0.0288	0.0312	0.0180	0.00132

Table 3.6

Rate of Occurrence of Magnitude of District Headquarter Kanker

Time Interval T in year	$\frac{1}{\sqrt{T}}$	$\frac{\sqrt{(N_1/T)}}{\sqrt{T}}$	$\frac{\sqrt{(N_2/T)}}{\sqrt{T}}$	$\frac{\sqrt{(N_3/T)}}{\sqrt{T}}$	$\frac{\sqrt{(N_4/T)}}{\sqrt{T}}$
10	0.3162	0.2000	0.0000	0.0000	0.0000
20	0.2236	0.1118	0.1414	0.0000	0.015811
30	0.1826	0.1375	0.1454	0.0000	0.008628
40	0.1581	0.1225	0.1299	0.0000	0.00559
50	0.1414	0.1039	0.1183	0.0529	0.006325
60	0.1291	0.0866	0.1054	0.0473	0.004802
70	0.1195	0.0741	0.0909	0.0407	0.003807
80	0.1118	0.0649	0.0791	0.0354	0.003112
90	0.1054	0.0577	0.0712	0.0314	0.002876
100	0.1000	0.0520	0.0640	0.0300	0.002449
110	0.0953	0.0472	0.0585	0.0300	0.002132
120	0.0913	0.0433	0.0538	0.0284	0.001863
130	0.0877	0.0400	0.0492	0.0256	0.00165
140	0.0845	0.0378	0.0457	0.0248	0.001481
150	0.0816	0.0377	0.0427	0.0231	0.001333
160	0.0791	0.0380	0.0409	0.0217	0.001202
170	0.0767	0.0362	0.0385	0.0203	0.001191
180	0.0745	0.0342	0.0364	0.0193	0.001097
185	0.0735	0.0333	0.0359	0.0187	0.001054

Table 3.7

Faults Considered for Hazard Analysis around the District Headquarter Dhamtari

Fault No.	Fault length Li in km	Minimum map distance to the site D in km	Focal depth F in km	Hypo-central Distance R in km	Weightage of fault W_i	Maximum potential magnitude M_u
F1	75	276.311	10	276.5	0.0525	5.1
F2	140	273.686	10	273.87	0.0981	5.0
F3	76	257.749	10	257.95	0.0532	6.5
F4	182	256.68	10	256.88	0.1275	5.3
F5	38	251.866	10	252.07	0.0266	5.3
F6	91	224.959	10	225.19	0.0637	6.0
F7	71	178.889	10	179.17	0.0490	6.0
F8	70	196.69	10	196.95	0.0497	4.5
F9	125	183.544	10	183.82	0.0875	4.2
F10	45	149.074	10	149.41	0.0315	6.0

F11	58	83.799	10	84.40	0.0406	6.0
F12	25	125.114	10	125.52	0.0175	6.0
F13	180	225.942	10	226.17	0.1261	5.3
F14	130	253.116	10	253.32	0.0911	5.4
F15	121	263.061	10	263.26	0.0847	5.4
Total= 1427						

Table 3.8

Faults Considered for Hazard Analysis around the District Headquarter Kanker

Fault No.	Fault length L in km	Minimum map distance to the site D in km	Focal depth F in km	Hypo-central distance R in km	Weightage of fault W_i	Maximum potential magnitude M_u
F1	182	289.122	10	289.3	0.1013	5.3
F2	38	283.721	10	283.9	0.0211	5.3
F3	91	261.459	10	261.66	0.0506	6.0
F4	71	222.399	10	222.63	0.0395	6.0
F5	70	291.522	10	291.7	0.0389	5.0
F6	125	200.507	10	200.76	0.0696	4.2
F7	45	161.198	10	161.51	0.0250	6.0
F8	58	116.039	10	116.47	0.0323	6.0
F9	25	148.451	10	148.79	0.0139	6.0
F10	180	217.247	10	217.48	0.1002	6.4
F11	174	277.406	10	277.59	0.0969	5.4
F12	228	288.384	10	288.56	0.1269	6.4
F13	130	210.941	10	211.18	0.0724	5.4
F14	129	282.015	10	282.2	0.0718	6.4
F15	32	298.074	10	298.25	0.0178	5.4
F16	121	235.618	10	235.84	0.0673	5.4
F17	46	298.307	10	298.48	0.0256	5.4
F18	51	273.877	10	274.06	0.0284	5.4
Total=1796						

Table 3.9

PGA for M_{100} Earthquakes at District Headquarter Dhamtari

Fault No.	Fault length L_i in km	Minimum map distance to the site D in km	Focal depth F in km	Hypo central distance R in km	100 years recurrence M_{100}	PGA * of Site
F1	75	276.311	10	276.5	4.68	0.00104
F2	140	273.686	10	273.87	4.78	0.00120
F3	76	257.749	10	257.95	5.25	0.00230
F4	182	256.68	10	256.88	5.05	0.00189
F5	38	251.866	10	252.07	4.49	0.00106
F6	91	224.959	10	225.19	5.15	0.00287
F7	71	178.889	10	179.17	5.0	0.00399
F8	70	196.69	10	196.95	4.25	0.00140
F9	125	183.544	10	183.82	4.10	0.00135
F10	45	149.074	10	149.41	4.75	0.00431
F11	58	83.799	10	84.4	4.90	0.01305*
F12	25	125.114	10	125.52	4.35	0.00372
F13	180	225.942	10	226.17	5.05	0.00255
F14	130	253.116	10	253.32	3.90	0.00052
F15	121	263.061	10	263.26	3.85	0.00044

Table 3.10

PGA for M_{100} Earthquakes at Kanker Dam site

Fault No.	Fault length L_i in km	Minimum map distance to the site D in km	Focal depth F in km	Hypo central distance R in km	100 years recurrence M_{100}	PGA * of Site
F1	182	289.122	10	289.3	3.80	0.00033
F2	38	283.721	10	283.9	4.70	0.00100
F3	91	261.459	10	261.66	4.50	0.00098
F4	71	222.399	10	222.63	4.30	0.00114
F5	70	291.522	10	291.7	4.10	0.00046
F6	125	200.507	10	200.76	3.95	0.00094
F7	45	161.198	10	161.51	3.95	0.00145
F8	58	116.039	10	116.47	4.10	0.00313
F9	25	148.451	10	148.79	3.50	0.00096
F10	180	217.247	10	217.48	5.00	0.00264
F11	174	277.406	10	277.59	4.70	0.00106
F12	228	288.384	10	288.56	5.20	0.00164
F13	130	210.941	10	211.18	4.60	0.00181
F14	129	282.015	10	282.2	4.80	0.00113
F15	32	298.074	10	298.25	3.70	0.00026
F16	121	235.618	10	235.84	4.50	0.00126
F17	46	298.307	10	298.48	3.90	0.00034
F18	51	273.877	10	274.06	4.00	0.00048

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A Few Lines on the Odes of John Keats

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Abstract- The major six odes upon which Keats's fame as an ode-writer rests were composed in 1810 and may be treated as almost forming a group. One meets images, emotions and ideas which occur and recur in them, echoing and enforcing one another. The three earlier odes stand separated from the 189 group of odes in time period and represent the phase of Keats's experimentation which the odes form and style. The 'Ode to Apollo', composed in February 1815, belongs to the pre-Endymion Phase of Keats's career and has an ostensible immaturity of style. Homer, Virgil, Milton, Shakespeare, Spenser and Tasso are introduced one by one in succession, each singing in his characteristic vein. The song of each poet exhibits the dominant trait of his poetry. Homer's song is remarkable for vigour. Virgil's for sweetness of melody, Milton's for Grandeur, Shakespeare's for passion, Spenser's for its celebration of "Spotless Chastity", i.e. ideal beauty and Tasso's for ardour.

Index Terms- fame, echo, sensitive, situation, passion, imaginary, sympathetic, melancholy.

I. INTRODUCTION

There are five Odes which Keats himself acknowledged as Odes. They are: 1. 'Psyche', 2. 'Nightingale', 3. 'Grecian Urn', 4. Melancholy and 5. Indolence. The first four of which were published by him in the 1820 volume. Apart from them, the present study also includes 'Ode to Apollo', 'On a Lock of Milton's Hair', the fragmentary ode 'To Maria' and 'To Autumn', all of which have been recognized by critics to bear distinctive characteristics of the odes. Robert Gittings¹ observes that Keats wrote four poems to Fanny Browne, none of which were published during his life time and not one of them as a poem is without serious flaws. For determining the order of the odes the basis of either known or tentative date of their composition, the present study has relied on Finney²:

Sl.No.	Name of the Odes	Date of Composition
1.	Ode to Apollo	February, 1815
2.	Lines on Seeing a Lock of Milton's Hair	January, 16, 1818
3.	Maiya	May 1, 1818
4.	Ode to Psyche	End of April, 1819
5.	Ode to a Nightingale	May, 1819
6.	Ode on Melancholy	May, 1819
7.	Ode on a Grecian Urn	May, 1819
8.	Ode on Indolence	May, 1819
9.	Ode to Autumn	September 19, 1819

To discuss about the odes properly I think it would be better to have a short glimpse of the poet's biography which is required to suffice the purpose. John Keats, one of the greatest Romantic Revival, was born on October 31, 1795 in London. He was the oldest of five siblings. One of them, Edward died at infancy. He lived a happy childhood in North London. His father Thomas Keats and his mother Frances Jennings had a business called the "Swan and Hoop". John was a very unique boy. He would answer people by rhyming the last word of his answer to the last word to their question. John really enjoyed doing this, which paid off later in his life. Keats loved his mother very much and was very protective of her. Keats' family wasn't rich but they were well off. When Keats was 9 years old, his father fell off his horse on the way home and died several hours later. Jennings' misery didn't last long and she soon married a minor bank clerk named William Rawlings. Rawlings only wanted money and they broke up shortly after. After this, John's mother disappeared. This caused Keats to lose his respect and hope for his mother. The rest of Keats' life became a struggle for money. His mother soon became sick and tired. Keats' whole attitude changed and he focused primarily on pleasing his mother and making her proud. He read all the time and studied very hard. He was awarded the school prize for best literary work of that year. Around this time, Keats had read almost every single book in his school's library. His mother became very proud in him indeed. However, she soon died from tuberculosis. His grandmother granted Richard Abbey as the guardian of the children. It was a terrible decision and because of the vague will, Abbey often deliberately withheld the children's money. He was unsympathetic to the children and once referred to one of Keats' poems as, "a horse that you cannot catch and isn't any good once you catch it."

II. KEATSEAN ODES' LITERATURE

John Keats grew to be a poet in the atmosphere of romanticism dominated by Wordsworth and Coleridge. The traditions of the great romantic poets were carried forward by Keats. These traditions reached their culminating point in his poems. John Keats wrote his first poem at 19 years old just before his grandmother died. Keats wanted to be a poet but he knew that poetry is a privilege to the wealthy who do not have to work and can afford to indulge in word play. This was a very hard decision for Keats and to make it even worse, Abbey withdrew John and one of his brothers George from school and apprenticed John as an apothecary. John was part of the beginning of the Romantic period of poetry. Technique and common sense was in the past prized higher than inspiration and passion. Romantic poets began to spring up but their works were still disliked and thus it was very hard to make a decent living. There was also another popular form of poetry that tried to be

romantic by glorifying things that weren't so great. Keats took his work after a minor poet named Leigh Hunt whom he admired. Cowden Clark, a friend of John Keats, had read some of Keats' work and was impressed by it. He then took some of John's poems that he owned and brought them to a friend of his, who just happened to be Leigh Hunt. Hunt loved it and immediately asked Clark to bring him over to meet with Keats. Hunt and Keats became friends and Hunt would later prove very influential to Keats' writing, for Hunt became a devoted critic. John Keats then decided to end his medical career. He also had a friend name Benjamin Bailey with whom he went to stay at Oxford. Bailey was very well off and Keats enjoyed his stay. The campus was a quiet and peaceful place, where he could write poems and then take long walks with Bailey, discussing his works. Bailey was deep into studying theology and often had religious talks with Keats. Also, evidence shows that while at Oxford, Keats may have contracted a venereal disease. He began to take mercury (which had many terrible side effects) to try and cure it. Later, Keats regretfully moved back to London with his two brothers George and Tom. Tom then became very ill and soon died of tuberculosis. George met a woman and planned to marry her in America. John was lonely and all the rest of his family was gone. John Keats' and his neighbor Fanny Brawne fell deeply in love and got engaged in 1819. However, the previous year on a trip to Scotland, signs of sickness started growing in Keats. They then moved to Italy, in September 1820 while still keeping secretly engaged. In February 1821, John Keats died peacefully in Rome of tuberculosis.

John Keats' poem 'Robin Hood' was actually a letter to his friend John H. Reynolds. It's a sad and melancholy poem comparing the days of Robin Hood and his band of outlaws to the days Keats lived in. Legend says that Robin Hood was an outlaw and a thief who stole from the wealthy. But to the villagers and peasants, he was a hero. Keats expresses how Robin Hood is almost like a hero to him also because of his lack of money throughout his entire life. Keats goes into telling about the medieval times and how honorable they were. He then talks about how if Robin and his crew were alive now, they would despair for things had drastically changed since their times. It sorrowfully explains how Robin would find all of his oaks cut down and used for industrial purposes. The industrial revolution was also going on during Keats' life. Keats describes how the poor have no choice but to live a terrible life whereas in the Middle Ages you could grow things for yourself and live in the peaceful forest with Robin and his band. In the poem, Keats shows skill at rhyming every line. He got a lot of practice during his childhood where he would rhyme his answer with the question anybody asked him. Keats is also a very descriptive writer and he uses metaphors in the line, "Of the forest's whispering fleeces," and in, "Many times have winter's shears". They describe how the leaves on a tree form a coat and the sound of the wind going through that coat. The other describes how winter "shears" away plants and life like a shepherd cutting wool. When winter comes, all the green is drawn away to leave white and brown.

The poem 'On Death' is one of Keats' shortest and most meaningful poems. It asks that what if death is really sleep and life is just a dream. The great times of our lives may just be imaginary like a phantom. We think that it is painful to die, but

what if it is just the end of a dream. Keats shows how we all live great our lives while poisoning them with our immense fear of death. But would it be so terrible still, if you were only waking up?

Keats's 'Ode to a Nightingale' was written in early May, 1819. It is the longest of the odes, but, as described by Charles Browne, the composition in the first draft lasted only 'two or three hours, written in the garden behind Browne's house in Hampstead. In the first stanza the poet moves with heavy inertia towards oblivion. The poet is not envious of the bird's happiness through wine. He wants to escape from the world of sorrow and misery to an ideal world of the bird. Escape from that world, however, cannot be achieved through wine, through the senses; only the poetic imagination seems to have the power. Now the poet's imagination carries him to join the bird in forest. Escape has been accomplished and the poet enjoys for the moment positive beauty. In the sixth stanza the lush darkness makes the poet regress again and we learn that he has been 'half in love with easeful Death. In the next stanza he develops the idea that the nightingale is immortal. The individual nightingale dies; but the bird has become a symbol of continuity.

The idea that Keats is conveying, is probably something that he truly believed in. This theory reassured Keats when most of his family died while he was still very young. When his father died when Keats was only 9 years old, he was only able to cope with the shock by imagining that his father was not in pain and was only waking up from a dream. Any death or tragedy that came to Keats, he could just deal with it like a bad dream and it will be over eventually. Keats was so aggressive and known to be a "fighter" because he wasn't afraid to die. He would welcome death if it came. Keats did not feel like there was no greater pain than to die. He thought life continued on and got better. The Author also advise people not to be so afraid and says that we lead a life of sorrow and pain when the people we love die and when we become ill or close to death ourselves. We should instead be happy for them and go on with our lives and try to live up to their standards.

Keats wonderful technique is very unique. As a kid he was known to be a sensitive person. Keats didn't follow the obvious and sought further meaning into things around him. Keats listened to sounds a different way than everyone else did. He heard music instead of noise. Being a romantic poet, Keats loved and honored the olden days. But also being born during a time of great industrialism, harmony and nature were not paid much attention to. Some of the most enjoyable times were spent during Keats' stay at Oxford with his friend Bailey. It was very quiet there even indoors. There, Keats could concentrate on his poems without disturbance yet also watch and listen to the peaceful things around him. Eventually Keats left Oxford and moved back to London where he hated it because it was very cramped and noisy. John became truly grateful of nature and peace.

'To Autumn' was one of Keats' last poems. It has a deep feeling of serenity, freshness and abundance. Yet at the same time it shows decaying and the passing of something. Autumn is the time of harvesting and is also when there is the "most food on the table". The glee and happiness is clearly shown in the tone of the poem. The Author describes also how Autumn is passing of summer and green life and the bringing of a dark cold winter. Autumn takes the summer's warmth and rips down the leaves.

The idea that John Keats was trying to portray was that everything dark has a purpose. Spring wouldn't be that invigorating if hadn't seen winter for a while. Would we really appreciate light if we had never seen dark? Life wouldn't be nearly as treasured if we never knew what death was. Dark things make people very grateful for the good things that they had. Keats really understood this and secretly summarized his life in this poem. Keats lost many of his family and friends. As a result, no matter what situation that Keats was in he was still glad to be alive. Keats was very grateful of the luxuries he had during his stay at Oxford, unlike most other people there, because he had witnessed poverty. The wealthy aren't truly grateful unless they have been poor for a while.

'Ode to Apollo' displayed Keats' great respect for many well-known poets. Apollo is the god of the arts including poetry and music. There is also a lot of history involved in 'Ode to Apollo'. Keats had a very good education as a child and was thirsty for knowledge. Keats knew a lot about Greek mythology and culture thus giving the poem a very ancient feeling tone. The author once again refers to poets as bards throughout the literary work. In the line "whose chords are solid rays, and twinkle radiant fires," a metaphor describes Apollo's harp as having strings made of the sun's rays. Keats also uses stanzas to individually describe seven poets. The poets are Apollo, Homer, Maro, Milton, Shakespeare, Spenser, and Tasso. All of these poets were highly admired by Keats. Irony is used when Keats describes Homer in "Looks through renovated eyes". This is situational irony because Homer was blind. The last stanza separates itself from the rest of the poem. In it, Keats states that the bards mentioned in the poem all had lineage with Apollo. This clearly shows that Keats highly admired these poets. When Keats read most of the books in the entire library of his school, he probably did the best thing he ever did to aid his career. He shows advanced knowledge of Apollo and the other poets in 'Ode to Apollo'. These poets' style often appears in many of John Keats' poems. When Keats liked what he saw he adapted some of their technique. John's life was full of many hardships and difficulties that would be almost impossible for anyone to normally bear. However, Keats was able to go on with his life and cage up his emotions. When he writes, Keats puts his entire mood into the work. Those emotions can be traced through the poem and they add true passion to his works. Using this style, Keats wrote some of the best literary works ever created.

III. CONCLUSION

Like all romantic poets, Keats seeks an escape in the past. He travels back into the ancient Greece as well as the Middle Ages. 'La Belle Dame Sans Merci' and 'Isabella' are suffused with medieval atmosphere. The romance and artistic glory of the medieval world are also presented in The Eve of St. Agnes. In The Eve of St. Agnes we notice medieval beauty and spiritual symbolism of the church ritual, in the Eve of St. Agnes we see that external wealth of colour and picturesqueness that Walter Scott found so fascinating in the middle Ages. Keats's poems are saturated with sensuousness. All the five senses of sight, ear, smell, touch and taste are enchantingly put together in his poems.

Keats was a renowned admirer of wonderful sights and scenes of nature. He loves nature purely for her own sake and paints her not with the reason but with imagination. According to Compton- Rickett, "Whereas Wordsworth spiritualizes and Shelley intellectualizes nature, Keats is content to express her through the senses. Imitating much, whether consciously or unconsciously, Keats was certainly nobody's slave but his own; subjecting himself to the influences of the senses and of the past, he saw vividly and memorably but with his own eyes; we may mark the influences in his work, but also take account of his own unique creativity. He is a visual poet, a writer of the senses and feelings, but his poems and letters bear eloquent witness to the quality of his thought.

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Development of Gear Hobbing Fixture Design for Reduction in Machine Setting Time

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Abstract- The design of a fixture depends a lot on the designer's expertise and experience and hence no solution is optimal or near optimal for a given workpiece. For a Gear hobbing fixture also there are multiple designs possible. This paper is about redesigning of a hobbing fixture to make it common for the other gears' manufacturing and reduce the no of settings of the fixture on the hobbing machine. There by, reducing company's cost & time. The design was checked and validated for safety under the action of cutting forces.

Index Terms- Fixtures, Gear Hobbing, Hobbing fixtures

I. INTRODUCTION

Gear hobbing is a widely applied manufacturing process for the construction of any external tooth form developed uniformly about a rotation center. It is an advanced metal removal process as compared to conventional machining, such as turning and milling [1]. For the hobbing on gear hobbing machine properly designed hobbing fixtures are needed. Design of such fixtures is complex and numerous plausible designs are possible for a single work piece [2]. S. Vishnupriyan et al. [3] suggested that fixtures form an integral part of the manufacturing process and are required to hold the work piece in the desired position. The fixture design should aim at restraining unwanted movement of the work piece under the action of cutting forces through- out machining. Fixtures are work holding devices, which are used in most of the manufacturing operations such as, machining, assembly, inspection, etc. [4, 5]. Fixturing systems, usually consisting of clamps and locators must be capable to assure certain quality performances, besides of positioning and holding the workpiece throughout all the machining operations. [6]. such location must be invariant in the sense that the devices must clamp and secure the work piece in that location for the particular processing operation. Fixtures are normally designed for a definite operation to process a specific work piece and are designed and manufactured individually. Michael Yu Wang [7] stated that fixture layout is the fundamental task of fixture design, to determine the number, type, and location of the basic fixturing elements of locators, supports, and clamps, as opposed to the detailed design of the fixture assembly.

II. PROBLEM FORMULATION

Fixture forms an important factor in traditional and modern manufacturing systems, since fixture design directly affects manufacturing quality and productivity. Since the total

machining time for a workpiece includes work-handling time, the methods of location and clamping should be such that the idle time is minimum. The design of fixture should allow easy and quick loading and unloading of the workpiece. This will also help in reducing the idle time.

During manufacturing of gears on Hobbing machine, the time taken for the setting of the hobbing fixture was very high. Whenever a gear of a new Root Diameter is to be manufactured, old fixture has to be removed & the relevant new fixture has to be installed. For changing of the fixture on the gear hobbing machine the time required was found out to be approximately 145 Minutes. This includes the time required in setting up of a new fixture and unloading an old fixture. The data was collected for 6 months pertaining to the number of settings done in each month on 8 hobbing machines. The number of settings came out to be 578. This was considerable amount of wastage of time and money for the company. This wastage was due to the changing of fixture every time a gear of new root diameter was to be manufactured. The type of fixture used and redesigned had locating mandrel, face clamping for disc type of gear blanks having bore.

III. REDESIGNING OF THE HOBGING FIXTURE

- Detailed analysis of the present design
- Making the bore in all the gears same so that the mandrel remains same while hobbing gears of different root dia.
- Making the base of the fixture common for all.
- Designing the mandrel and other parts of the fixture such that the gears of different Root Diameter can be manufactured without changing it time & again. This will reduce the setting time.
- Planning of types & position of locators, clamps & supports.
- Detailed design of locators clamps & supports.
- Fixture body design.
- Evaluation, approval & completion of design.

The design of the locating mandrel was such that it had to be removed along with the base. The gear blanks' resting was fixed with the locating mandrel and clamping cup was removable. In the new design resting was made removable by making it like a bottom cup and clamping cup i.e. top cup was already removable. The base of the fixture was made common as during the loading of the fixture on machine its centre has to be

aligned with the machining centre, the commonization has reduced this time also.

IV. RESULT AND DISCUSSION

The new fixture was designed and implemented, the number of machine settings reduced from 578 from Jan'11 to Sept'11 to 129 from Dec'11 to Mar'12. The average number of

settings per machine ranged from 11.3 in Mar'11 to 14.6 in May'11, when the old fixture was used and during the period between Dec'11 to Mar'12 when the new was used the average number of settings ranged from 3.7 in Jan-12 to 4.3 in Mar' 12 as can be seen in Fig 1. The number of settings reduced from 12 per month per machine to 4 per month per machine.

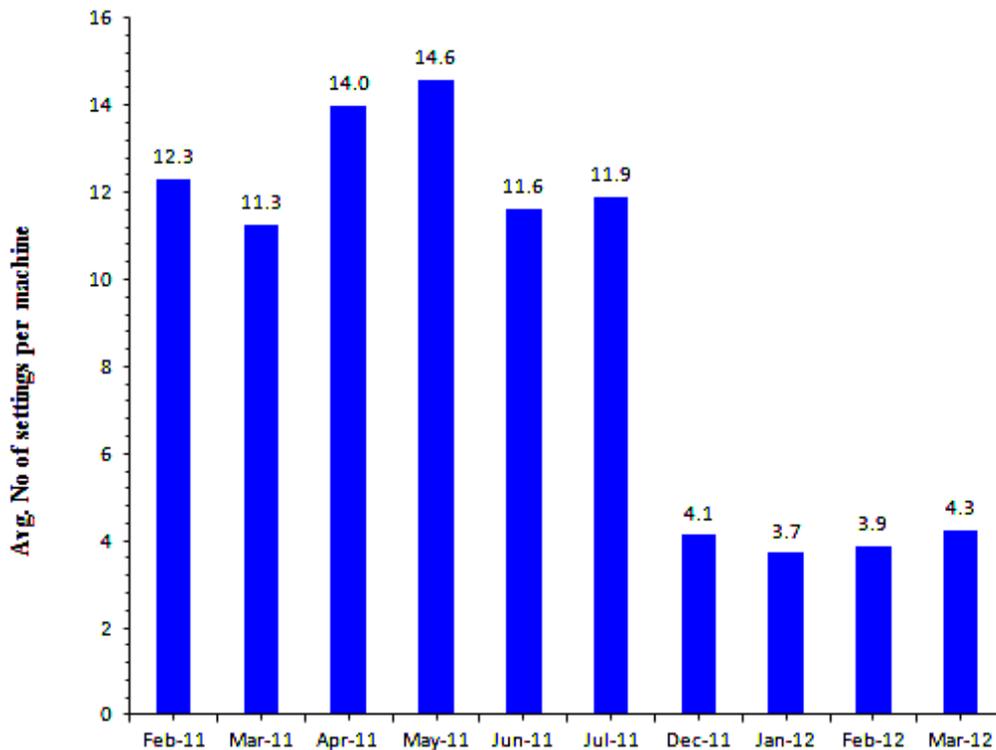


Fig. 1 Average Number of Settings Per machine

Table I Machine Running Cost for Existing Fixture

Design	Avg. Time for one setting (Tool Down Time + Tool Setting Time) Mins	No of settings	Total setting Time 6 months. Mins	Mach ine Running Cost/ Hr Rs	Total Running
Previous Design	145	578	578 X 145=83810 Mins or 1397 Hrs	261	3,64,617
Total Cost for 12 months = 7,29,234					

Table II Machine Running Cost for New Fixture

Design	Avg. Time for one setting (Tool Down Time + Tool Setting Time) Mins	No of settings	Total setting Time 4 months. Mins/Hrs	Mach ine Running Cost/Hr Rs	Total Running Rs
New Design	145	129	129 X 145=18705 Mins or 312 Hrs	261	81,432
Total Cost for 12 months = 2,44,296					
Total Savings over an Year =7, 29,234-2, 44,296=4, 84,938 Rs					

Finally it can be concluded from Table I and Table II that the cost savings to the company projected for 12 months will be Rs 4,84,938, which is a considerable amount.

V. CONCLUSION

The Present work was conducted to redesign the Gear Hobbing Fixture used in the manufacturing of gears at Mahindra & Mahindra (Swaraj Division). A lot of time was wasted in changing of the fixture earlier in changing the Hob, Changing the base and Zero dialing it. All this time which was wasted is now saved with the newly designed fixture by reducing the no of settings .It can be concluded that the amount of saving to the company is considerable in terms of time and money.

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Universal Detector with GSM Interface

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Abstract- Adding automation to an existing fully functional (manual) system has always been a challenge for engineers. The most common problems may include installation of distribution boards, selection of different hardware for different load ratings, etc. Often, a potential user avoids going for such systems as installations want major modification, are quite expensive & cumbersome. There's nothing simpler than connecting an automation system simply by bypassing the existing system and also using the same system irrespective of the voltage rating. To add basic level of automation i.e. detection of any switching of a device, we have come up with a device called 'Universal Detector' with added communication feature. This concept is presented by the use of an external GSM modem which acts as a communication interface between the user and the device. Universal Detector is a retrofit-able device with the key feature being its low cost and wide voltage range literally making it "Universal".

I. INTRODUCTION

Presently, automation is highly application specific and is often termed as a luxury. Simple switching ('on' to 'off' or 'off' to 'on') detection can be the basic building block of any automation system. Universal detector can find application in home as well as building automation.

Universal Detector with GSM is capable of detecting the presence or absence of any voltage in the wide range of 3V-240V, 50/60Hz. It aims at augmenting automation to an existing installation without the need to reinstall the application's entire setup. We used an Atmel 89C51 microcontroller based universal detector i.e. the input can be AC or DC voltage. It makes use of UART communication protocol to transmit messages from the device to the respective user. Currently we have integrated a GSM modem which is communicating with the user. An android powered [4] smart phone application is created which converts the trigger of text message into a user friendly pre-saved message. This pre-saved message comes as a pop-up alert whenever the state of the device connected at the respective port changes. The application also includes mode selection and change of phone number facility.

One can also choose to replace the GSM modem with his personal computer or any other application specific device which can accept data serially.

II. DESCRIPTION

1. INPUT INTERFACE

Each input port is connected to a bridge rectifier which converts AC to DC (and DC input remains unaffected). The

rectified voltage is then passed through a RC-filter (3 resistors with $R=4.7$ ohms/2W connected in series and $C=10\mu F$, 415V) to moderate the ripples. The range of DC at the output of the rectifier would be in the range of approximately 3V to 240V depending upon the input. This voltage is now given to the input of the opto-coupler (ps2502-1). The output side of the opto-coupler consists of a Darlington pair whose collector is connected to 5V DC (via pull-up resistor of value 1kohms/0.25W) with emitter grounded. The output for the controller is directly taken from the collector.

The above can be summed up as: If there is voltage at the input port, the output of the opto-coupler gives approximately zero volts (TTL logic 0); and in the absence of voltage at the input port, the output of the opto-coupler gives approximately five volts (TTL logic 1). Hence by this interface a wide range of voltages has been narrowed- down to a simple TTL logic. By connecting opto-coupler, it helps us isolate the high/low voltage grounds of the input side from the microcontroller interface- which is working at constant 5V DC. Also each of the ports can be connected to loads operating at different voltages in the range specified above.

The voltage and power values of the components such as resistors and capacitors in the input interface have been designed and simulated on the software Cadence Allegro.

2. MICROCONTROLLER INTERFACE

The outputs (TTL level) from the opto-coupler are given to Ports 2.0, 2.1, 2.2, 2.3 of the microcontroller Atmel 89C51. An indicator LED for every port is taken as output from Ports 0.0, 0.1, 0.2, 0.3 respectively [2]. A crystal of frequency 11.0592 kHz provides clock pulses to the microcontroller. Power-on LED and Reset facility is also provided. Ports 3.1 and 3.2 are transmitter (Tx) and receiver (Rx) pins respectively. These pins are connected to the max232 IC which converts TTL level to UART level. A UART cable is used to connect this circuit to the GSM modem.

The entire microcontroller interface is simulated on the software Proteus (ISIS) and the C code [1] [3] is written on the software Keil.

III. BLOCK DIAGRAM

Fig1. Shows the block diagram of Universal Detector. The block diagram consists of the following major blocks:

A. *Rectifier with filter*: used to accept convert AC voltage to DC voltage. In case DC is applied, it passes through the rectifier unaffected.

B. *Filter*: used to reduce the ripples in the full wave rectified output from the rectifier

C. *Opto-coupler*: It acts as an isolator and isolates the grounds of the ports and the processing circuit. It detects voltages between 3V to 240V. If voltage is present at its input it produces 0 volt output, as soon as the input voltage is reduced to 0 it gives a 5V DC output.

D. *Microcontroller (AT89C51)*: receives the inputs at TTL level from various ports and processes them. It then actuates the respective LED/s and also sends the desired command/s to the GSM modem which in turn sends SMS/s to the user.

E. *MAX232*: converts TTL level signals received from the microcontroller to UART level which is understood by the GSM modem.

Mode 1: Detects “on to off” switching.
 Mode 2: Detects “off to on” switching.

When both the modes are selected both “on to off” and “off to on” switching are detected.

Consider a Miniature Circuit Breaker (MCB) connected across Port A as shown in Fig 2. It is seen that the Universal Detector is simply connected at the output side (load side) of the MCB. Let Port A be configured in Mode 1 operation. Hence the input from Port A is at logic low to the controller (at port 2.0). Now due to some reason (e.g. Overload or Short Circuit) at the load end the MCB trips, the voltage across Port A falls to zero. This will cause logic high to appear at the controller (at port 2.0). This triggers the controller to send AT commands [5] to the GSM modem such that an “A” is transmitted as a text message to the user’s mobile phone. This is then interpreted by the phone application as a pre-saved message as chosen by the user.

IV. WORKING

The overall application can be divided into two modes (selected by the phone application):

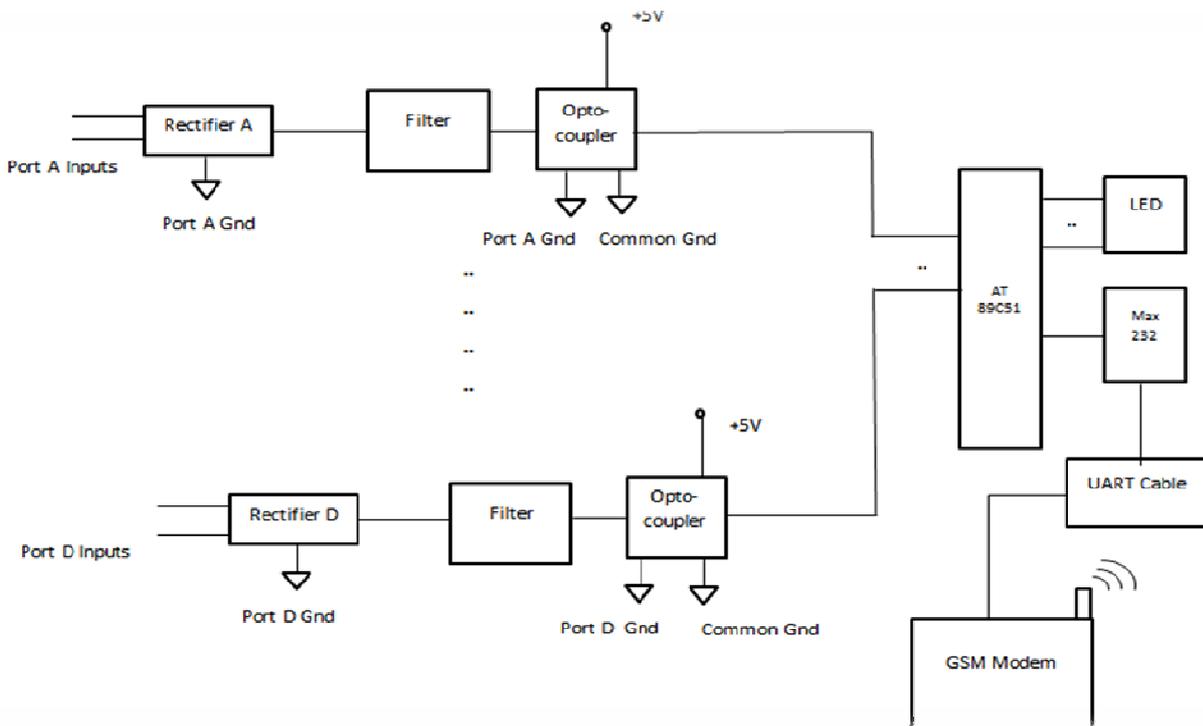


Fig.1Block Diagram

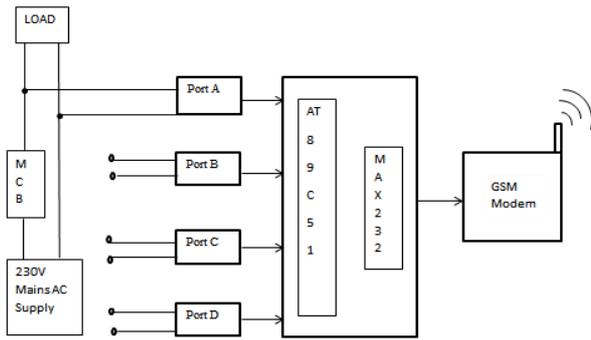


Fig.2 Universal Detector Connected Across Load

V. MOBILE APPLICATION

The application opens with an Authorization window which asks for username and password to ensure only the authorized user is granted access (Fig 3). After authorization, a menu driven window (Admin) opens which giving options of “Add Description” and “Change of Phone number” (Fig 4).

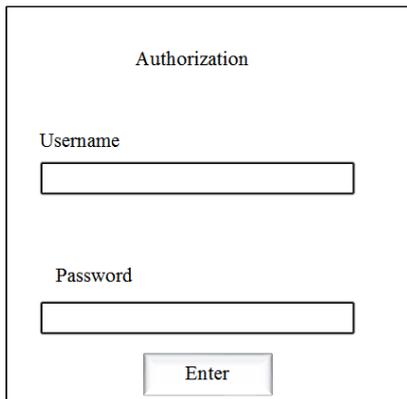


Fig.3 Authorization Window

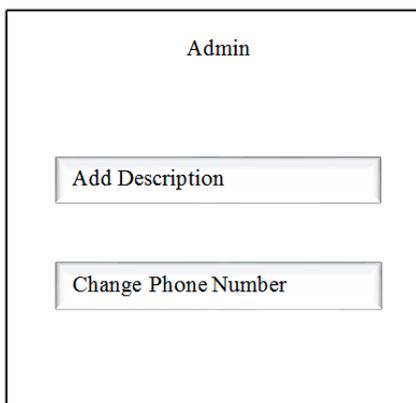


Fig.4 Admin Window

1. Add Description :

When the user selects this option, the window as shown in Fig. 5 appears. This allows the user to name each and every port the way he wants it to appear in the pop-up. This enables the overall concept to be more open and user-friendly.

E.g. Port A is given the name “MCB 1” and its operation in Mode 1 is selected.

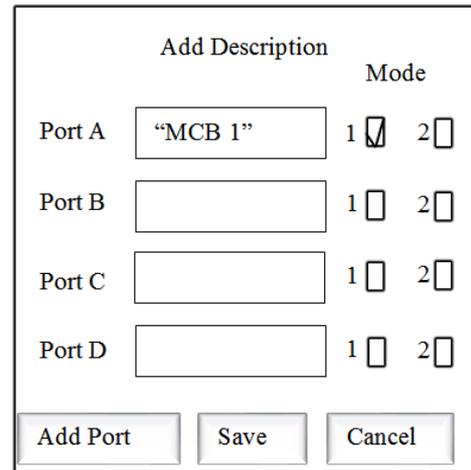


Fig.5 Add Description Window

Four ports (A to D) are provided by default, and by selecting the option “Add Port” the user can add more ports, (provided the hardware supports-maximum limit up to 25 ports). The last option on the same window is “Save” which as the name suggests, saves the above changes.

Now, if a text message of “A” arrives, a pop-up of “MCB 1” is displayed by the application.

2. Change of phone number:

When the user selects this option, the window as shown in Fig 6 appears. This allows the user to change the phone numbers for the preceding messages. The new phone number is entered in the “New Number” box shown and “send” is pressed. This sends the new phone number to the controller which responds by sending a 5-digit confirmation code (on the new number). The user then needs to type this number in the “Confirmation Code” space as shown in the Fig. 6, and then click “send”. This will change the number within the microcontroller memory. Now, all the preceding messages will be sent on the new number.

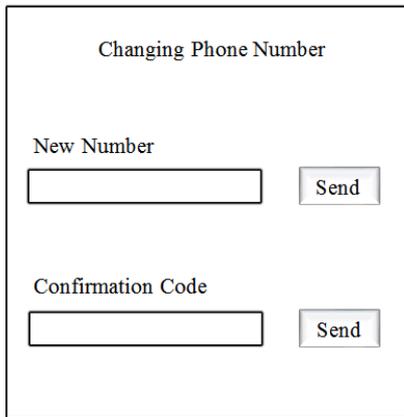


Fig.6 Change Phone Number Window

VI. APPLICATIONS

Universal Detector can be used in a variety of applications such as follows:

- i. Home Automation: Indicates when a MCB trips.
- ii. Medical: Detecting tripping/non-functioning of critical equipments.
- iii. Fire Detection: in conjunction with a fire/smoke. Detector (by simply bypassing its power LED).
- iv. Security Systems in banks.
- v. Detectors in pressure and flow regulations.
- vi. Any other application where presence or absence of voltage needs to be detected.

VII. COST

Universal Detector with four input ports costs approximately Rs 230. Every additional port adds a cost of Rs 35 to the device.

VIII. RECOMMENDATIONS

- i. We can further increase the voltage range from 3V to 415V so that it can be used with 3 phase supply also.
- ii. We can also make it RoHS (Restriction of Hazardous Substances) compliant by using Lead free solder, wires with acceptable grade pigments& hexa-chrome plating on the metallic enclosure.

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Study of the Various Person's Characteristics and Contribution of Particular Plant in Their Life

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Abstract- The Present Paper Deals With A Preliminary Study On 1-31 Different Plant Species Associated With The Astrology. Its Reports The Various Person's Characteristics And Contribution Of Particular Plant In Their Life. Punitvan Is Situated In Sector 18, Gandhinagar. It Was Established In The Year 2004.Thus Punitvan Gives Us Inspiration To Protect The Plants And To Know Its Uses. There Are Various Plants Planted According To Different Themes Like Planets, Constellations, A Sign Of Zodiac, And Panchavati. The Punitvan Inspires To Human Society To Plant The Trees And Care They Including All Matters. Indian Astrology Claims A Definite Correlation Between Plants And Navgrahas - The Eight Planets And The Sun At The Center. These Planets Are Supposed To Influence Different Organs In The Body Resulting In Diseases Due To Evil Effects And Different Plants Have Been Prescribed For Usage To Overcome The Ailments. So, Certain Plant Species Associated With The Planets And Are Believed To Have Medicinal Properties For Treating The Various Diseases. In This Paper We Survey No. Of Various Persons With Personal Meeting And Got And Studied Different Characteristics. We Displayed Local Name, Scientific Name, Family, The Nature Of The Persons Born On 1st To 31st Dates Of Any Month.

I. INTRODUCTION

Methodology:

We Have Collected Information Of Different Important Persons From The Various Magazines, News Papers And Others Valuable Literatures. We Have Taken Photographs And Collected Information With Several Trips. We Contacted The Particular Person And Got Information With Personal Interviews. The Species Were Arranged According To 1st -31st Dates Of The Any Month. All The 31 Plants Were Identified With The Help Of Gujarat Flora And Arranged Scientifically And Taken Photographs.

II. OUR OBSERVATIONS

The Nature Of The Persons Born On 1st To 31st Dates Of Any Month.

Date 1

Local Name: Umar **Scientific Name:** *Ficus glomerata*
Family: Urticaceae

List Of Persons: Great Alexander (Sikandar), Jimmy Kartar,Kiro,Minakumari, Aishwariya Rai, Bismark, S.D. Barman, Ravishankar Raval, Balraj Sahani,Mannade, Hariprashd Choursia, Bipasha Basu,Mahadev Desai, Jecky Shrof, Kakasaheb

Kalelkar, Gramsmith (South Afrika-Caption), Shahid Afridi (Pakistan).

Person's Characteristics: 1. Separate And Attractive Method Of Work. 2. First Rank In His Field (Area) 3. More Patient And Endurance. 4. Capacity To Solve In Adverse Circumstance. 5. Generous By Heart 6. Will Not Do Allurement Fraud. 7. Will Work Hard Than Others. 8. Conflict In Any Circumstances. 9. More Ambition. Much Advantage (Profit) Will Gain Keeping Umra Tree, Moreover Someone Give This Tree As Present On His/Her Birth Date, Auspicious Result Will Meet.

Date 2

Local Name: Kher **Scientific Name:** *Acacia chundra*
Family: Mimosaceae

List Of Persons: Mahatma Ghandhi,Lalbhadr Shastri,Shahrukkhan,Satyjitrai,Ajay Devgan,Veer Narmad,Asha Parekh,Andru Starut,Maichel Clark,Abdul Razak.(Pakistan Cricketer.)

Person's Characteristics: 1. More Endurance & Great Self Confidence. 2. Solve Any Adverse Circumstances. 3. To Mount High Level From Beginning. 4. Sacrifice For His/Her Family. 5. Suitable (Adjust) To Others. 6. Would Torture All If Come In Obstnacy 7. Able To Control Defendent. 8. Tendency To Oppose Evil, Courage To Fight For Truth. 9. Cheerful In Any Circumstance.

Date 3

Local Name: Mahudo **Scientific Name:** *Madhuca indica*
Family: Sapotaceae

List Of Persons: Dr.Rajendraprasad ,Gernal Manekshah,Pruthviraj Kapor,Alexzander Bel,Jaya Parda,Aruna Erani,Vahida Rehman,Sanjay Kahn, Harbhagansinh.

Person's Characteristics: 1. Chase From Last Moment 2. No Sign Of Frighten By Anybody. 3. Fight With Anybody Up To Last Breathe 4 Brilliant In His/Her Works . 5. Devastate To Enemies. 6. By Time Can Become Contrary. 7. Defeat Opponent Opponent Badly. 8. In His /Her Life Decline Would Become Conflict Would Arise Without Reason.

Date 4

Local Name: Dhro **Scientific Name:** *Cyanodon dactylon*
Family: Poaceae

List Of Persons: Beil ,Neel Armangstorn,Shyamji Krushna Verma,Birju Bavare,Tabbu,Kishorkumar,Shrimota,S.B.Balsubramniyam,Karu nanidhi,Jeneliya Desoza,Nina Gupta

Person's Characteristics: 1. Practice (Study) In All Subjects. 2. Economy (Frugality) Nature. 3. Buy After Inspect Perfect Inquiry. 4. Knowledge Of Every Arena 5. Habit To

Invent (Discover) Something. 6. Gain High Position Indesired Field (Arena)

Date 5

**Local Name: Piplo Scientific Name: *Ficus religiosa*
Family: Moraceae**

List Of Persons: Dr.Radhakrishna ,Karl Marks,Wolt Desny,Kapil Dev,Abhishek Bachhan,Dipika Padukon,A.R.Rehaman,Virat Kohli, Shushil Modi

Person's Characteristics: Frank (Straight) And Quite By Nature, Think To Others Necessarily, Sensetive And Simplicity, Let Less Idleness, Devotee To Work, Careful In His/Her Dutu, Perfect In Their Own Subject, Fight With Life And World, Without Perfect Proof, No Comment

Date 6

Local Name: Borssalli, Scientific Name: *Mimusops elengi*, Family: Sapotaceae

List Of Persons: Alexfleming,Sigmand,Fehming,Maichel,Angelo,Khalik Jibrahim,Maxmular,Lradatta,Meghnath Sada,Rakesh Rosahn,J.C.Raider.

Person's Characteristics: Wrong Step May Take By Unthought (Blind), Sensetive And Devout By Nature, His Advice (Consul) Fruit Ful For Others, Much Adventure Nature, To Be Worn Out (To Be Poor) To Others By Waste Own Money, Do Analysis And Criticize For Everthing.

Date 7

**Local Name: Ambli Scientific Name: *Tamarindus indica*
Family: Caesalpiniaceae**

List Of Persons: Ravindranath Tagore ,Maharan Pratap,Medam Quri,Dr.Sv.Raman,Begam Akhtar,Kajol,Jitendra,Kamalhasan,Akta Kapoor,Zahir Khan,Mahendrasingh Dhoni,Tiku Talsania.

Person's Characteristics: Very High Intelligence & Ability Than 1q Level, Planning Nature, Can Economy Very Well, Depth In His/Her Subject, Merciful, Affectionate And Benevolent, Would Not Hear Any One When Angry, Hard Worker.

Date 8

**Local Name: Nagkesar, Scientific Name: *Mesua ferea*
Family: Gutiferae**

List Of Persons: Swami Sivanad,Gealelio,Zakir Hussain,Dharemendra,Dimple Kapdia,Farah Khan,Asha Bhosle,Shahir Ludhiyana,Sharmila Tagor,Silpa Setti,Allaudikhan(Us Tad),Farriyaruba (Us Tad),Bretly,Roth Tailor.

Person's Characteristics: No Care For World If It May Oppose, Hold Way Of Sincerity, Bold (Courageous) Fight For All Type Challenges, Stand Alone Even If Other Leave, Dedicated For Own Works, Cannot Forget Obligations.

Date 9

**Local Name: Ashok Scientific Name: *Saraca indica*
Family: Caesalpiniaceae**

List Of Persons: Sonia Ghandhi,Chalc Dicksine,Hargovind Khurana,Kiran Bedi,Mahomand Azharudin,Akshy Kumar,Pyuri

Gagrine,Diya Mirza,Gurudatt,Jaya Bachhan,Patel Parthive,Satughnsinha.

Person's Characteristics: Alone Brave Man, Much Adventurous (Courageous)/Enthusiasion Man, Many Give Enjoyment, Renunciation, Sacrifice, Encourage To Other For Progress, Think What Want To Associated With, Challage All The Hardship.(Trouble),Desire To Do More.

Date 10

Local Name: Zer Kochlu Scientific Name: *Srychons nuxvomica* Family: Loganiaceae

List Of Persons: Swami Ramdas,Sunil Gavaskar,Rahul Bajaj,R.K.Narayan,Rekha,Arti Agnihotri,Hitik Roshan,Dr. Su Chandrasekhar, Dhasyima(Git),Crompton.

Person's Characteristics: Do His/Her Work By His/Her Own Way, No Endure Others Interference, Work By Much Enthusiam, Feeling For Relative Well, Zealous For Work, Habit To Keep Secret Matter, Do His/Her Work Continuously/No Snoop Others, My Sterious Person. (May Be).

Date 11

**Local Name: Amla Scientific Name: *Emblica officinalis*
Family: Euphorbiaceae**

List Of Persons: Amitabh Bacchhan,Dilip Kumar,Thoumas Alva Addition,Sayajirav Gaykvad,Vinoba Bahve,Rani Lakhsmi Bai,Abdul Kalam Azad,Srimad Rajchandra,Mala Sinha,Jayprakash Narayan,Ronit Roy,Magan Desai.

Person's Characteristics: Do Work For Other.By Heart, Pleased By Spending Money To Others, Bene Volency ,Merciful,Affection By Nature, Will Gain His/Her Own Field To Higher Post, Would Become Great Without Disturbing Others, Endurance Very Well, Build G Fresh Way, Show & New (Fresh) Waiting (Road).

Date 12

**Local Name: Vad Scientific Name: *Ficus benghalensis*
Family: Moraceae**

List Of Persons: Swami Vivekanand,Charls Darvine,Abraham Linkam,Bimal Roy,Vikram Sarbhahi,Rajnikant,Pren,Asho Rajnish,Uvrajsingh,Munaf Patel,Palod (West Indies)

Person's Characteristics: Great Self Confidence, Very Strong Firm, No Disappointment In Any Failure, Do Progress Even Failure, Very Much Concentration Of Mind, Remember World For His, Much Leave For Sentiment's Relation.

Date 13

Local Name: Chandan Scientific Name: *Santalum album* Family: Santalaceae

List Of Persons: Freedal Casto,Sarojini Naydu,Ashok Kumar,Shri Devi,Juhi Chavla ,Vaiganti Mala,Shoeb Akhtar.

Person's Characteristics: Frank Person, Do For Others, Leave Her/His Rejoicing For Others, Perfect In His/Her Arena, Used To In Much Peace Than Friction, High Affective For Their Family, Much Sensitive And Perception, Cannot Endver On Your Self Respect, Believe In Like & Let Other Live.

Date 14

Local Name: Billi **Scientific Name:** *Aegle marmelos*
Family: Rutaceae

List Of Persons: Shir Arvind, Albel Sain Style, Jhwarlal Nehru, Dr. Baba Sahib Ambedkar, Babar Badshah, Madhubala, Stafigraph, Amir Khan, Sushma Swraj, Gutam Gambhir, Prince Chalse, Johni Lever, J.P. Humani, Dilanshn, Umarghul, Shyam Benegal.

Person's Characteristics: Disagreement In Family Life, May In Peace After 37 Years
3. Pungent In Intelligence & Ability, Deep Knowledge In Art, May Fight For Real Affection, Reach To Destination Easily
Aster Guidance, Insistence For Per Fection, Sence Of Dressing Very Well, Like To Live Up To Date.

Date 15

Local Name: Gulmahor **Scientific Name:** *Delonix regia*
Family: Caesalpinaceae

List Of Persons: Lionard -De -Vinchi, Mortine Leurking, Sarad Chandra Chattopadhyay, Gurunanak, Madhuri Dixit, Rakhi, Mandira Bedi, Dr. Dukhmy Swami, Mayavati, Sonu Nigam.

Person's Characteristics: Talent For Intelligence/Ability High, May Not Use Proper Talent, Challenges Fall In Life, Conflict Life In Begining Year, Discovery In Some On Field, Be Disapperintment By Giving More Important To Any Matter.

Date 16

Local Name: Limdo **Scientific Name:** *Azadirachta indica*
Family: Meliaceae

List Of Persons: Charley Chapline, Kaitrina Kaif, Hema Malini, Saif Ali Khan, Manisha Koirala, Simmi Garewala, Devid Dhavan, Lalia Pawar, Subolaxmi, Devidben Gurubin (Priminister Of Izrayel) J.K. Kalsh (South Africa).

Person's Characteristics: Vast Friend Cicle, Do Sincerely For Others, Matching Natyre, Pure (Clear) By Heart, No Depend For Others, Remain His/Her Own Infatuation, With Stand (Last) In His /Her Own Field Long Time.

Date 17

Local Name: Ambo **Scientific Name:** *Mangifera indica*
Family: Anacardiaceae

List Of Persons: Narendra Modi , Vijya Laxmi Pandit, Benzamine Frankline, Bithonav, Amruta Rav, Sachin, Pruthviraj Chavhan, Mishel Obama, Usuf Pathan, Ashwine, A, B, Divilayars, Mutaiya Morlidharan.

Person's Characteristics: To Be Burden Some With Enemies, Perfection In Their Own Field, Be Famous Much In Many Type Fields, Their Work Are Worth Praise , Nobody Can Challenge, Do Work Very Well In, Ability Of Administration Is Very Well, Very Fearless And Frank, To Bring Before Like/Unlike In Frank Words, Can Control Feeling.

Date 18

Local Name: Netar **Scientific Name:** *Calamus rotang*
Family: Poaceae

List Of Persons: Swamiramkrushn Parmhans, V. Shantaram, Bentansel, Yash Chopra, Shbana Azami, Ompuri , Aruna Irani, Gulzar, Priyanka Chopra, K. Sudrashan, Vajjantimala.

Person's Characteristics: Difference Of Openion With Husband, Much Soft Corner (Much Feeling) Towards Children, For fame, Honour, Reputatioin Works More, Abundant Friend Circle, Excite Nature, Indvstrious More Less Tire, Like Much To Move, Give Much Respect To Elders, Can Represent Very Well For Any Thing.

Date 19

Local Name: Asopalav **Scientific Name:** *Polyalthia longifolia* **Family:** Annonaceae

List Of Persons: Indira Ghandhi, Kopernicks, Prof. S. Chandrashekhar, Snni Deol, Riki Pointing.

Person's Characteristics: Very Much Adventures, Can Pass Difficulties, Can Take Immediate Decisions, Do Much Works Hard Work, Deep In Understanding, Very Well Eloquence, Do Manage Somebody Easily, Do Not Care If Opponent

Date 20

Local Name: Jambudo **Scientific Name:** *Syzygium cumini* **Family:** Myrtaceae

List Of Persons: Rajiv ghandhi, Hilleri, Alka Yagnik, Babita, Mahesh Bhatt, Kangna Ranavat, Grigeresingh, Nasruddin Shah, Virendra Sehvag.

Person's Characteristics: Expert (Well Informed) In Their Field, Examine In Detail For Any Fields, Give Openion Having Done Perfect Inquiry, Favour Of Fortune Godess, Famous In One Art, Distinction Personality, Not Forget Obligation, Cheat By Feeling.

Date 21

Local Name: Champo **Scientific Name:** *Plmeria rubra*
Family: Apocynaceae

List Of Persons: Dr. Shanti Swarup Bhattnagar, Bismillakhan, Sie Alsred Nobel, Sammi Kapoor, Karina Kapoor, Sudhachandan, Kisgain, Rang Avdhut, Bhumika Chavla

Person's Characteristics: Much Talkative, Do Much Works For Others, Like Much Gossips, Fond Of Arrange Equipment, Wish To Remain Top Position, Very Well Dressing Sense, Dignified Personality, Dominant Personality (In Ladies)

Date 22

Local Name: Anghedi **Scientific Name:** *Achyranthes aspera* **Family:** Amaranthaceae

List Of Persons: Guru Govind Sigh, Jyarej Washigntan, Swami Sacchidanand, Maichel Ferade, Shirnivasn Ramanujn, Kumar Sanu, Dipti Naval, Raj Sippy, Kumar Sanu.

Person's Characteristics: Independent Thinking, Deep Interest To Research For Different Subjects, Teaching Sound, Perfect In Own Field, Disagreeable To Work Under Others, Fond Of Music, Fond Of To Travel Difference Places.

Date 23

Local Name: Ardusi **Scientific Name:** *Adhatoda vasica*
Family: Acanthaceae

List Of Persons: Satya Sai Baba, Akabar Badshah, Subhash Cahndra Boz, Chandrashekhar Azad, Bal Ganghadahr Tilak, Ram Mohan Lohiya, Bal Thakre, Malika Arora, Tanuja, Prem Chopra.

Person's Characteristics: Knowledge Only One Organ, Top In Field, Work With Dedication Though Pay Anymore Cost.

Disturb With Family Life, Selfishness And Senseless Nature, Financial Waste Become If No Proper Guidance.

Date 24

**Local Name: Garmalo Scientific Name: *Cassia fistula*
Family: Caesalpiniaceae**

List Of Persons: Sachin Tendulkar, Pandit Omkarnath Thakure, Mahomand Raffi, Jyodje Washintone, Navshad, Jaylalita, Mallika Sheravate, Selina Jetli, Manojkumar, Stive Johns (Apple), Arundhati Roy, Subhash Dhai, Piyush Chavla (Cricketer).

Person's Characteristics: Quite, Patient, Deep, Top In Field, Research By Nature, Speak Less, Work More, Presenting Contrast Thinking, Can Preserve Politeness, Do Any Thing Whomever Feeling.

Date 25

**Local Name: Arjun Scientific Name: *Terminalia arjuna*
Family: Combretaceae**

List Of Persons: God Jesus, Sir Iject Nuton, Murari Bapu, Pandit Ravishankar Maharaj, Amerosan, Markoni, Karishma Kapoor, Divya Bharti, Emran Kahn, Rakhi Savant, Kavita Krishnamurti, Denny.

Person's Characteristics: Good In Management, May Be Angry Unless Suppose Work, Ability To Go Head From Bottom To Top, Much Talkative, Troublesome For Digest, Much Active, Trouble Some For Digest, May Not Become Early Under Awe By Another (Dignity), Do Anything Whomever He Feeling

Date 26

**Local Name: Kadam Scientific Name: *Anthocephalous cadamba*
Family: Rubiaceae**

List Of Persons: P.M Dr. Manmohansingh, Mother Teresa, Devanand, Vicketer Hugo, Jyodje Barnod Show, Bankimchandra Chatopadyay, Baba Ampte, Mausami Cherji, Ambubhai Purani, Dada Bhagvan, Iswarchandra Vidhyasagr.

Person's Characteristics: No Control By Anybody, No Spare Anybody, Habit To Research New To Do Difference, Habit To Live In Selfjoy, Much Sensation, Much Dangerous, Very Deep Go A Head To His /Her Subject, Hot Tempered By Nature, Lonely More, Not Forgot Insult, Fully Paid With Interest If Opportunity Arise.

Date 27

**Local Name: Rukhdo Scientific Name: *Adansonia digitata*
Family: Bombacaceae**

List Of Persons: Dr.H.M.Patel, Hari vansh ray Bacchan, Margard (Viole), Khali, Amrosand, Brusli, Boby Deol, Ravindra, Prakash Randh, Suresh Raina (Cricketer), Sangkara (Cricketer), Jayvardhan (Cricketer), Denishsalvatori (Cricketer), Mak Kulam (Cricketer), Kevine Pitson (Cricketer).

Person's Characteristics: Pour By Heart, Only Big Circle, Intelligence Capacity (I-Q) High Level, Speak Openly, Very Deep Understanding, Resist Any Type Of Wound, Keep Secrate, Do Anything For Family.

Date 28

**Local Name: Moto Akado Scientific Name: *Calotropis gigantea*
Family: Asclepiadaceae**

List Of Persons: Swami Sahajanand, Bill Gates, Dhirubhai Ambani, Ratan Tata, Lata Mangeshkar, Lala Lagpatrai, Ashokbhatt, Munan Sen, Bhagina Navodita, Pandit Jasraj, Nakol Sarafesi (Pm Of France), Malinga, Misbowl Dak.

Person's Characteristics: Top In Field, Personality , Virtue Of Leadership, Conquer People Heart By Personality In Open, Become Great Name In His /Her Own Field, By Time Obstinate , Do His /Her Presumed Work By Obstinate, Do His Presumed Work By Trick, Know All Formerly How Many Want Whom Ever.

Date 29

**Local Name: Khakro Scientific Name: *Butea monosperma*
Family: Fabaceae**

List Of Persons: J.R.G.Tata, Rajesh Khanna, Roma Rola, Tensingh, Morarji Desai, Lanachandaverkar, Ashish Nehra, Yunishkhan.

Person's Characteristics: Straight Forward Man, Generated New Way (Path), Steep Challenge For Circumstances, Can Endure Improper, Frank Persons, Respect To Parents, Anything Do For Reputation In His /Her Society.

Date 30

**Local Name: Fanas Scientific Name: *Artocarpus integrifolius*
Family: Urticaceae**

List Of Persons: Charchil, Henry Ford, Homibhabha, Jagdishchandra Boz, Frakline Ruzwelt, Dada Phalke.

Person's Characteristics: Do Anything For Someone, Straight Simple , Frank, Only Circle Vast, Do Presumed, Do Great Enterprise, Remain To Work By Concentration Without Considering Time, Their Thought Become Worth Praise After Some Time, Take Leadership Of Multitude, Do Useful Works For Society.

Date 31

**Local Name: Vans Scientific Name: *Dendrocalamus strictus*
Family: Poaceae**

List Of Persons: Munsu Premchand, Mumtaj, Sardarvallabhai Patel, Priti Zinta, Amruta Arora, Dashim Amla (South Africa)

Person's Characteristics: Clean By Heart, Hi-Fi Life Style, Joy Mischief In Life- First Affection To Song And Music, Trouble Remain About Health, Perfect In His /Her Field, Very Much Active, No Tire (Tireless) , No Sense Of Excessive Labour.

III. RESULT AND DISCUSSION

Total 31 Plant Species Were Recorded. Photo Plate (1 to 3) Shows Enumeration Provides The different plant species. The List Of Plant Species, Scientific And Vernacular Names, Family. Also given in the text. Now A Day This Type Of Species Diversity Is Difficult To Find Amongst The Big City Like Ahmedabad. Therefore, We Suggest Taking Special Measures To Protect Valuable Species. Above Displayed Data Will Very Useful To The Society And Botany Research Students As Well

As Which People Are Interested In This Field And Thus Certain
31 Important Plant Species Protect.

ACKNOWLEDGEMENTS

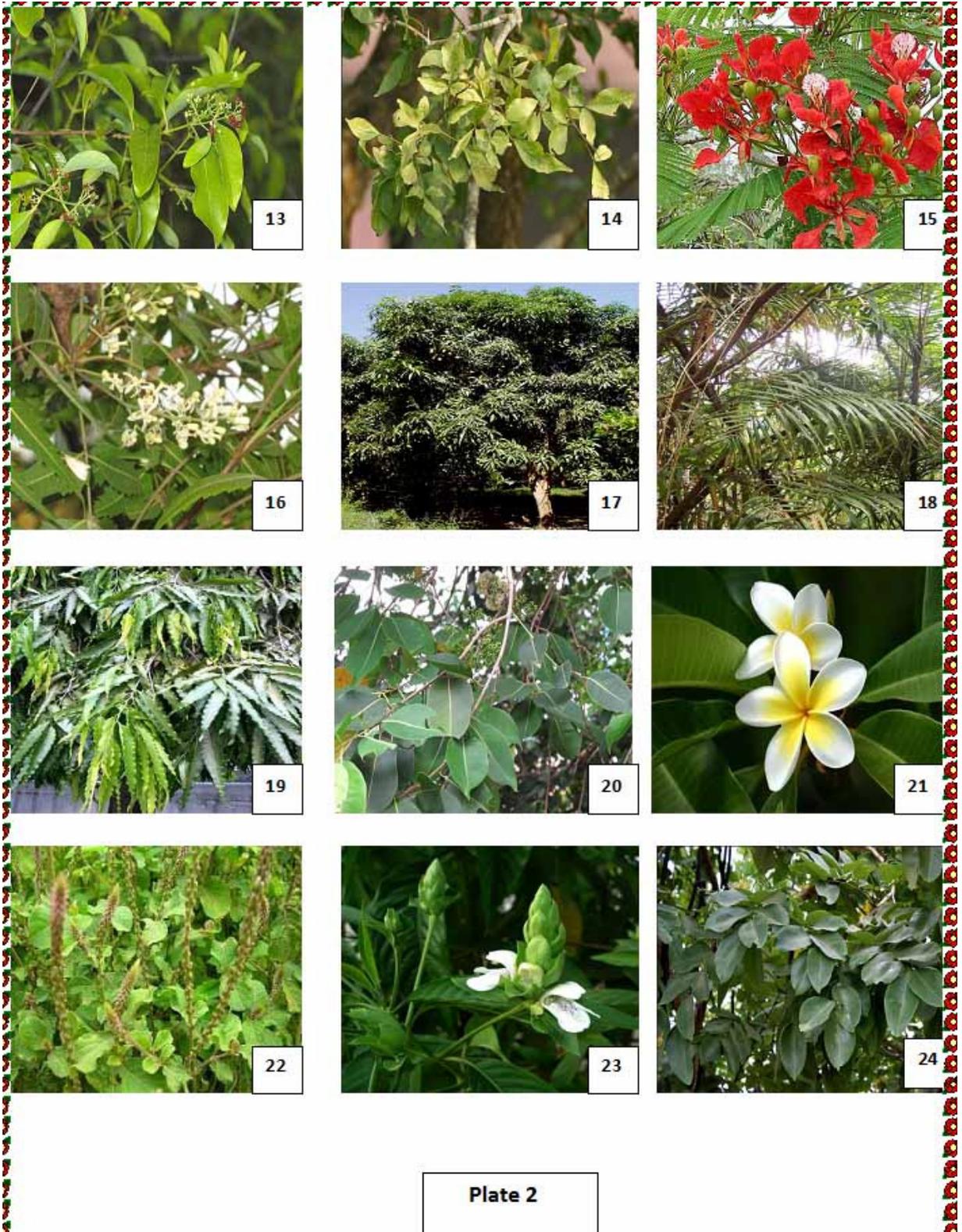
Authors Are Very Thankful To The Authorities Of The
Punitvan To Give Permission For This Work. The Work Has
Been Inspired And Encouraged By Various Contacted People
With Personal Interviews.

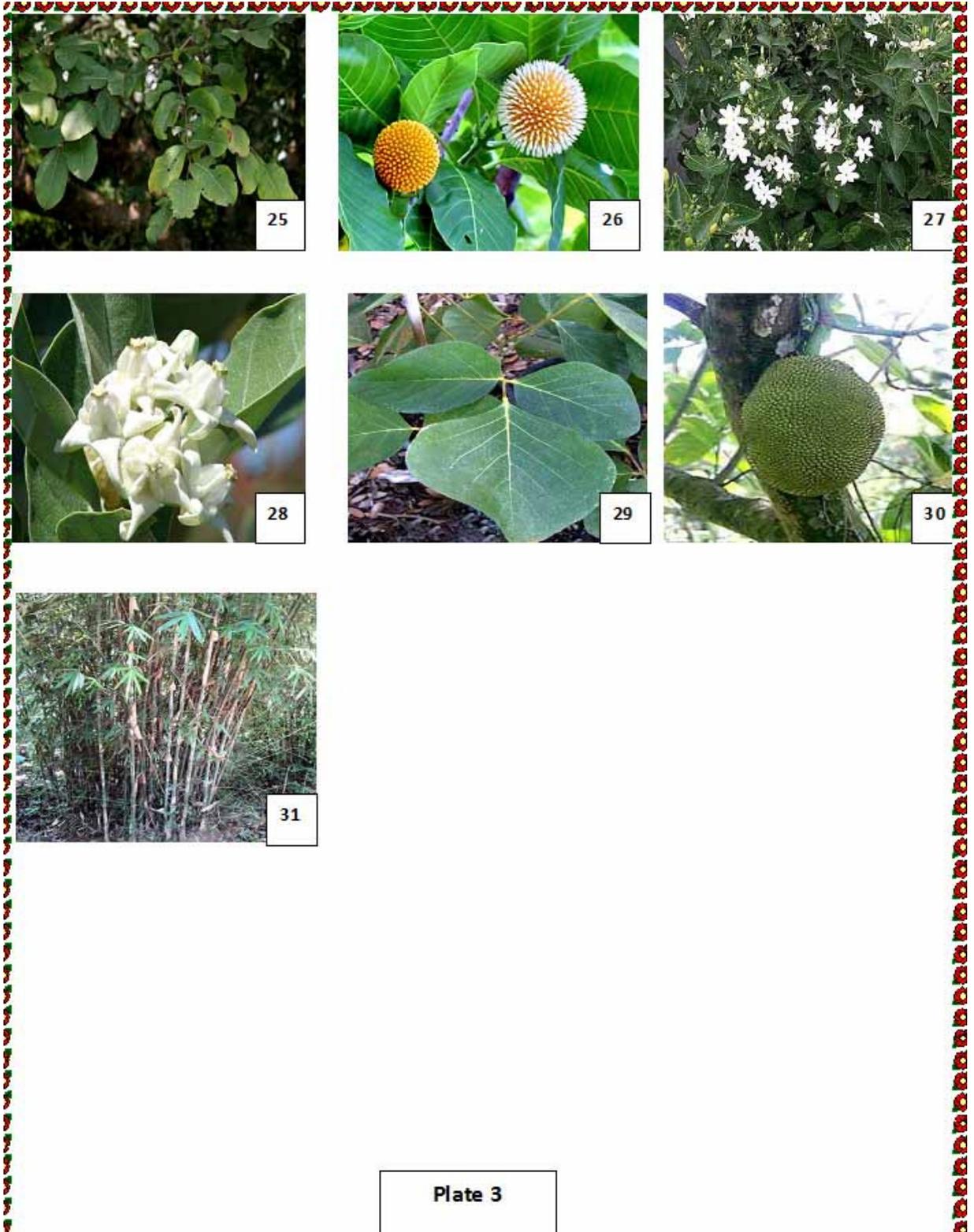
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Plate 1





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Anthropometric Predictors for Sexual Dimorphism of Skulls of South Indian Origin

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Abstract- Identification of an individual is important in any medicolegal investigation. The primary factors that helpful in the identification include age, sex and stature. 1 Skull is important in this regard as it resists adverse environmental conditions over time. 2 The present study aims to determine sexual dimorphism in 80 skulls of south Indian origin. Parameters used are maximum cranial length, maximum cranial breadth, facial height, bizygomatic diameter, nasal height and nasal width. Cranial, upper facial and nasal indices were calculated.

Craniometrical measurements were expressed in descriptive statistics i.e. mean and SD are calculated. The p value of nasal height, nasal width and mastoid process length of both sides showed significant difference.

Index Terms- Sexual dimorphism, Skulls, Anthropometry

I. INTRODUCTION

In the field of forensic medicine, normally the available materials after sufficiently long period of death will be utilized to determine various body characteristics such as age, sex, etc for identification of individual. Gender has long been determined from skull, pelvis and the long bones with epiphysis and metaphysis in unknown skeletons. Anthropometry is an important part of physical\ biological anthropology. Forensic anthropometry is a scientific specialization emerged from the discipline of anthropology dealing with identification of human remains with the help of metric techniques.³

The use of anthropometry may arise under several sets of circumstances i.e. natural, intentional and accidental (air crash, train accidents, flood, fire etc) of the dead body.⁴ Sex of an individual can be identified accurately in 80% of cases using skull alone and 98% cases using pelvis and skull together.⁵

The aim of this study to determine sexual dimorphism of skull by multivariate analysis of anthropometric data which will be helpful in anthropometric and medicolegal studies.

II. MATERIALS AND METHOD

The present study was undertaken in the Department of Anatomy, JSS Medical college, Mysore. Ethical clearance was taken from the institutional ethical review committee before the initiation of the study. The dry macerated skulls of age group 50-

60yrs of known sex 41 Males and 39 female skulls were studied. The measurements were taken after placing the skull in Frankfurt's horizontal plane. Instruments used are vernier sliding caliper and spreading caliper.



Fig 1: Max cranial length- glabella to occipital point



Fig 2: maximum bizygomatic diameter



Fig 3: mastoid process length – upper border of external acoustic meatus to tip of mastoid process

Anthropometric parameters used for the study are :

1. Max cranial length
2. Max cranial breadth
3. Cranial index $\frac{\text{breadth} \times 100}{\text{length}}$
4. Facial height
5. Bizygomatic diameter
6. Upper facial index $\frac{\text{bizygomatic diameter} \times 100}{\text{facial height}}$
7. Nasal height
8. Nasal width
9. Nasal index $\frac{\text{width} \times 100}{\text{height}}$
10. Mastoid process length- right and left side

III. STATISTICAL ANALYSIS

The data entry and analyses were done using SPSS version 17. Craniometrical measurements were expressed in descriptive statistics i.e. mean and SD are calculated. The differences in mean and SD of males and females are analysed using unpaired t test. Variables which were found statistically significant in the univariate analyses were subjected to conditional forward stepwise multiple logistic regression, independent predictors of sex determination were assessed. P value of ≤ 0.05 was considered statistically significant.

IV. RESULTS

Table 1 clearly depicts the measured anthropometric variants in the study as a predictor of sexual dimorphism in the skulls. Mean and standard deviations of all anthropometric measurements and indices were tabulated. Among those, nasal height, nasal width and right mastoid process length were found to be statistically significant predictors of sex determination of skulls. Mean and SD of nasal height among males and females were 4.79 ± 0.57 and 4.54 ± 0.35 respectively and the differences in the mean among males and females with respect to nasal height was found to be statistically significant ($p=0.004$). Similarly, Mean and SD of nasal width among males and females were

2.36 ± 0.26 and 2.23 ± 0.24 respectively and the differences in the mean among males and females with respect to nasal width was found to be statistically significant ($p=0.026$). Mean and SD of right Mastoid process length among males and females were 3.53 ± 0.42 and 3.42 ± 0.30 respectively and the differences in the mean among males and females with respect to right Mastoid process length was found to be statistically significant ($p=0.041$).

Table 1: Comparison of males and female skulls using anthropometric measurements and indices:

	Parameters	Male		Female		P Value
		Mean	SD	Mean	SD	
1	Cranial breadth	13.29	1.93	13.28	1.45	0.990
2	Antero – posterior length	16.81	1.61	16.77	1.73	0.904
3	Cranial index	78.40	7.13	79.13	5.87	0.622
4	Facial height	6.09	0.47	6.02	0.40	0.516
5	Bizygomatic breadth	12.73	1.56	12.61	1.45	0.732
6	Upper facial index	48.13	7.08	47.85	6.06	0.850
7	Nasal height	4.79	0.57	4.54	0.35	0.004
8	Nasal width	2.36	0.26	2.23	0.24	0.026
9	Nasal index	49.38	7.50	49.24	6.37	0.930
10	Mastoid process length- right	3.53	0.42	3.42	0.30	0.041
11	Mastoid process length- left	3.54	0.42	3.36	0.34	0.041

Table 2 depicts the results of multivariate analysis to find out the independent predictors of sexual dimorphism. On stepwise conditional forward multiple logistic regression, nasal height ($p=0.044$) and mastoid process length left ($p=0.006$) were found to be independent predictors of sex determination among

skulls of south Indian origin with b co-efficients of -1.053 and -2.202 respectively.

breadth. And obtained the accuracy level of 82--89% and 79.4% by applying discriminant functional analysis.¹⁰

Table 2: Multivariate analysis of predictors of sex determination of skulls

	β co-efficient	SE	Wald	OR	P value
Nasal height	-1.053	0.601	3.071	0.349	0.044
Nasal width	-1.944	1.039	3.499	0.143	0.061
Mastoid process length-right	1.819	1.397	1.696	6.166	0.193
Mastoid process length-left	-2.202	1.256	3.075	0.111	0.032
Constant	10.616	3.855	7.583	40779.549	0.006

V. DISCUSSION

In the present study p value of nasal height, nasal width and mastoid process length of both the sides showed difference compared to other parameters. Harihara studied Japanese skulls by discriminant analysis using measurements like max.length of skull, max breadth of skull, height of skull with 89.7% accuracy.⁶

Deshmukh and deveshi studied parameters like maximum cranial length, maximum cranial breadth, cranial height, maximum cranial circumference, maximum bizygomatic diameter, basion- nasion length, biasterionic breadth, bregma lambda length, mastoid length, palatal breadth. They were found to be significant with p value < 0.05 and also revealed 90% accuracy of male crania and 85.29% accuracy of female crania.⁷

Sanjai sangvichien et al studied 30 measurements on 101 skulls and showed 26 of 30 measurements and 5 of 14 indices showed a statistically significant difference between males and females. Multiple logistic regression analysis to predict gender on 4 skull measurements ie nasion – basion length, maximum breadth of cranium, facial length and bizygomatic breadth of face.⁸

In another study by Sudke Geetanjali B and Diwan Chhaya V studied 73 skulls using parameters like maximum cranial length, maximum cranial breadth, orbital height, orbital breadth, nasal height, nasal breadth, bizygomatic diameter, nasion-prosthion length. It showed percentage of skulls identified was 95.5% for males and 86.2% for females..⁹

Giles et al and kajanoja had done the statistical analysis using the anthropometric parameters as glabella – occipital length, max width, basion bregma height, max bizygomatic diameter, prosthion nasion height, basion prosthion, nasal

VI. CONCLUSION

Sex could be determined very well from the cranium using Anthropometry. The parameters like nasal height, nasal width and mastoid process length can be used as predictors to determine gender. The gender differences in cranial morphology emphasize the significance of applying data to an individual subject in a given population. Such knowledge is not only applicable to forensic scientists but also in plastic surgery and oral surgery with craniofacial deformity.

ACKNOWLEDGEMENT

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Multi-Level SLAs with Dynamic Negotiations for Remote Sensing Data as a Service

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Abstract- Cloud computing is another form of internet. In cloud computing the online services are conducted to be pay-as-you-use. The Service Level Agreements (SLA) are agreements signed between user and service provider. In this paper, we mainly focus on Multi-level SLAs and Dynamic Negotiations. In the Multi-level SLAs each user is specified with an SLA by service provider and the Dynamic Negotiation is occurred when we need to specify the exact constraint for the user's service request. Also, in this paper we designed a model for Data as a service for remote sensing data from that model. We used weighted sum model (WSM) to decide which provider finally provides best requirement made by the user.

Index Terms- Cloud computing, Multi-level SLA, Negotiations, MCDM method, WSM, QoS, EContract

I. INTRODUCTION

In cloud computing the online services are conducted on a pay-as-you-use basis. Cloud computing that provides cheap and pay-as-you-go computing resource is rapidly gaining momentum as an alternative to traditional IT infrastructure. Due to the dynamic nature of the cloud, continuous monitoring on Quality of Service (QoS)[10] attributes is necessary to enforce SLAs [1][2]. An important element that provides some degree of assurance to both users and service providers is the Service Level Agreements. The service level agreement is an agreement that is established between a user who has Quality of Service (QoS)[10] metrics like data, service, budget and deadline. Who put a request for the service also data and to execute his service needs some infrastructure. Here each provider provides service to the user Quality of Service (QoS); also each provider has its own SLA [1]. The SLAs varies depends upon the type of the user, requesting for the service. In this paper, mainly we study about Multi-level SLAs and to negotiate constraint of user dynamically by using some MCDM (multi-criteria decision making) methods. Mainly in this research work, if there are multiple users (e.g., student, researcher, employee etc) each of them has own QoS and put a request. Then we are designing one model in which we see QoS parameters or metrics of the user and remote sense data from Data Provider (e.g., NRSC) as we designed one algorithmic model for that, by accepting SLAs [1] that are established by Data provider. Then service provider provides service to execute that data in the requested infrastructure by the user. Here our main intension is to reduce the budget for every user who are requesting for a service by providing best cost after evaluating in a process. Here we mainly discussing about the users that are

requesting for service to the service providers. Our main intension is like we act as a broker like if user request for an data and service that are defined in QoS parameters then we who acts as a broker we get data by remote sensing from the data provider and getting service to execute the service of user also an infrastructure to run the service. Finally by gathering the total cost of service from the providers we give the best least cost for the user to execute service in the cloud. In this paper, further we can see how the data has been remote sensed; also we give best least cost for the user requested service.

The cloud architecture has three layers IaaS (Infrastructure as a service), SaaS (software as a service), PaaS (platform as a service). IaaS [6] is determined as utility computing model and it is a cloud computing service model in which hardware is virtualized in the cloud and the service vendor owns the equipment like servers, storage, and network infrastructure. The virtualized resources are mapped to real system, when the client interact with an IaaS[6] service and requests resources from the virtual systems, those requests are redirected to the real servers that do the work, the IaaS has public clouds which are Amazon(EC2, S3, SQS, cloud front), proof point, right scale.

PaaS[6] provides the development tools for application/service design on time without installation the development can be carried out. For e.g.: provide .Net, SQL as online tools no need of installation.

In SaaS [6]consumer uses an application, but does not control the hardware, operating system or network infrastructure on which it is running. A SaaS deployment does not require any hardware and can run over the existing internet access infrastructure. The PaaS providers are Microsoft Windows Azure, Google, Sales force.com, and SaaS providers are Google and workday.

II. RESEARCH WORK

Recently, in cloud computing SLAs have become interesting topic. It is been used in various fields like organization, institutes etc, to get any service from the provider or to publish his service in the cloud then the SLAs plays an vital role in Cloud computing[4]. There are already defined SLAs metrics [2] that are frequently used by the services (such as IaaS, PaaS, and SaaS).

In our research work we came to know that the multi-level SLAs and Dynamic Negotiations [7] combined not done in research works. As to know the main metrics for agreement formation of SLAs [1]and multi-level SLAs [2] in between the user and provider. For each type of cloud service there is some

SLA parameters include: availability, scalability, a clear method for cost calculation, the configuration of service, and security and privacy. A basic architecture for developing the service level agreement contract between service consumers and other parties such as service providers and external agents. The effective service level agreement is the key to ensure that a service provider delivers the agreed terms of services to the cloud consumer. In cloud computing, cloud consumers with clear definition of SLA parameters and flexible negotiation methods can increase the reliability and trust level of Cloud provider-cloud consumer relationship. After the SLA metrics for service provider has been defined then we need to construct one model for remote sensing data from that model. So we used NRSC data price model to get the data in one place. It is private one so NRSC has its own SLA metrics and SLAs for all users. There may be number of data providers from all that providers we choose NRSC [11] data price model which provides data to remote sense data from that. Again we need to get provider for service to execute the data in particular infrastructure. So, here mainly we act as a broker in between the various users and service providers, our main aim is to get the best least cost for the user request for service from service providers. We discovered on model that is mainly used to get best provider for user request i.e., the MCDM (Multi-criteria Decision making) methods [8] which comes under the direct negotiation under negotiation strategies. Our model consists of multi-level SLAs for multiple users and dynamic negotiation is used for reducing cost of service to user service. We need to develop table for each provider (data, service, and infrastructure) to confirm which provider is best for user service request. The service provider and infrastructure provider are linked up internally but in between each has its own SLAs, like if service provider wants to run its service in the infrastructure(like to compute, to storage etc) infrastructure provider has its own SLAs , if the service provider accepts that SLAs then it has to pay some amount for executing its service. Now in our model we who act as an broker in between users and the service providers we get costs from all providers for the user requested service after that we compare costs of all providers to choose the least best cost to reach/ to satisfy the user request by using WSM (weighted sum model) which is used to define the particular provider who can reach the QoS parameters [10] (like data, service, budget and deadline) of the user. The data provider(NRSC) has its own SLAs and it can make its own SLA metrics[3] in matrix , but in the case of the service providers and the infrastructure provider it has to use the SLA metrics that are proposed like which are frequently used metrics. Finally after the negotiation is done dynamically by the broker (we) in between all providers we can give the best least cost for the user who request service by giving some QoS parameters to the broker (we). Finally an EContract [3] is signed between the user and the providers by agreeing to some SLAs

III. RELATED WORK

Recently, much of growing interest has been pursued in the context of Multi-level SLAs [1]-[2] and Dynamic Negotiations [3]-[4]-[7]-[8]

While researching about SLAs role in cloud computing, we came to know that there are several types of SLAs present in

cloud computing for providing agreement between users and service providers. In Multi-Level SLAs [2], the SLA is split into the different levels, each addressing different set of customers for the same services in the same SLA. We focused on Multi-level SLA as it is new one and comes near to our work. For the providers in cloud there are some metrics which are defined and are used frequently in work The SLA metrics[3] for IaaS: cpu capacity, memory size, boot time, storage, scale up, scale down, scale up time, scale down time, auto scaling, max number can be configured on physical server, availability and response time. SLA metrics[3] for PaaS: integration, scalability, pay as you go billing, environments of deployment, servers, browsers, number of developers The SLA metrics[3] for SaaS: reliability, usability, scalability, availability and customizability. When we come to the negotiation strategies, there are some possible negotiations strategies like the direct negotiation in which the user directly request for service to the provider without any mediators and in this the Multi-Criteria Decision Making methods from that we use one model like Weighted Sum Model to get the particular provider for user request. Finally an EContract [4] is established between the user and the provider.

IV. PROBLEM STATEMENT AND GOAL

Our main work is to get a model which will dynamically provide the minimum cost for the user who requested service by providing some QoS parameters [10] (like data, application, budget and deadline). For this we have no model yet to decide which provider give best requirement for the user QoS. Also both Multi-Level SLAs[3] and negotiations [8] are not dynamically constructed because some providers like AMAZON WEB SERVICES have their own SLAs it is not possible to get minimum cost for the budget of user. So, we designed one model. Here we have two types of giving minimum cost and time to the user like:

- By requesting providers to provide their SLAs and cost for the service. Finally we receive many ways to select which one is best for the user request
- Another way is like we request for service for providers, as we use dynamic model we get required provider cost and total cost within deadline for the user request

Now we developed model for NRSC [11] data price model for remote sensing data like data provider which has its own SLAs and algorithmic design for that model. Still we need to construct algorithm for each provider by using WSM [8] (weighted Sum Model) method. We are just using method for getting required budget and deadline requested by user in QoS parameters. So, we need to design dynamic model in between multiple users and multiple providers for getting MSLAs [2] with dynamic negotiations for the user request.

V. SYSTEM DESIGN

There are many data providers in cloud computing, from that we designed model for one of the data provider i.e. NRSC

[11] provider by taking its data price list as base to get data to execute in one of service provider which internally request for infrastructure to run the service

reference mono, stereo ortho kit, ortho corrected, standard, precession geo coded, standard full scene, precision geo coded, standard full scene, standard quadrant, full scene, 18 degree latitude }

Scale, Sc={ 25,000 , 50,000 , 25,000 , 50,000 , 25,000 , 2,50,000 }
Price, C= {6,500, 8,000, 12,000, 6,000, 7,000, 6,000, 7,000}

Finally,

$$D = (\{s_i, t_j, r_k, tp_l\}, Sc, C)$$

Service provider:

Service provider, Sp= (s_n)

s_n = nth service name

$$s_n \in TP_s$$

TP_s= {system corrected geo reference mono (9.6kmx9.6km).....}

$$TP_s = \{(s_n, Sp_i, C_{s_j}, \{IP\}) \dots\}$$

C_s= cost for service provided by service provider

IP= infrastructure provider

Infrastructure provider:

Infrastructure provider, Ip= (O, R, P, A)

Cost, C= (o_i, r_j, p_n, a_m)

Where,

O= operating system

o_i= ith operating system

$$o_i \in O$$

O= {windows XP, windows7, windows vista, LINUX...}

R= RAM

r_j= jth RAM

$$r_j \in R$$

R= {512Mb, 500Mb, 1 GB, 2 GB ...}

P= processors

p_n= nth processor

$$p_n \in P$$

P= {2, 4, 6, 9...}

A=architecture

a_m= mth architecture

$$a_m \in A$$

A= {INTEL , AMD....}

E-contract:

e-contract_{IDIN}= (tu_i, {s}, {D_d,S_j,I_n}, SLA_{idjn})

Where,

tu_i= type of user (like i=1 is public user, i=2 is private user...)

s= service requested by user 'i'

D_d= dth data provider, where D_d ∈ D

S_j= jth service provider, where S_j ∈ Sp

I_n= nth infrastructure provider, where I_n ∈ Ip

SATELLITE DATA PRODUCTS PRICE LIST
(w.e.f November 24, 2008) (Figures in Rupees)

High Resolution			Medium Resolution		
Product Type	Scale # (Accuracy)	Price per scene (per sq km)	Product Type	Scale# (Accuracy)	Price
PAN (1m)* (Cartosat-2)			LISS-III (24m)* (IRS1C/1D/P6)		
System Corrected Geo-referenced Mono (9.6 km x 9.6 km) (Min area 1 scene)	100 m	6,500 (70-)	Standard Full Scene 141 km X 141 km	250,000 (500 m)	7,000
#Ortho-kit with RPC AOI	100 m	6,500 (70-)	Precision Geo coded 15x15	50,000 (100 m)	8,000
PAN-A/F (2.5 m)* (Cartosat-1)			AWIFS (58m)* (IRS-P6)		
Geo Reference Mono 27.5 km X 27.5 km	— (250m)	8,000 (13-)	Standard Full Scene 740 km X 740 km	— (500 m)	15,000
#Stereo Ortho kit 27.5 km X 27.5 km	— (250 m)	12,000 (20-)	Standard Quadrant 370 km X 370 km	500,000 (500 m)	8,000
Ortho Corrected 7.5 X 7.5	25,000 (25 m)	8,000	Low Resolution		
LISS-4 MX (5m)* (IRS-P6)			OCM (380 m)* (Oceansat-1)		
Standard 23.5 km x 23.5 km	50,000 (500 m)	6,000 (14-)	Full Scene 1420 km X 1420 km	— (1.5 km)	2,000
Precision Geo coded 7.5 X 7.5	25,000 (100 m)	10,000	AVHRR (1 km)* (NOAA)		
PAN (5m)* (IRS-1C/1D)			18 Degree Latitude (1900 km x 2300 km)		
Standard Full Scene 70 km X 70 km	— (1.5 km)	7,000	NOTE		
Precision Geo coded 7.5 X 7.5	25,000 (100 m)	7,000	① scale is applicable for Photo Products		
			② accuracy for IRS1C/1D LISS-III products is 1.5 km		
			③ Output resolution		
			④ Certificate required Academic , Private & Foreign Users		

Fig.1 NRSC Data Price List

A. Algorithmic Design

Data provider:

Resolution types, P= (H, M, L)

H= high resolution

M= medium resolution

L= low resolution

Data provider, D= (p_i, Sc, C)

p_i= ith product type (i=1, it is high resolution),

Sc= scale at accuracy

C= price per scene

$$p_i = \{s_i, t_j, r_k, tp_l\}$$

S= set of satellite-ids

s_i= ith satellite type

$$s_i \in S$$

S= {cartosat-2, cartosat-1, IRS-P6, IRS-1C/1D, IRS-P6, oceansat-1, N OAA}

T= set of sensors

t_j= jth sensor type

$$t_j \in T$$

T= {PAN, PAN-A/F, LISS-4, PAN, LISS-III, AWIFS, OCM, AVHRR}

R= set of resolutions

r_k= kth resolution type

$$r_k \in R$$

R={ 1m, 2.5m, 5x, 5m, 24m, 56m, 360m, 1km}

TP= set of type of service

tp_l= lth type of service

$$tp_l \in T$$

TP={ system corrected geo-referenced mono, ortho-kit with RPC AOI, geo

$SLA_{idjn} = SLA$ is established between i th user and d th data provider, j th service provider, n th infrastructure provider.

In the above algorithm we can see various users such as academic, private and public users. We designed algorithmic design for data provider based on NRSC[11] data price list and also we assumed some parameters and designed algorithm for service provider and infrastructure provider

B. Dynamic Model

In this we need to implement a dynamic model in which we get minimum cost in requested deadline of user for the service. Here each user is assigned with some particular SLAs this is called the Multi-Level SLA, also after the budget had been set and dynamic negotiations come to the picture like to provide the total cost which can reach the user budget by getting from providers. This can be done by using the MCDM[8] method which is one of the approaches of negotiation strategies also we use one of the methods of MCDM i.e. the Weighted Sum Method (WSM)[8], we construct a table with matrix format for every provider, we take SLAs metrics that are commonly used by service providers (application provider and infrastructure provider). But these SLA metrics are only used by application and infrastructure provider not by data provider because it has its own private SLA metrics which only gives to us, but never published publicly to all others. Then based on the algorithmic model we came to know that if the user requests for a service by providing its QoS to us (we act as a broker), then we see who is the best provider that can reach all QoS parameters of user. As we studied that present WSM[8] is not completely implemented in our model only we take some portions for an idea how to assume a dynamic model for the MSLAs and negotiations in between the users and the providers. The main intention of using the MSLAs in our dynamic model is that, each provider is assigned with some SLAs to access the service from the provider, also each user has own QoS parameters[10] to request a service to provider. Mainly SLA only provides agreement between

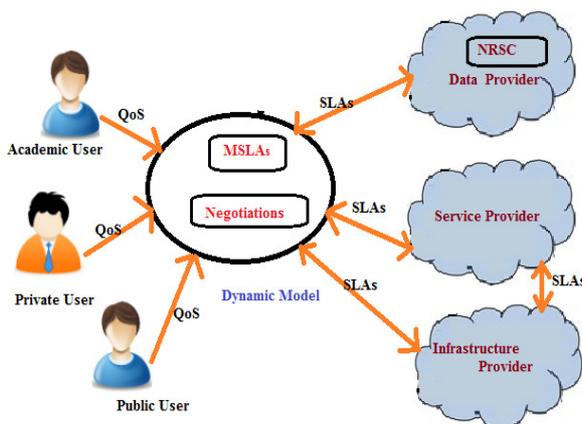


Fig. 2 Dynamic Model for MSLAs and Negotiations

A user and the provider but the MSLA is different from the SLA i.e. the SLAs are split in different types for the different users, each user is proposed with some SLA on the provider side

by assuming them as SLA metrics. Where in the case of Dynamic Negotiations [6], if we get budget in some kind of list like user must select from the proposed list, so we go with dynamic way like we give exact cost in particular deadline for the user who requested for service. These are the two ways so we go with the second way like we provide exact cost in particular deadline by using WSM[8] method.

VI. CONCLUSION

As we conclude that it is possible to give service for user by using dynamic model of Multi-level SLA [3] and negotiations [4]. We can get minimum cost to reach the user requested budget in QoS parameters [10]. In future work we need to build a dynamic model in the form of matrix form by giving all SLA metrics on one side and providers for that metrics. So that it is easy to pick best provider for the user request that are stated in QoS parameters [10].

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Application of DNA Fingerprinting Technology in Forensic Investigation

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Abstract- Every individual in the world can be, identified at the molecular level on the basis of an extremely high level of polymorphism in the sequence of his or her DNA, which he or she inherits from his or her biological parents and is identical in every cell of the body. DNA fingerprinting, as this technique of identification is called, can confirm with certainty the parentage of an individual. The application of DNA profiling in the criminal justice system is an important issue in criminal investigators today. The technology is changing rapidly and several new techniques are becoming available. DNA profiling has been described as a powerful breakthrough in forensic science. The Forensic Use of DNA Profiling is a major contribution to a technology which can help not only in including the culprit but also to exclude the innocent. In this article an attempt is made to elaborate the changing scenario of the technology in the recent years as well as to present some real cases where different variants of the DNA fingerprinting technology were successfully applied in solving the criminal cases in our laboratory.

Index Terms- DNA, Genotyping, STR's, Y DNA, mt DNA

I. INTRODUCTION

The human genome with 3 billion base pairs in size harbors genetically relevant information, which is essential for each individual but appears to represent only 10 % of the human genome. This minor part of the gene-coding DNA has been subjected to evolutionary pressures and selection mechanisms ensuring the development of higher organized organisms. The engine driving the process is the non-directed mutations, which are maintained when the generation of a neutral or improved ability is successful while negative mutations normally get lost. The so-called non-coding regions of the human genome are not regulated by these rules of selection and maintenance as long as these are not affecting the survival capacities of the individual. This is the reason for the accumulation of mutations leading to the generation of a genetic diversity within non-coding genomic DNA. The notable exceptions are polymorphisms in gene-coding regions, which reveal a high genetic stability combined with a very low mutation frequency.

A special part of non-coding DNA is comprised of repetitive sequences. Highly polymorphic spots in these non-coding regions are mini- or micro- satellites characterized by repeating DNA blocks, each of which contains up to several hundreds of base pairs in size (1). The single-locus satellites are localized at a specific site of a given human chromosome, while multi-locus satellite elements of short tandem repeats (STRs) are

spread throughout the entire genome. The widespread use of Short Tandem Repeat (STR) technology in forensic caseworks has resulted in the successful DNA typing of a wide range of forensic samples (2-6). This success is partly due to the availability of polymorphic STR loci in the human genome (7,8) and the relatively short (500 base pairs or less) lengths of amplified Polymerase Chain Reaction (PCR) amplicons.

STR markers were first described as effective tools for human identity testing in the early 1990s (9,10). The variable number of tandem repeats (VNTR) defines the length of the individual-specific "alleles", which can be examined now by PCR techniques. STR typing is typically performed using size comparisons with standardized allelic ladders that possess the most common alleles, which have been sequenced to reveal the true number of repeats. Different STR kit manufacturers supply allelic ladders with slightly different allele ranges. **At present sixteen validated forensic markers are used in a forensic DNA report. Multiplex PCR amplifications kits are available from Applied biosystems Foster City, CA and Promega Corpn.**

Amplification of compromised DNA samples including samples exposed to harsh environmental conditions, skeletal remains of missing persons, or human remains from mass disasters can result in a partial or no genetic profile. This loss of signal may be the result of either PCR inhibitors which co-extract with forensic evidence or a fragmented DNA template. These factors can impact the ability to obtain probative information from large multiplexes producing a wide range of PCR products. The AmpFISTR® MiniFiler™ PCR Amplification Kit delivers results when other traditional methods produce little to no results. Casework and missing person laboratories now have a tool that facilitates the analysis of degraded samples and results in fewer allele dropouts, reducing the need for repeat analysis. Degradation of forensic samples occurs over time due to bacterial, biochemical or oxidative processes. The development and introduction of truncated PCR amplicons or "mini STR" technology shows remarkable promise for use in forensic casework applications. In 2007, Applied Biosystems released the first commercially available miniSTR multiplex, the AmpFISTR® MiniFiler™ PCR amplification kit (11). MiniFiler™ has the capability to elucidate genotypes from the eight largest loci (D13S317, D7S820, D2S1338, D21S11, D16S539, D18S51, CSF1PO, and FGA, as well as Amelogenin) contained within the Identifiler™ PCR amplification kit.

The analysis of Y-chromosomal short tandem repeats (Y STRs) is a powerful tool for analyzing mixed forensic stains and for paternity testing. Paternity cases involving the common trio constellation of mother, offspring and alleged father can usually

be solved with STR's alone, and do not seem to require any additional or alternative markers. If a father/son relationship is to be tested, Y str markers are useful .The Y chromosome is found only in males, and therefore genetic markers along the Y chromosome can be specific to the male portion of a male-female DNA mixture such as is common in sexual assault cases. Y chromosome markers can also be useful in missing person's investigations, some paternity testing scenarios and historical investigations, because of the fact that most of the Y chromosome (barring mutation) is passed from father to son without changes. Multiplex PCR amplifications kits are available from Applied biosystems, Foster City,CA. and Promega Corpn.

However, if a father/ daughter parentage is in question, it may be worthwhile using also X chromosome (ChrX) markers for testing. Fathers transmit their X-chromosome to daughters as haplotypes. Analysis of X-chromosomal loci might be beneficial in deficiency paternity cases, where half-sisters and/or grandmothers are examined. If a father/son relationship is to be tested, ChrX markers are not useful at all. For testing mother-daughter relationships, ChrX markers are similar to autosomal STR markers and do not provide any specific advantage. Testing mother-son kinship, however, is more efficiently performed using ChrX markers. The exclusion chance in such cases is identical to that of ChrX STRs in father/daughter tests (12). The commercially available Mentype Argus kit (Biotype AG, Dresden, Germany) makes it possible now to examine eight different linkage groups in one multiplex reaction.

The mitochondrial DNA (mt DNA) analysis is also being used in forensic investigation. The mt DNA is important because all mothers have the same mt DNA as their daughters, because of the fact that the mitochondria of each new embryo come from mother's egg cell whereas the father's sperm contribute only the nuclear DNA. The mt DNA is present in numerous copies per cell and is applicable when nuclear DNA is extremely degraded as in air crashes where high temperatures degrade the nuclear DNA. The second reason is that mt DNA is 100% maternally inherited; therefore during identification of body the mt DNA of remains of the body can be easily compared with that of the mother or maternal uncles of the victim (13). Mitochondrial DNA kit is available from Applied biosystems, Foster City,CA.

We provide below some real cases where different variants of the DNA fingerprinting technology were successfully applied in solving the criminal cases in our laboratory.

Case 1

This was the first case solved by the DNA fingerprinting Unit MP proving the fact that the DNA technology is not only to apprehend the guilty but to save the innocent. A physically challenged unmarried girl gave birth to a child. The girl was supposed to have indicated by sign language the alleged father of her new- born child. The child died a few days after birth. The referral blood samples taken from the mother (the complainant) as well as from the alleged father and femur bone with adhering tissues of the dead child were received in our lab. DNA profile of all three samples was generated. The comparison of the DNA profile of the dead child, the mother and the alleged father proved conclusively that the alleged father of the child is not the biological father of the dead child, thereby proving the allegation

of fathering the dead child to be false. The child's profile had an allele from its mother on all forensic STR markers but not so from the alleged father, thus proving this case to be one of exclusion (Table 1). This finding was further confirmed by the Y(Male)DNA profile of the suspected father and the child ,as the child was the male child (confirmed by the XY on Amelogenin loci). The child was found paternally unrelated with the alleged father.

Case 2

Burnt skeletal remains of a young person were found on the roof of a house. There was no other clue available to prove the identity of the deceased. Face and body was found to be burnt only teeth and few bones were seen. A vigilant doctor who examined the remains carefully preserved postmortem blood, burnt tissue, femur bone and a few teeth which were referred to our lab for analysis. The referral blood samples of an elderly couple (who could not identify the remains but suspected the remains to be of their missing son) were also sent to the lab. All the samples received here yielded amplifiable DNA. Comparative analytical studies on the DNA profile obtained from the blood samples of the couple and the profile generated from burnt forensic samples confirmed the remains to be those of the son of the couple.

Table 1: Results obtained from the referral samples of Case 1

Genetic Markers	DNA profile generated from referral blood sample of Father	DNA Profile Generated from Femur Bone	DNA profile generated from referral blood sample of Mother
D8S1179	14, 15	14,16	15,16
D21S11	30, 30	30, 33.2	30, 33.2
D7S820	8, 12	9, 12	9,12
CSF1PO	9, 10	10, 10	10,12
D3S1358	16,16	17,16	17,17
TH01	8, 9	9, 9	9, 9.3
D13S317	10, 12	8, 10	8,12
D16S539	12,13	13, 12	11,12
D2S1338	20, 23	23, 18	18, 18
D19S433	13, 14	14, 15.2	15.2,15.2
vWA	14, 14	14, 16	16,17
TPOX	8, 11	8, 8	8, 8
D18S51	13,17	17, 15	15,19
D5S818	11,12	11, 12	10,12
FGA	24, 25.2	24, 25.2	22.2 , 24
AMELOGENIN	X Y	X Y	X X

Note- Forensic DNA test is based on the fact that the child shares the allele from his parents. For example on Ist loci tested i.e. on D8S1179 the child is 14,16, one of these two allele has to come from father (14 in this case) and the other one from his mother(16 in this case).This has to be tested on all the 16 loci in the kit. One or two mismatch in this test shows exclusion. But this needs further confirmation by Y DNA, mt DNA or X DNA

kit/markers, as per the requirement or availability of the referral samples.

Case 3

In a case a mandible, scapula and few teeth were recovered near a petrol pump near a highway. A person from the staff was missing since last couple of years. During investigation the referral blood samples of father was sent to DNA lab along with the mandible, scapula and teeth. mandible and scapula were not found suitable for DNA examination. DNA was isolated from teeth but only partial DNA profile could be generated with AmpfSTR identifier kit. By this time we got the AmpfSTR® MiniFiler™ kit. The remaining loci were amplified (Table 2). with this kit it became possible to fix the identity of few teeth.

Table 2: Results obtained from the degraded sample with the Minifiller Kit in case 3

Genetic Markers	DNA Profile Generated from Few Teeth	DNA profile generated from referral blood sample of Father
D8S1179	12,12	10,12
D21S11	29,31,2	29,31,2
D7S820	10,12*	8,12
CSF1PO	10,12*	12,12
D3S1358	14,16	15,16
TH01	8,9	6,8
D13S317	11,11	8,11
D16S539	10,13	9,13
D2S1338	19,20	17,20
D19S433	13,16,2	14,2,16,2
vWA	15,18	16,18
TPOX	9,11	11,11
D18S51	15,16*	14,15
D5S818	11,13	11,13
FGA	20,24	24,25
AMELOGENIN	XY	X Y

*low peaks in the profile confirmed by Minifiller Kit

Note: In this case as the referral sample of mother was not available so for deciding the case conclusively Y DNA profile of the both were also matched to confirm patrilineal relatedness.

Case 4

Another case pertains to an even more complicated & precise forensic DNA profiling examination. A young girl committed suicide. Her postmortem examination revealed that her uterus was suspected to be gravid (6-8 weeks). The examining doctor had put a question mark against the uterus examination column. The dead girl's uterus, referral blood

samples of the two suspects- a young neighbor and the dead girl's father were sent to the DNA unit, for examination. On opening the uterus, the tiny fetus could not be discerned as the inner mass had turned pulpy due to the sample not being preserved as per DNA examination guidelines. However, careful sampling from the endometrial lining as also from the outer wall of the uterus was done. But when autosomal STR DNA profile was generated it was found to be the same female. The DNA from the endometrial lining was checked for the presence of Y DNA with AmpfSTR Y filler kit. A Y profile was generated. Y DNA profiles using the same kit were also generated from the referral blood samples of both the accused. A careful study of the DNA profiles thus obtained revealed that, in fact, the maternal grandfather was the father of this foetus (in his dead daughter's Uterus). The other person accused of being the father of the unborn fetus was thus exonerated of a crime he never committed.

Case 5

In most of these cases, the victim is from a cast different from that of the perpetrator, and interestingly, most of these allegations have been proved to be false post- DNA profiling examination.

For example, an allegation was made by a lady of a different cast against two Gurjar youths of having raped her. The lady was working as an employee of another Gurjar land-owner. On analysis of vaginal smear samples and clothing of the victim and the referral blood samples of the two accused, it was found that the source of male DNA present in the private part and the clothing of victim was not of the two accused (their STR profile was different from the STR profile of the male found in the samples of the victim).

Interestingly, this male (whose presence has been confirmed in the private parts of the victim) shares a similar Patrilineal Y-chromosome profile as found on the Y chromosome profile of both accused. That is to say, the male fraction found on the person of the complainant is of a male related to the accused patrilineally.

Case 6

A case of suspected child swapping in the Govt. hospital was received at DNA fingerprinting laboratory, Sagar for establishing the paternity of the questioned child. A woman gave birth to a child in a Government Hospital. Her family members claimed that the child born to the woman was a male but the child handed over to them was female. Referral blood sample of both parents as well as of the female child were referred to DNA Fingerprinting unit to unravel the truth. DNA was isolated by using FTA paper and phenol chloroform extraction procedure, DNA fragments were amplified by using AmpfSTR identifier kit the and the analysis was done by Genemapper software version 3.1 using 3100 Sequencer supplied by Applied Biosystems. The genotyping results showed a complete match of the newborn child with both parents except on vWA locus with mother. At vWA locus the father and daughter were homologous 16, while on the same locus mother was homologous 17, thereby showing a mismatch. With the data of genotyping it was not possible to decide the paternity of the child conclusively. Therefore to confirm the paternity of the child mitochondrial DNA sequencing of control region was performed. The

mitochondrial DNA sequence of mother and child showed complete matching. Thus, the female child was found to be the biological daughter of the couple proving their allegation against the hospital administration to be false.

Thus from the above illustrative cases, it is obvious the DNA profiling is a tool that is not only used to apprehend the guilty but also to exonerate the innocent.

As it often happens in the justice delivery system, conventional evidence can be tempered with, witnesses turn hostile, but DNA evidence remains the same. The Passage of time does not affect it and neither does is change. DNA evidence thus unravels the truth-it never lies.

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Studies on Primary Productivity of Bay of Bengal at Puri Sea-Shore in Orissa

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Abstract- Primary production refers to evaluation of the capacity of an ecosystem to build up, at the expense of external energy both radiant and chemical, primary organic compounds of high chemical potentials for further transformation and flow to higher system levels. The highest values of gross, net primary production and biotic respirations were obtained during winter due to low water temperature, higher transparency, high dissolved oxygen values, bright and clear weather where as in summer because of high water temperature leading towards higher photosynthetic rate as well as higher metabolic rate, the primary productivity also become high and lower values during rainy season due to cloudy weather.

Index Terms- Primary production, gross primary production, net primary production, biotic respirations.

I. INTRODUCTION

Puri marine water offers one of the best lucrative fish landing center in Orissa, having high fishery potentialities and thus serves as one of the most important marine products. The composition of fish species is highly varied. The success of fishing operations depends upon the extent and efficiency of manpower (i.e. fishermen). Studies on the primary productivity in the Bay of Bengal especially in the inshore waters of mandapam, were initiated by the CIFRI in 1957 based on the production of organic matter, an assessment of the potential fishery resources in the inshore waters of the Gulf of Manner was made. Gradually, studies on Primary Productivity were extended to the South West of India and Laccadive sea during the IIOE, Considerable data on primary production.

The present study deals with Gross, net and community productivity of marginal sea water of puri sea beach.

II. MATERIALS & METHODS

Primary productivity

The water samples were collected from 50cm depth from the sea shore and observations were made in the middle of every month for a period of one year 2009 - 2010. For the estimation of primary productivity different techniques have been used by different workers viz. Radioactive Carbon (C^{14}), Chlorophyll Method and oxygen method by light and dark bottle (Gaarder and Gran, 1927) of these the last mentioned technique is relatively simple and does not require extensive instrumentation and therefore, it was used during the present investigation. Water samples were collected in triplicates around the middle of every month. The first sample bottle was used to determine the initial

volume and dissolved oxygen following winklers volumetric method (Ellis *et al.*, 1948). The second bottle was painted with black colour to prevent the light penetration and photosynthesis and hence it served as a control to facilitates as the first one to measure the net production. Net production value when added to respiration value gives gross production. The last two bottles were incubated at 50cm. depth for a period of 24 hours, and the oxygen Concentration was measured. Oxygen value $mg\ l^{-1}$ were converted to carbon value by applying the equation suggested by Agarwal (1980).

$$\text{Production (Mg}^C) = \frac{(mg\ l^{-1}) \times 0.375}{PQ=1.25} - \frac{\text{Respiration}}{\text{Photosynthesis}}$$

PQ represents quotient $\frac{\text{Photosynthesis}}{\text{Respiration}}$ - A compromise value of 1.25 was used which represents metabolism of sugars, some fats and proteins. The value of 0.375 represents a constant to convert the oxygen value ($mg\ l^{-1}$) to carbon value. Productivity values were expressed as $g^C\ m^{-3}\ day^{-1}$ assuming a 12 hour photo period and then converted to $g^C\ m^{-2}\ day^{-1}$ multiplied by average water depth.

Puri is one of the coastal districts of Orissa, having a coastline of 155 Kms out of the total coast line of 480 Kms of the state. Puri is present between 18,450 E to 19,400W (Latitude) and 85,480N to 84,270S (Longitude). However Sea Shore of puri bifurcate at 20.28^oN to 85.52^oE to puri in Orissa.

III. RESULTS AND DISCUSSION

Mean data of Gross and Net Primary Production along with biotic respiration and NPP/GPP ratios of three different stations are presented in table -(1 & 2) and graphically represented in figure(Fig:1-5).

Station -1 = s_1 -> Penthakata, Station - 2 = s_2 -> Sapakothi ,
Station - 3 = s_3 -> Ramachandi

The minimum gross production ($135.52\ g^C/m^2/day$) was obtained at S_2 and the maximum ($298.88\ g^C/m^2/day$) at S_1 . The gross and net Primary Productions ($298.88\ g^C/m^2/day$ and $190.86\ g^C/m^2/day$) were at their peaks during February. The maximum biotic respiration was obtained at S_1 ($108.16\ g^C/m^2/day$) and the minimum at S_2 ($41.90\ g^C/m^2/day$). The higher values of gross primary production, net primary production and biotic respirations were obtained during winter and summer seasons and the lower values were obtained during rainy season.

The weather condition affects the productivity in aquatic ecosystem. This statement hold good as the higher values of net, gross primary productions were reported from October to May when weather condition was bright and clear. Lower Production value during rainy season may be due to cloudy weather organic affluent in water, low transparency and high water current (Hutchinson, 1957). Besides, the poor nutrient concentration of phosphates and total Nitrogen may bring about the low productivity values, (Pasternak and Kasza, 1979). It appears that there is a direct correlation between temperature and production, which is in agreement with Srenivasan(1964),Hall&Moll(1975),Goldman and Wetzel(1963),Mohanty(2000),Pauly & Chirstensen (1995) and Thomas *et al.*, (1980). In the present study productivity values were high ($136.0\text{g}^{\text{c}}/\text{m}^2/\text{day}$ to $298.2/\text{g}^{\text{c}}/\text{m}^2/\text{day}$) at low temperature (23.0°C - 31.0°C).

Generally productivity is the manufacture of living substances through the interaction of constituents of the natural environments as they are self sustaining in nature. This production of organic material is done by autotroph level as the nutrients are being transferred to the higher levels of food chain. The biological producer level comprises of the chlorophyll bearing phytoplankton and photoautotroph organisms and are the primary level of synthesizing food material from inorganic food stuff in the presence of solar radiation in the aquatic environment, of the total solar energy in organic substances. The energy of carbohydrates formed, represents the gross and net primary production and is the sum of the energy present in photosynthesis.

Primary production values vary in order of $S_1 > S_3 > S_2$. The increased nutrient concentration and higher temperature results in higher algal population, which in turn helps in higher productions.

Table1- Monthly Variation in Primary Productivity (gC m-2 day -1) of three stations at Puri- on- sea During 2009- 2010

Months	Weather condition	Station-1				Station-2				Station-3				Tem. Of Water (oC)
		Gross Primary Productivity (g ^c m ² day ⁻¹)	Net Primary Productivity (g ^c m ² day ⁻¹)	Biotic respiration (CR) (g ^c m ² day ⁻¹)	NPP/GPP	Gross Primary Productivity (g ^c m ² day ⁻¹)	Net Primary Productivity (g ^c m ² day ⁻¹)	Biotic respiration (CR) (g ^c m ² day ⁻¹)	NPP/GPP	Gross Primary Productivity (g ^c m ² day ⁻¹)	Net Primary Productivity (g ^c m ² day ⁻¹)	Biotic respiration (CR) (g ^c m ² day ⁻¹)	NPP/GPP	
April	Bright Sunny	216.34 ± 12.3	143.86 ± 8.5	72.48 ± 4.5	0.665 ± 0.39	215.3 ± 12.3	143.82 ± 8.5	71.48 ± 4.5	0.668 ± 0.39	216.43 ± 12.3	143.84 ± 8.5	73.08 ± 4.6	0.663 ± 0.39	31.0
May	Bright Sunny	192.4 ± 11.6	118.52 ± 6.8	73.89 ± 4.6	0.616 ± 0.21	193.2 ± 11.7	128.09 ± 7.7	65.11 ± 4.1	0.663 ± 0.39	192.84 ± 11.8	122.54 ± 7.4	70.3 ± 4.4	0.613 ± 0.21	32.4
June	Bright Sunny	142.0 ± 8.4	93.88 ± 5.7	48.52 ± 2.9	0.662 ± 0.38	141.92 ± 8.3	96.36 ± 5.9	45.56 ± 2.7	0.679 ± 0.39	141.73 ± 8.3	94.42 ± 5.8	47.3 ± 2.9	0.668 ± 0.39	29.8
July	Cloudy & Rainy	139.8 ± 8.6	93.38 ± 5.7	46.42 ± 2.8	0.668 ± 0.39	139.2 ± 8.3	97.30 ± 6.0	41.90 ± 2.6	0.699 ± 0.39	139.62 ± 8.3	95.55 ± 5.9	44.07 ± 2.6	0.684 ± 0.37	30.1
August	Cloucy & Rainy	137.9 ± 8.2	87.29 ± 5.4	50.61 ± 3.0	0.633 ± 0.29	137.8 ± 8.2	84.05 ± 5.0	53.75 ± 3.4	0.610 ± 0.22	137.62 ± 8.1	86.64 ± 5.1	50.98 ± 3.1	0.615 ± 0.23	28.4
Sep.	Cloudy	136.0 ± 8.1	84.45 ± 5.3	51.55 ± 3.1	0.621 ± 0.24	135.52 ± 8.0	88.47 ± 5.3	47.43 ± 2.9	0.651 ± 0.36	135.9 ± 7.9	86.86 ± 5.1	48.68 ± 2.9	0.640 ± 0.30	29.2
Oct.	Bright	187.4 ± 11.3	103.63 ± 6.3	83.77 ± 4.9	0.553 ± 0.36	187.2 ± 11.2	103.52 ± 6.3	83.68 ± 4.9	0.553 ± 0.28	187.8 ± 11.3	103.56 ± 6.3	84.04 ± 5.0	0.552 ± 0.28	30.8
Nov.	Bright	188.2 ± 11.3	131.17 ± 8.0	57.03 ± 3.3	0.697 ± 0.47	188.0 ± 11.3	133.48 ± 8.3	54.52 ± 3.3	0.710 ± 0.49	188.4 ± 11.3	132.54 ± 8.1	55.86 ± 3.4	0.703 ± 0.48	24.0
Dec.	Bright	188.66 ± 11.3	124.70 ± 7.5	63.36 ± 3.9	0.661 ± 0.38	188.64 ± 11.3	122.99 ± 7.3	65.65 ± 4.1	0.652 ± 0.36	188.6 ± 11.3	124.25 ± 7.5	64.35 ± 4.0	0.658 ± 0.37	22.4
January	Bright	190.2 ± 11.5	122.29 ± 7.3	67.91 ± 3.9	0.643 ± 0.30	190.4 ± 11.5	122.42 ± 7.3	67.98 ± 3.9	0.663 ± 0.39	109.6 ± 6.9	122.45 ± 7.3	68.15 ± 4.0	0.648 ± 0.30	22.9
Frebruary	Bright	298.88 ± 17.3	190.54 ± 11.5	108.16 ± 6.4	0.639 ± 0.29	297.3 ± 17.2	190.86 ± 11.5	106.44 ± 6.3	0.642 ± 0.30	298.2 ± 17.3	190.72 ± 11.5	107.66 ± 6.5	0.638 ± 0.28	25.4
March	Bright	238.24 ± 13.5	155.09 ± 9.3	83.15 ± 4.9	0.651 ± 0.36	238.0 ± 13.5	155.41 ± 9.3	82.59 ± 4.8	0.653 ± 0.36	238.82 ± 13.5	155.35 ± 9.3	83.47 ± 4.9	0.650 ± 0.36	28.0

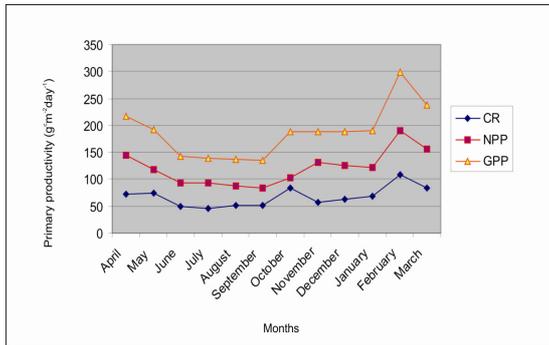


Fig. 1 (i) Monthly variations in primary productivity (GPP, NPP & CR) at S₁ of Puri-on-Sea during 2009 – 2010 (in g^C m⁻² day⁻¹).

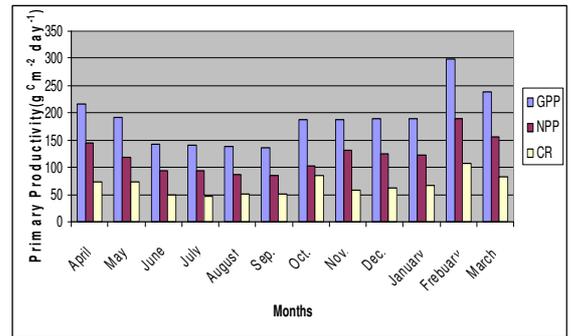


Fig. 1(ii) Monthly variations in primary productivity (GPP, NPP & CR) at S₁ of Puri-on-Sea during 2009 – 2010 (in g^C m⁻² day⁻¹).

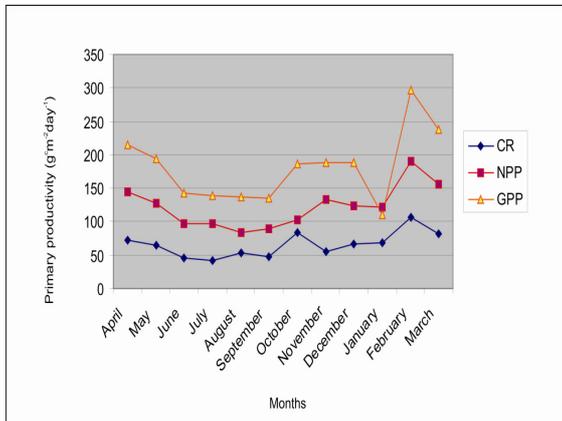


Fig. 2 (i) Monthly variations in primary productivity (GPP, NPP & CR) at S₂ of Puri-on-Sea during 2009 – 2010 (in g^C m⁻² day⁻¹).

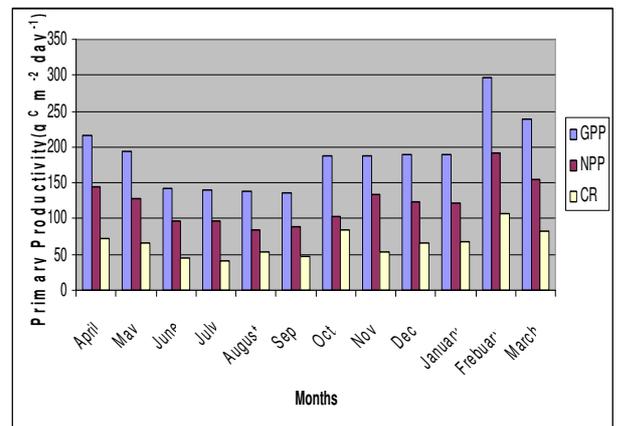


Fig. 2 (ii) Monthly variations in primary productivity (GPP, NPP & CR) at S₂ of Puri-on-Sea during 2009 – 2010 (in g^C m⁻² day⁻¹).

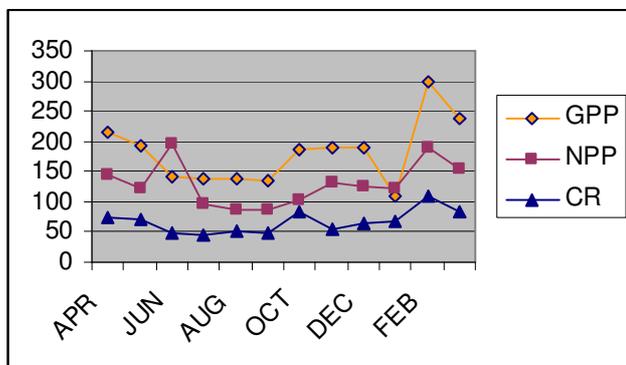


Fig 3 (i) Monthly variations in primary productivity (GPP, NPP & CR) at S₃ of Puri-on-Sea during 2009 – 2010 (in g^C m⁻² day⁻¹).

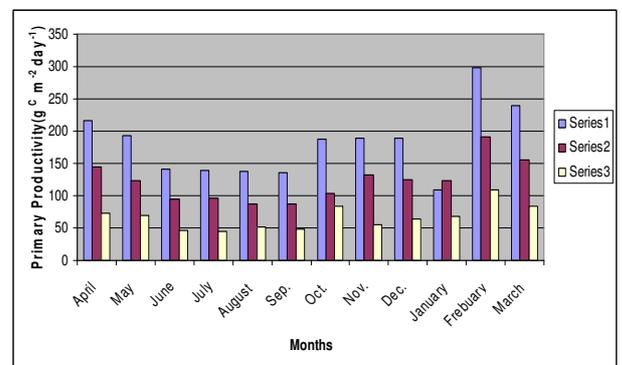


Fig 3 (ii) Monthly variations in primary productivity (GPP, NPP & CR) at S₃ of Puri-on-Sea during 2009 – 2010 (in g^C m⁻² day⁻¹).

Table 2 : Shows the seasonal variations in primary productivity.

Station No.	Winter (October-January)	Summer (Feb. – May)	Rainy (June- Sep)	Annual
S ₁	188.6 ± 11.35	236.8 ± 13.72	138.9 ± 8.32	564.2 ± 32.07
S ₂	188.5 ± 11.32	235.9 ± 13.67	138.6 ± 8.15	563.1 ± 33.19
S ₃	188.8 ± 10.2	236.2 ± 13.67	138.7 ± 8.20	563.7 ± 33.39

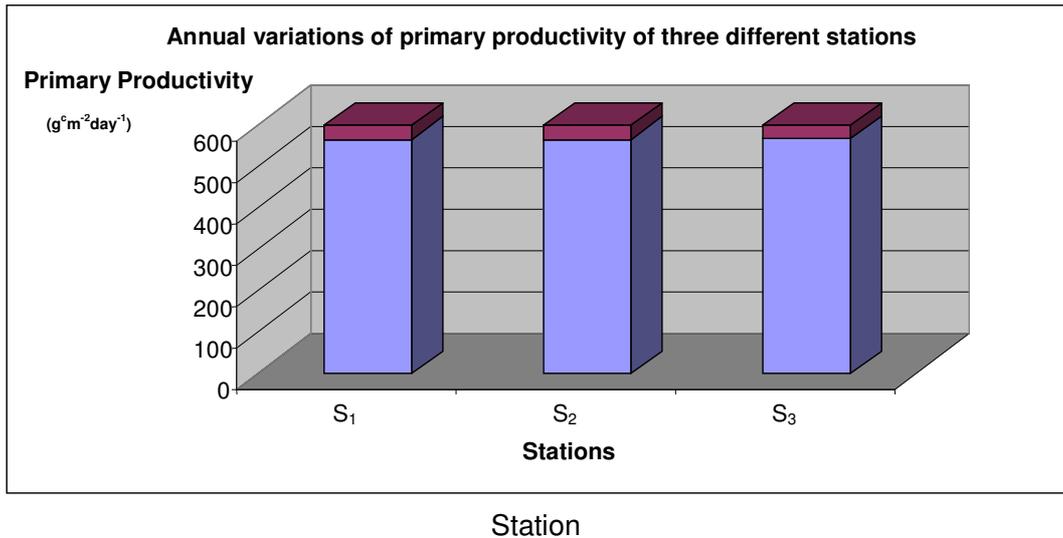


Fig. 4 Shows annual variations of primary productivity at three different stations.

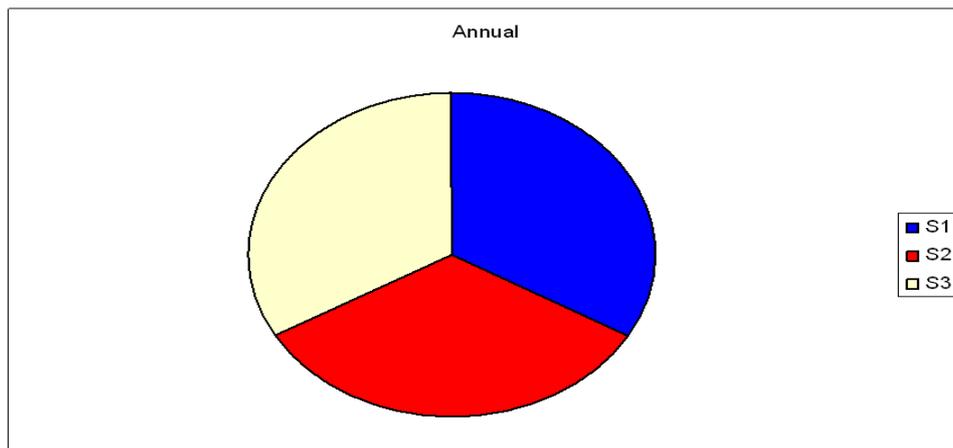


Fig 5. Annual variations of GPP at S₁,S₂,S₃ during 2009 - 2010 at Puri –on-sea.

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Refractometry Study of S-Triazinethiocarbamides in Different Percentage of Dioxane-Water Mixture

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Abstract- S-triazine and thiocarbamide group containing drug create their own identity in the drug, pharmaceutical and medicinal sciences. Refractometric measurements of recently synthesized drugs viz. 1-(4-hydroxy-6-methyl)-S-triazino-3-phenylthiocarbamide (L1) is carried out at various percentage composition of solvent and at different temperatures to investigate effects of structure, groups on S-triazino thiocarbamides. The data and the results obtained during this investigation gave detail information regarding drug absorption, transmissions activity and effect of these drugs. This study explores the potency of newly synthesized drugs, stability of drug and also to renovate and modify the traditional drugs which are used by medicinal practioners. Taking all these things in to consideration this research work was carried out.

Index Terms- 1-(4-hydroxy-6-methyl)-S-triazino-3-phenylthiocarbamides, Dioxane-Water mixture, Refractometry study.

I. INTRODUCTION

One of a unique and important property of liquid is refractive index. When a ray of light passes from less dense to denser medium then there is a change in the direction of refraction and also angle of refraction changes and ultimately the refractive index changed. The result obtained during this investigation directly through light on the dipole association of ligand, intermolecular attraction between solute and solvent, dielectric constant of medium, polarizability and mutual compensation of dipoles. These results are much more useful for transmission, stability, activity and effect of drug hence this study is essential. Pharmaceutical, medicinal and biochemical literature survey reveals that S-triazino and thiocarbamido nucleus containing drugs have their own identity in drug chemistry. Many of them are used as drugs as muscle relaxant¹, hypoglycemic agent², blood pressure depressant³, anti-diabetic drug⁴. With the development in medical field, it is reported that the drug having S-triazino nucleus possess anti-tumor properties⁵⁻⁶, anti-

bacterial⁷⁻⁹, anti-inflammetry¹⁰ and anti-cancer properties¹¹. These drugs were also be used as hormone antagonists¹² and antipsychotic agent¹³. The S-triazino compounds possess their own identity and also play an immense role in industrial¹⁴ fields. Results of refractometric measurements directly gave information regarding solute-solvent, solvent-solvent interactions. Taking all these things into consideration the present investigation was carried out in various percentage compositions and at different temperatures. This is hither to unknown. This study becomes milestone in the drug, medicinal, pharmaceutical of triazinethiocarbamido molecules.

II. EXPERIMENTAL

The 0.1M solution of ligand in different percentage of dioxane-water and the solutions of different concentration of ligands in 60%, 70% and 80% dioxane-water mixture were prepared. All weighing were made on Mechaniki Zaktady Precyzying Gdansk Balance [Poland make, (± 0.001 gm)]. The densities of solutions were determined by a bicapillary Pyknometer ($\pm 0.2\%$) having a bulb volume of about 10cm^3 and capillary having an internal diameter of 1mm. The refractive indices of solvent mixture and solutions were measured by Abbe's refractometer (± 0.001). The temperature of the prism box was maintained at 27°C . Initially, the refractometer was calibrated with glass piece ($n=1.5220$) provided with the instrument.

III. OBSERVATION AND CALCULATION

The present work deals with the study of molar refraction and polarizability constant of ligand (L_1) in 60%, 70% and 80% dioxane-water mixtures at different composition at different temperatures. The data obtained have been used to compute intermolecular interactions. The refractometric reading were taken as described in literature.

Table No. I- Molar Refraction of Different Percentage of Dioxane - Water Mixture	
% of Dioxane-Water Mixture	Molar Refraction (RM) (cm³ . Mole⁻¹)
100	21.5977
90	15.4584
80	11.9390
70	9.6554
60	8.0551

Determination of Molar Refraction and Polarizability Constant at Different Concentrations and Temperature for 60%,70% and 80% of Dioxane-Water Mixture

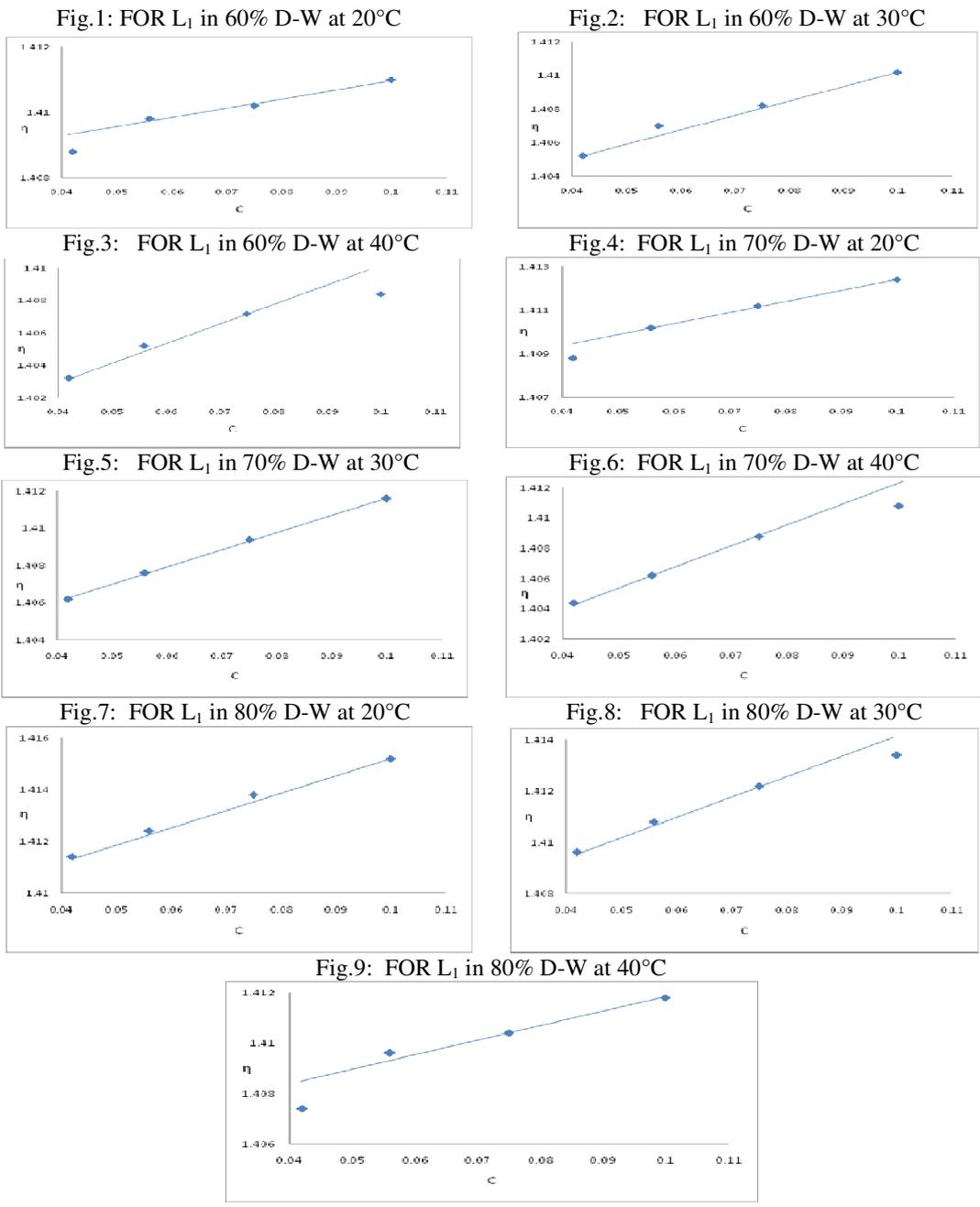
Table No. II For L₁ at 60% D-W Mixture

Temp (°C)	Concentration (M)	Density ρx10³ (kg.cm⁻³)	Refractive Index η	R_{mix} (cm³.mole⁻¹)	R_{Ligand} (cm³.mole⁻¹)	αx10⁻²³ (cm³)
20	0.1000	1.0246	1.4110	8.8577	0.8026	0.03180
	0.0750	1.0243	1.4102	8.7976	0.7425	0.02942
	0.0560	1.0241	1.4098	8.7556	0.7005	0.02776
	0.0420	1.0239	1.4088	8.7059	0.6508	0.02579
30	0.1000	1.0236	1.4102	8.8427	0.7876	0.03121
	0.0750	1.0234	1.4082	8.7597	0.7046	0.02796
	0.0560	1.0231	1.4070	8.7029	0.6478	0.02567
	0.0420	1.0228	1.4052	8.6385	0.5834	0.02312
40	0.1000	1.0228	1.4084	8.8086	0.7535	0.02986
	0.0750	1.0224	1.4072	8.7408	0.6857	0.02717
	0.0560	1.0219	1.4052	8.6691	0.6140	0.02433
	0.0420	1.0213	1.4032	8.6008	0.5457	0.02162

Table No. III For L₁ at 70% D-W Mixture						
Temp (°C)	Concentration (M)	Density $\rho \times 10^3$ (kg.cm⁻³)	Refractive Index η	R_{mix} (cm³.mole⁻¹)	R_{Ligand} (cm³.mole⁻¹)	$\alpha \times 10^{-23}$ (cm³)
20	0.1000	1.0291	1.4124	10.4785	0.8221	0.03257
	0.0750	1.0281	1.4112	10.3991	0.7427	0.02943
	0.0560	1.0271	1.4102	10.3337	0.6773	0.02684
	0.0420	1.0264	1.4088	10.2728	0.6164	0.02442
30	0.1000	1.0288	1.4116	10.4604	0.8040	0.03186
	0.0750	1.0281	1.4094	10.3588	0.7024	0.02783
	0.0560	1.0271	1.4076	10.2760	0.6196	0.02455
	0.0420	1.0259	1.4062	10.2154	0.5590	0.02215
40	0.1000	1.0279	1.4108	10.4427	0.7863	0.03116
	0.0750	1.0269	1.4088	10.3455	0.6891	0.02730
	0.0560	1.0253	1.4062	10.2450	0.5886	0.02332
	0.0420	1.0246	1.4044	10.1753	0.5189	0.02056

Table No. IV For L₁ at 80% D-W Mixture						
Temp (°C)	Concentration (M)	Density $\rho \times 10^3$ (kg.cm⁻³)	Refractive Index η	R_{mix} (cm³.mole⁻¹)	R_{Ligand} (cm³.mole⁻¹)	$\alpha \times 10^{-23}$ (cm³)
20	0.1000	1.0392	1.4152	12.8257	0.8867	0.03510
	0.0750	1.0356	1.4138	12.7231	0.7841	0.03107
	0.0560	1.0319	1.4124	12.6358	0.6968	0.02761
	0.0420	1.0292	1.4114	12.5725	0.6335	0.02510
30	0.1000	1.0314	1.4134	12.7746	0.8356	0.03311
	0.0750	1.0293	1.4122	12.6798	0.7408	0.02935
	0.0560	1.0281	1.4108	12.5926	0.6536	0.02590
	0.0420	1.0265	1.4096	12.5241	0.5851	0.02318
40	0.1000	1.0298	1.4118	12.7364	0.7921	0.03139
	0.0750	1.0281	1.4104	12.6311	0.6921	0.02742
	0.0560	1.0269	1.4096	12.4873	0.5483	0.02172
	0.0420	1.0259	1.4074	12.4622	0.5232	0.02073

Graph Plotted Between Refractive Index (η) Versus C at Different Concentrations and Temperature for 60%, 70% and 80% Dioxane-Water Mixture.



IV. RESULT AND DISCUSSION

The molar refraction of solutions of ligand in Dioxane-Water mixture were determined by a following equation,

$$R_{\text{mixture}} = [(\eta^2 - 1) / (\eta^2 + 2)] \{ [X_1 M_1 + X_2 M_2 + X_3 M_3] / d \} \quad \text{-----} \textcircled{1}$$

Where,

η is the refractive index of solution,

X_1 is mole function of Dioxane,

X_2 is mole function of Water,

X_3 is mole function of Solute,

M_1, M_2, M_3 are molecular weights of Dioxane, water and solute respectively,

D is density of solution

The molar refraction of ligand is calculated as,

$$R_{\text{lig}} = R_{\text{mixture}} - R_{\text{Dioxane-Water}} \quad \text{-----} \textcircled{2}$$

Where,

$R_{\text{Dioxane-Water}}$ - The molar refraction of solvent, Dioxane-Water mixture

The polarizability constant (α) of ligand is calculated from the following relation,

$$R_{\text{lig}} = \frac{4}{3} \pi N_0 \alpha \quad \text{-----} \textcircled{3}$$

Where, N_0 is Avogadro's number.

The values of molar refraction of Dioxane-Water mixture were presented in Table No I. The values of molar refraction and polarizability constant of ligand in 60%, 70% and 80% of Dioxane-Water mixtures were presented in Table No. II to IV.

From the results, it is observed that, the concentration of ligand is directly proportional to density and refractive index for ligand at temperature 20°C, 30°C and 40°C. This may be due to the weak solvation effect which interprets weak molecule interaction. The a weak solute-solvent interaction which is good for interactions in between the drug and the drug receptors shows best drug activity and drug effect and it favors pharmacokinetics and pharmacodynamics of drug. At the same time, ligand is hydrophilic in nature and they disrupted the hydrogen bonding in the mixture of solvent causing lesser molecular interaction. Thus, these factors plays important role during designing of any drug.

From the table, it is observed that, the temperature of solution is inversely proportional to the density and refractive index for ligand at all concentration. It is due to the temperature increase, randomness of solute molecule in solution also increases shows weak the molecular interactions. From this discussion, it is clear that bulky substituent on the molecule is not only factor in trend of refractive index but the reactivity and stability and tautomeric conversion as well as electron donating nature, electron clouds, nature of hetero atom present in ligand and the compactness in the molecule will directly hampered results and trends in the refractive index.

It shows that, the molar refractivity (true molar volume) as well as the polarizability constant of ligand may be attributed to the fact that, the dipole in the ligand lies perpendicular to the longer axis of the molecules and in the presence of dioxane causing decrease in dielectric constant of medium, considerable dipole association (intermolecular attraction) take place which would be accompanied by decreases in polarizability as well as molar refractivity because of the mutual compensation of dipoles. In the present work, non specific solute-solvent association caused by the dielectric enrichment in the solvent

shell of solute takes place result may be due to strong hydrogen bonding resulting weak molecular interaction and in a dilute solution, solute molecules can disrupt this H-bonding to lesser extent.

The literature survey on pharmaceutical, medicinal, biochemical and chemical sciences reveals that the pharmacokinetics and pharmacodynamics of that drug are governed by solute-solvent and solute-solute interactions. These interactions can be determined by refractometric measurements. These studies become important and essential tool for these studies in medicinal and pharmaceutical sciences. The results obtained in refractometric measurements directly focused and gave information regarding solute-solvent (drugs-solvent) interactions and also solute-solute (drug-drug receptor) interactions. Hence, refractometric measurements create its own identity in medicinal, pharmaceutical and chemical sciences. At the same time methodology is very simple, easy and easily affordable and required learnt chemicals and low cost instruments. This study also maintains green chemistry parameters.

The results obtain in refractometric study directly shows merits or demerits of that drug. The literature survey also shows that the transport of drug which is a part of pharmacokinetics which involved drugs absorption, drug distribution (transmission), drug metabolism and drug excretion in which solute-solvent interactions were studied. While in pharmacodynamics drug and drug interactions (solute-solvent interactions) were studied. Drug transport and drug receptor interactions were studied in pharmacokinetics and pharmacodynamics respectively. Pharmacokinetics and pharmacodynamics parameters can also be determined by refractometric study. Interpretation of nature of chemical reactions involved in pharmacodynamics and pharmacokinetics can be easily predicted by obtaining results of refractometric measurements as drug and drug receptor interactions is also depends upon refractive index¹⁵⁻¹⁷ and transport of drug¹⁸⁻²¹ also depends upon this factor. Hence, refractometric study creates its own importance and identify in the medicinal, pharmaceuticals, biochemical and chemical sciences. So it become prior duty of chemist before giving final result and opinion about any drug, the result must be cross verified and then only result must be determined. Taking all these things into consideration, the molar refraction and polarizability constant of ligand 1-(4-hydroxy-6-methyl)-S-triazino-3-phenylthiocarbamide L_1 was studied in various percentage of dioxane-water mixture at different and also at various concentrations and temperature.

V. CONCLUSION

Hence from the above discussion, it was clear that bulky substituent on the molecule was not only factor in trend but tautomeric conversion as well as electron donating nature, electron clouds, nature of hetero atom present in compounds and compactness in the molecule will directly hampered results and trends in the molar refraction. It means that when the temperature of dioxane increases, weak solute-solvent interactions i.e. interaction of compounds (drugs) and dioxane increases, which may be stabilize the drug activity. From this it can be concluded that the drug absorption, drug transmission and drug effect of

compounds is more effective at higher temperature of dioxane. This study may become a milestone in the drug, medicinal and pharmaceutical chemistry of triazino thiocarbamides.

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Critical Relational Data Tuple Transmission Using Integer Wavelet Transform

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Abstract- Remote database systems are becoming increasingly popular due to their potential usage in information storage. However, digital tuple data (e.g. bank balance, account details) are themselves vulnerable to security attacks. There are various methods available to secure critical tuples. In this scheme we propose a new method in which data tuples are embedded in a container image.

In this technique, we are using wavelet transform for hiding data in digital images by combining the use of adaptive hiding capacity function that hides secret data in the integer wavelet coefficients of the cover image with the optimum pixel adjustment (OPA) algorithm. The OPA algorithm is applied after embedding secret relational tuples to minimize the embedding error. The proposed system showed high hiding rates with reasonable imperceptibility compared to other steganographic systems.

This container image is encrypted to have more security against the attack. At the client end the image is decrypted and converted into original format. From this image the data tuples are extracted.

Index Terms- Amplitude modulation, RNG mechanism, Adaptive steganography, Integer wavelet transform.

I. INTRODUCTION

Now days with emerging technology in computer science, an increased security of the remote data tuples is necessary in order to reduce attacks on data. Techniques based on steganography can be suitable for transferring critical information from a server to a client and reduce the chances of illegal modification of the critical remote data.

In the remote database system, various types of data is stored and send to user according to his request for data. This request may demand some data which is very much important as such. This type of data may contain bank balance, credit card number, passwords, etc. It is very much risky to send this data in unencrypted form. In server side data is stored in encrypted form for security purpose but once the data is decrypted this security is lost. So, to provide extended security to the critical relational data tuples, we use the method of steganography. This proposed method helps to secure the tuples from the communication channel attacks at the time of transmission of result of requested query. Server sends result of requested query in the form of image container. This image container is opened rightly at client side only when client provides correct secret key.

Steganography is the art and science which deals with security of data. In steganographic system, data is kept hidden in any multimedia object of secure transmission of it. Any digital file such as image, video, audio, text or IP packets can be used to hide secret message. Generally the file used to hide data is known as cover-object, and the file containing secret message is known as stego-object. Generally the image files are normally used for the hiding of data as they have high hiding capacity due to the redundancy of digital information representation of an image data and have higher degree of distortion tolerance than other types of files.

There are various types of data embedding techniques are available now a days. These techniques are generally classified by the type of cover image and type of data is used. Another method to classify the steganographic technique uses the method of transformations. There are number of transformations are available with mathematical methods. The classification may be done by the domain of embedding process.

In the transform domain techniques which appeared to overcome the robustness and imperceptibility problems found in the spatial domain substitution techniques. There are various transforms that can be used in data hiding, the most widely used transforms are; the discrete cosine transform (DCT), the discrete wavelet transform (DWT) and the discrete Fourier transform (DFT). In some technique the secret message is embedded into the high frequency coefficients of the wavelet transform while leaving the low frequency coefficients subband unaltered. While in another, an adaptive (varying) hiding capacity function is employed to determine how many bits of the secret message is to be embedded in each of the wavelet coefficients.

In spatial domain technique, the Least Significant Bit (LSB) substitution is used most of the times to hide the data. In LSB method, least significant bit of cover image pixel is directly replaced by secret data. This technique is most preferred technique used for data hiding because it is simple to implement offers high hiding capacity, and provides a very easy way to control stego-image quality. This has low robustness to modifications made to the stego-image such as low pass filtering and compression and also low imperceptibility. These limitations are not there in transform domain. This technique has high ability to tolerate noises and some signal processing operations but on the other hand they are computationally complex and hence slower [9].

To minimize the computational error rate we use an adaptive data hiding technique joined with the optimum pixel adjustment algorithm to hide data into the integer wavelet coefficients of the base image. This will maximize the hiding capacity by great extent. To increase the system security we use a pseudorandom

generator function to select the embedding locations of the integer wavelet coefficients.

There are various cryptographic techniques are available in the area of information security to encrypt the multimedia objects. This image container is encrypted to have more security. Some sophisticated algorithms provides much security of confidential data and used for image data. In general we use the blue channel in pixel to embed information. Blue channel is used because blue color has less sensitive to human eyes comparing with the red or the green ones, so better invisibility can be achieved. At the receiver end the image container is decrypted and tuples are extracted from it.

II. DATA SERIALIZATION AND BIT ADJUSTMENT

In relational database system, the data is stored in the form of tables and entities in the table. To retrieve this data user has to specify a query for request. This query result is in the form of table. For the embedding process this table data need to be serialized first. There are various algorithms for serialization is available. This results into xml like structure which is used as input for embedding process. At the receiver side schema are extracted from Image container and tables are extracted from this xml like schema.

No.	Cust Name	Value
1	Johm	54000
2	Kushal	52000
3	Kedar	69235
4	San	22589

The converted serialized form will be like this:

```
<xml>
<info1>
  <No> 1 </No>
  <Cust Name> Johm </Cust Name>
  <Value> 54000 <Value>
</info1>
<info2>
  <No> 2 </No>
  <Cust Name> Kushal </Cust Name>
  <Value> 52000 <Value>
</info1>
<info3>
  <No> 3 </No>
  <Cust Name> Kedar </Cust Name>
  <Value> 69235<Value>
</info1>
<info4>
  <No> 4 </No>
  <Cust Name> San </Cust Name>
  <Value> 22589<Value>
</info1>
</xml>
```

The main idea of using the optimum pixel adjustment (OPA) algorithm is to minimize the error difference between the original coefficient value and the altered value by checking the right next bit to the modified LSBs so that the resulted change will be minimal. This will result in very less distortion in base image.

For example, if a binary number 1000 (decimal number 8) is changed to 1111 (decimal number 15) because its three LSB's were replaced with embedded data; the difference from the original number is 7. This difference in the original value is called the embedding error. By adjusting the fourth bit from a value of 1 to a value of 0, the binary number now becomes 0111 (decimal number 7) and the embedding error is reduced to 1 while at the same time preserving the value of the three embedded bits. It is observed that this OPA algorithm minimizes the error by half. In OPA algorithm we check the bit right next to the last changed LSBs. It is used to decrease the error resulted after insertion of message bits.

The algorithm is depend on calculating the difference δ_i between original value $P(x, y)$ and the modified value $P'(x, y)$

$$\delta_i(x, y) = P'(x, y) - P(x, y)$$

After calculating the δ_i , the algorithm modifies the changed value in the following manner:

III. INTEGER WAVELET TRANSFORM

Integer wavelet transform maps an integer data set into another integer data set. In discrete wavelet transform, the used wavelet filters have floating point coefficients so this may cause the loss of data when any truncations of the floating point values are done. To avoid these problems instead of using floating point data we use the integer format and in this case there will be no loss of information through forward and inverse transform.

This is an adaptive data hiding scheme. In this which randomly selected integer wavelet coefficients of the base image are modified with critical relational tuple bits. Each of these selected coefficients hides different number of message bits according to the hiding capacity function. Once the data is inserted we apply optimum pixel adjustment algorithm to reduce the error induced due to data insertion.

A. Insertion Algorithm:

Data elements : Sequence [], I [] [] : Image, I' [] [] : image, block [] [] [], n : no of bits in input tuple data. s [] : bit stream, Co : absolute value of wavelet coefficients, k: min length used in each coefficient, k1: secrete Key, x,n,I,d : iterators.

Step 1: I = ReadImage(BaseImage)

Step 2: for i=0 to no_of_pixels do

If pixel[i]>255 || pixel[i]<0 then

Modify_pixel(pixel[i]);

End if;

End for;

Step 3: divide_image_into_8x8_blocks.

Step 4: for $i=1$ to no_of_blocks do
 IWT(block[i]);
End for;

Step 5: //Calculate hiding capacity of each coefficient, we used a modified version of the hiding capacity function. The length of LSBs of wavelet coefficients (L) is determined as:

/*
It is observed that as we lower the bits used to hide the secret message in the LL subband the resulted distortion in the stego-image becomes lower; so that we modified this hiding capacity function by using different ranges for k for the LH, HL and HH subbands where its values are form 1 to 4. For the LL subband the value of k is equal to 0 and in some cases the bits used is fixed to only bits to enhance the stego-image quality. */

Step 6: sequence=generateSeq(k1);
 for $i= 1$ to n do
 for $j=0$ to L do // L bits of message
 Embed(sequence[i], s[j]);
 end for
 end for

Step 7: for $i= 1$ to n do
 for $j=0$ to L do // L bits of message
 OPA(sequence[i]);
 end for
end for

Step 8: end;

B. Extraction algorithm :

Data elements : Sequence[], I [][] : Image, I' [][] : image, block[][][], n : no of bits in input tuple data. s[] : bit stream, Co : absolute value of wavelet coefficients, k : min length used in each coefficient, $k1$: secrete Key, x,n,I,d : iterators.

Step 1: $I = ReadImage(BaseImage)$

Step 2: divide_image_into_8x8_blocks.

Step 3: for $i=1$ to no_of_blocks do
 IIWT(block[i]); // Inverse IWT
End for;

Step 4: //Calculate hiding capacity of each coefficient, we used a modified version of the hiding capacity function. The length of LSBs of wavelet coefficients (L) is determined as:

Step 5: sequence=generateSeq(k1);
 for $i= 1$ to n do
 for $j=0$ to L do // L bits of message
 s'[j]= s'[j]+Extract(sequence[i]);
 end for;
 end for;

Step 6: convert_xml_to_relation(s');

Step 7: end;

IV. CONCLUSION

In this paper we proposed a novel method for transmitting the critical relational tuples at remote database systems. This scheme hides relational data tuples in an image by using integer wavelet transformation and the optimum pixel adjustment algorithm to increase the hiding capacity of the system compared to other systems. This method hides entities in tuples at random location in image. This uses the secrete key which is only known to both sender and receiver. This will increase the data invisibility and ability to detect the data from any unauthorized user in the communication channel. In this mechanism we used the hiding capacity function to improve the visual effects of base image. Any relational data type can be used as the secret message since our method was made on a binary stream of data. There was no error in the recovered message (perfect recovery) at any hiding rate.

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Can Software Faults be Analyzed using Bad Code Smells? : An Empirical Study

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Abstract- The design of software systems can exhibit several problems which can be either due to inefficient analysis and design during the initial construction of the software or more often, due to software ageing, where software quality degenerates over time. The design problems appear as "bad smells" at code or design level and the process of removing them is termed as Refactoring.. This paper presents the results from an empirical study that investigated the relationship between the bad smells and class error probability in three error-severity levels in an industrial-strength open source system. Our research, which was conducted in the context of the post-release system evolution process, showed that some Bad code smells were positively associated with the class error probability in the three error-severity levels. This finding supports the use of bad smells as a systematic method to identify and refactor problematic classes in this specific context.

Index Terms- Bad code smell, software maintainability, software metrics, refactoring.

I. INTRODUCTION

When we develop an Object Oriented Software system, its design change is continuous. In the process of maintaining an OO system after its release, the information on what classes have higher probabilities of containing errors than other classes can help the maintenance team allocate resources in various software engineering tasks such as testing and redesign. Understanding how the design structures of large systems evolve (after its release) and where the errors are likely to occur can enhance our knowledge about the relationship between relatively stable design structures and errors. (We assume that the design structures of a system is more stable after the system released than during the development.). According to Fowler [1], design problems appear as "bad smells" at code or design level and the process of removing them -Refactoring, i.e. an improvement in software structure without any modification of its behavior. Each bad smell, which can be identified by using a set of metrics and their threshold values, provides a more practical way of applying software metrics in the daily work of an engineer. It is held that to improve maintainability, code smells should be eliminated by refactoring. The maintainability of software is important, because it is one of the factors affecting the cost of the future development activities. It is claimed that classes that are involved in certain code smells are liable to be changed more frequently and have more defects than other classes in the code. In other words, it reflects code that is decaying and, unless eradicated, is likely to be the cause of frequent future maintenance, potential

faults, and associated testing overheads. Left unchecked and free to fester over time, smells can soon become "stenches" with the potential for relatively high fault-proneness, added maintenance demands, and extra testing as outcomes industrial resonance—decaying systems consume vast developer resources. The Bad code smells can be understood as a new measure of software maintainability, because removing those bad smells from the code is claimed to make software more maintainable.

So, in our study, we are going to find the relationship between Bad Smells and Class Error Proneness in the three error severity levels that occur in post-release evolution of software for fault prediction using the regression analysis.

II. LITERATURE SURVEY

Bryton et al.[14] worked towards the goal of demonstrating that the *Long Method* code smell can be detected automatically and objectively, grounded on expert's knowledge and statistical analysis, had been fully achieved. But their model could not be generalized, since its calibration was performed upon a single project and its detection ability was only assessed upon the same project. Deursenet. al.[3] collected a series of test smells that helps developers to identify weak spots in their test code and composed a set of specific test refactoring enabling developers to make improvements to their test code in a systematic way, For each smell they gave a solution, using either a potentially specialized variant of an existing refactoring from or one of the dedicated test refactoring. Emden et al [4] discussed the design considerations of a software inspection tool that is based on code smell detection. They showed how code smells can be broken up into aspects that can be automatically detected. Furthermore, they described how the code smell concept may be expanded to include coding standard conformance. They investigated the feasibility of the described approach using a case study in which a prototype tool was developed and applied on a software system. Two notable seminal studies of code smells were undertaken by M'antyl'a et al. [5] and M'antyl'a and Lassenius [5,6] who conducted an empirical study of industrial developers and their opinion of smells in evolving structures. Their study gave insights into which smells developers most "understood" and hence they would be most likely to eradicate—the "Large Class" smell featured prominently. A well-known "taxonomy" for allocating code smell was also proposed by M'antyl'a in subsequent work, M'antyl'a and Lassenius also describe mechanisms for making refactoring decisions based on smell identification. Min Zhang[16] investigated the relationship between six of Fowler et al.'s Code Bad Smells (Duplicated Code, Data Clumps, Switch Statements, Speculative Generality,

Message Chains and Middle Man) and software faults. In this paper they discuss how our results can be used by software developers to prioritize refactoring. They suggested that source code containing Duplicated code and Message Chain Bad Smell should be prioritizing for refactoring. **Li and Shatnawi [12]** investigated the relationship between the class error probability and bad smells based on three versions of the Eclipse1 project. Their result showed that classes which are infected with the code smells- Shotgun Surgery, God Class or God Methods, have a higher class error probability than non-infected classes. **Lozano et al. [8]** assessed the impact of bad smells, i.e., the extent to which different bad smells influence software maintainability.

They argued that it is possible to analyze the impact of bad smells by analyzing historical information. They concluded that, it is possible to assess code quality by detecting and visualizing bad smells. **Khomh et al [9]** in his paper, reported an exploratory study, performed on 9 releases of Azureus and 13 releases of Eclipse, which provided empirical evidence of the negative impact of code smells on classes change-proneness. He showed that classes with smells are significantly more likely to be the subject of changes, than other classes. He also showed that some specific code smells, are more likely to be of concern during evolution. **Olbrich et al. [15]** provided empirical evidence on the issue of how the code smells God Class and Brain Class affect the quality of software systems. They investigated the effects of both smells in three well-known, large-scale open source systems-without normalization with respect to size. The analysis shows that God and Brain Classes have a negative effect measured in terms of change frequency, change size and number of weighted defects. However, when the God and Brain Classes were normalized with respect to size, the results were opposite; these classes were less subject to change and had fewer defects than had other classes. **DhillonPreetKamalet al.[17]** investigated whether the Bad code smells could predict the class error probability in the post-release evolution of Rhino and found that some Bad code smells could still predict class error probability.

III. EXPERIMENT DESIGN

This study has the objective to test the association between the occurrence of bad smells and class error proneness in each error-severity level.

We marked each class as erroneous if there was at least one error found in the class, or not erroneous if no error was found in the class; we also categorized each class according to the three severity categories (high, medium and low). If a class had two errors from two severity categories, we listed the class twice in the data set (one for each error severity). The categorization of the errors in the three categories (high, medium and low) were done on the basis of occurrences/frequency of the errors.

1. High: If the number of errors occurring were above 7, then it was marked as high severity level.

2. Medium: If the number of errors occurring were between 4 and 6(both inclusive), then it was marked as medium severity level.

3. Low: If the number of errors occurring were between 1 and 3(both inclusive), then it was marked as low severity level.

A. The Bad Smells

The following bad code smells were used in the study as detected by the together tool[7].

1) *GC(God Class)*: A class has the God Class bad smell if the class takes too many responsibilities relative to the classes with which it is coupled. The God Class centralizes the system functionality in one class, which contradicts the decomposition design principles. It is difficult to reuse or maintain a God Class. If there are errors in the God Class, the error propagation tends to affect a big part of the system.

In our study, we treat the God Class as a categorical variable, which has the value of either zero or one: zero means that the class is not a God Class and one means otherwise.

2) *GM(God Method)*: A class has the God Method bad smell if at least one of its methods is very large compared to the other methods in the same class. In analogy to God Class, the God Method centralizes the class functionality in one method. It is very difficult for us to understand and maintain large methods and we should split a large method into two or more methods. “

In our study, we treat the God Method as an integer variable whose value indicates the number of God Methods in the class.

3) *RB (Refused Bequest)*: A class has the Refused Bequest bad smell if the class inherits methods that it does not use at all. These unused methods are indicators of bad abstraction and impair to the inheritance hierarchy. This problem can be solved by extracting these methods to a new class at the same level in the inheritance hierarchy.

In our study, we treat the Refused Bequest as an integer variable whose value indicates the number of methods that the class inherits but do not use at all.

4) *SS(Shotgun Surgery)*: A class has the Shotgun Surgery bad smell if a small change in the class causes many different changes to many classes. Shotgun Surgery is an indicator of complicated low-level couplings, which propagate changes and errors to the coupled classes; this phenomenon decreases the maintainability of the class.

In our study, we treat the Shotgun Surgery as a categorical variable, which is assigned either zero—if there is no Shotgun Surgery in the class—or one otherwise.

5) *FE(Feature Envy)*: A class has the Feature Envy bad smell if one of its methods calls many get-methods from other objects to calculate data values. The Feature Envy indicates problems in the class abstraction.

In our study, we treat the Feature envy as an integer variable whose value indicates the number of Feature Envy methods in the class.

6) *LMC (Long Message Chain)*: This smell means a case, where a class asks an object from another object, which then asks another and so on. The problem here is that the first class will be coupled to the whole class structure. To reduce this coupling, a middle man can be used.

In our study, we treat the Long Message Chain as a categorical variable, which is assigned either zero—if there is no Long Message Chain in the class—or one otherwise.

7) *ISP Violation (Interface Segregation Principle Violation)*: ISP means that clients shouldn't be forced to implement interfaces they don't use. In other words, if you have an abstract class or an interface, then the implementers should not be forced to implement parts that they don't care about. The dependency of

one class to another one should depend on the smallest possible interface. Even if there are objects that require non-cohesive interfaces, clients should see abstract base classes that are cohesive. Clients should not be forced to depend on methods they do not use, since this creates coupling.

In our study, we treat the ISP Violation as a categorical variable, which is assigned either zero—if there is no ISP Violation in the class—or one otherwise.

B. The hypotheses

The objective of this study is to investigate empirically the relationship between the bad smells and class error probability in the three error severity levels.

- Hypothesis 1: The Bad code smells cannot be associated with errors of the high-level severity in a class.
- Hypothesis 2: The Bad code smells cannot be associated with errors of the medium-level severity in a class.
- Hypothesis 3: The Bad code smells cannot be associated with errors of the low-level severity in a class.

We tested the association between bad smells and each error-severity level in Hypotheses 1–3. We assumed that each error severity level could be associated with different set of bad smells. We reject Hypothesis 1–3 if at least one of the seven bad smells is associated significantly with error-severity level.

IV. THE STATISTICAL MODEL

In our model we use a categorical variable indicating the error-severity level (we used it to test hypotheses 1–3). We used the Multinomial Multivariate Logistic Regression (MMLR) to study the association between bad smells and the various error-severity levels (the categorical dependent variable). The model is used for purpose of validating the association between bad smells and error proneness or error-severity levels of classes.

The MMLR model is built using only the significant bad smells; however, some bad smells may not contribute significantly at the multivariate level, so we do not include them in the multivariate model.

Univariate Multinomial Regression (UMR) test was done to examine whether there was any significant association between a Bad code smell and various error severity levels. Significant Bad code smells were used for next step of analysis. Multinomial Multivariate Logistic Regression (MMLR) was used to predict class error probability in each error category.

We reject Hypothesis 1–3, if one or more bad smells enter the MMLR model at 95% significance level, i.e. the P-value < 0.05.

The general MMLR model (the UMR model is a special case of MMLR when n is one) is as follows:

$$P_j = \frac{e^{\beta_j + \sum_{i=1}^m \alpha_i X_i}}{1 + e^{\beta_j + \sum_{i=1}^m \alpha_i X_i}}$$

where β_j is the intercept term, α_i is the coefficient of the i th bad smell, and X_i is the vector of bad smells.

β_j is the logit function for category j ;
 m : the number of categories; P_j the probability of error in category j ;
 Y : the dependent variable—it is a categorical variable;

X_i ($1 \leq i \leq n$): are the independent variables, which are the Bad code smells investigated in this study;

B_{ji} ($0 \leq i \leq n$) are the estimated coefficients from maximizing the log-likelihood.

V. DATA COLLECTION

We collected errors for three releases of Rhino project version 1.5, 1.6 and 1.7 using the FindBugs[10] tool. FindBugs is a program which uses static analysis to look for bugs in Java code. FindBugs gives list of probable bugs or errors along with their package name, class name and method name. After that we collected the Bad code smells for all the three versions of Rhino using the Together[7] tool. Together tool is a plugin in eclipse for finding the Bad code smells. Bad code smells used in study are SS, FE, RB, GC, GM, ISP Violations and LMC. Next we associated errors with each class in Bad code smell list. Each class was marked erroneous if at least one error was found and not erroneous if no error was found. After this we further categorized the classes under the error category namely- high, Medium or Low.

VI. ANALYSIS AND RESULT

In analyzing the relationship between bad smells and class error proneness, under each severity level it is important to know the distribution of errors and bad smells in the three releases. Therefore, we report these distributions in Tables I and II.

Table II shows the number of classes that had bad smells. We also provided the total number of classes that had Bad code smells in each release in the last row of the table.

Table I: Distribution of Errors

Error	Rhino 1.5	Rhino 1.6	Rhino 1.7
High	5	6	7
Medium	8	9	14
Low	39	44	78
Total no. of error	156	154	232
No. of error prone classes	52	59	89
Total classes	260	274	630

Table II: Distribution of Bad code Smells

Bad Smell	Rhino 1.5	Rhino 1.6	Rhino 1.7
SS	20	27	44
FE	36	42	45
RB	5	20	41
GC	17	18	22
GM	57	74	80
LMC	5	10	35
ISP	16	22	18
Total	156	213	285

A. The selection of the significant Bad code smells

We use the UMR (Univariate Multinomial Regression) analysis to investigate whether the seven bad code smells(SS, FE, RB, GC, GM, LMC,ISP)are associated with the three error-severity categories. A bad code smell is significantly associated with an error-severity category if its P-value in the UMR analysis is less than 0.05 in all the three severity levels i.e. High, Low and Medium.

Table III shows the results of the MMLR test after the insignificant bad smells were eliminated. We used 0.05 as the cutoff P-value. In the table below the insignificant Bad code smells have been highlighted as these are the smells with significance value more than 0.005, so they have been left out of the MMLR Analysis. The FE (Feature Envy) and RB(Refused Bequest) have been identified as insignificant.

Table III: Univariate Multinomial Regression Analysis

Bad Smell	Category	Rhino 1.5		Rhino 1.6		Rhino 1.7	
		B	Sig.	B	Sig.	B	Sig.
SS	H	3.169	0.000	2.055	0.024	2.592	0.000
	L	1.272	0.031	1.390	0.003	1.566	0.000
	M	2.904	0.000	2.055	0.007	2.592	0.000
FE	H	0.783	0.002	0.706	0.010	0.502	0.035
	L	0.347	0.160	0.398	0.110	0.250	0.263
	M	0.602	0.024	0.638	0.019	0.531	0.011
RB	H	-16.157	-	2.876	0.0022	-16.601	-
	L	1.316	0.157	1.218	0.189	0.817	0.227
	M	-16.157	0.999	-16.506	-	0.920	0.176
GC	H	23.973	-	4.499	0.000	3.983	0.000
	L	3.290	0.000	2.383	0.001	3.255	0.000
	M	3.546	0.001	4.190	0.000	4.312	0.000
GM	H	4.185	0.000	2.126	0.000	1.375	0.000
	L	2.833	0.000	1.067	0.000	1.073	0.000
	M	3.301	0.000	1.916	0.000	1.375	0.000
LMC	H	3.258	0.0014	1.351	0.045	1.142	0.020
	L	-17.447	-	-19.552	-	0.816	0.016
	M	3.546	0.001	0.805	0.339	1.380	0.000
ISP	H	3.121	0.002	1.138	0.280	3.574	0.000
	L	1.357	0.043	0.736	0.176	2.342	0.000
	M	3.526	0.000	2.237	0.001	3.191	0.000

To select an optimal set of independent variables, we perform MMLR (Multivariate Logistic Regression) on the set of bad code smells that have been selected from the above table to generate the models. The final MMLR Analysis are shown in Table IV to VI. Each table shows the coefficient (B) and P-value (Significance) of bad code smells included in the study. In the table, we have highlighted the bad code smells that have significance more than 0.05, signifying they are being not the good predictors for error proneness.

Error Category		B	Significance
High	Intercept	-29.611	.000
	SS	4.704	.019
	GC	22.947	.
	GM	4.762	0.000

Low	Intercept	-2.295	.000
	SS	1.206	.078
	GC	1.706	.074
	GM	2.539	.000
Medium	Intercept	-4.829	.000
	SS	3.275	.000
	GC	1.416	.249
	GM	3.097	.000

Table V: Mmlr Analysis for Rhino 1.6

Error Category		B	Significance
High	Intercept	-6.722	.000
	SS	3.677	.006
	GM	2.340	.000
Low	Intercept	-1.952	.000
	SS	1.343	.005
	GM	0.988	.000
Medium	Intercept	-5.140	.000
	SS	2.819	.003
	GM	2.009	.000

Table VI: Mmlr Analysis for Rhino 1.7

Error Category		B	Significance
High	Intercept	-5.058	.000
	SS	2.165	.000
	GC	3.372	.001
Low	Intercept	-2.345	.000
	SS	1.144	.002
	GC	2.970	.000
Medium	Intercept	-4.455	.000
	SS	2.134	.000
	GC	3.706	.000

In Rhino 1.5, SS and GM Bad code smells are significant predictors of class error probabilities in the two error categories-High and Medium and GM Bad Code smell was a significant predictor in the Low error Category. In Rhino 1.6, SS and GM are significant predictors of class error probabilities for all the three error categories. In Rhino 1.7, two Bad code smells namely SS and GC were significant predictors of class error probabilities for all error categories.

B. Models' Accuracy Evaluation

We learned through the MMLR analysis that we could use some Bad code smells to predict class error-proneness in the post-release evolution of Rhino. This strong association suggests some errors in the source code are indeed related to the design structure of the system (at the class level) in the development as well as the post-release evolution phase of a system.

We use the area under Receivable Operating Characteristics (ROC) curve to evaluate the classification accuracy of MLR. This area measures the association between the observed responses and the predicted probabilities from the model application. The ROC curve plots the probability of detecting true-positives (sensitivity- The sensitivity is the percentage of the

correctly predicted classes in the error category; it is the complement of the Type II error rate.) and false-positives (1 – specificity), the specificity is the percentage of the correctly predicted classes in the no-error category; it is the complement of the Type I error rate, for an entire range of cutoff points. The area under ROC curve ranges between 0 and 1; it measures the discrimination power of the models.

The general rule to evaluate the discrimination is:

- If $0.5 \leq \text{ROC} < 0.6$: no discrimination
- If $0.6 \leq \text{ROC} < 0.7$: poor discrimination
- If $0.7 \leq \text{ROC} < 0.8$: good discrimination
- If $0.8 \leq \text{ROC} < 0.9$: excellent discrimination
- If $0.9 \leq \text{ROC} < 1.0$: outstanding discrimination

Table VII: Area under Roc curve for Mmlr models.

Rhino Version	High	Low	Medium
Rhino 1.5	0.998	0.319	0.828
Rhino 1.6	0.976	0.347	0.845
IRhino.7	0.75	0.404	0.725

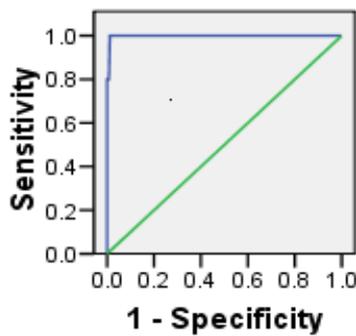


Figure 1 Rhino 1.5 High Category.

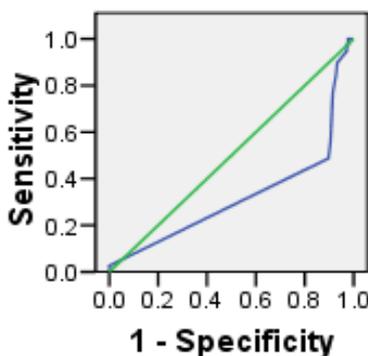


Figure 2 Rhino 1.5 Low Category.

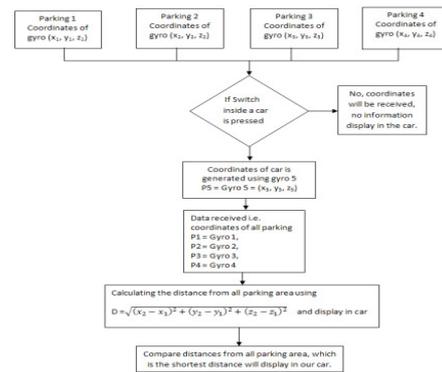


Figure 3 Rhino 1.5 Medium Category.

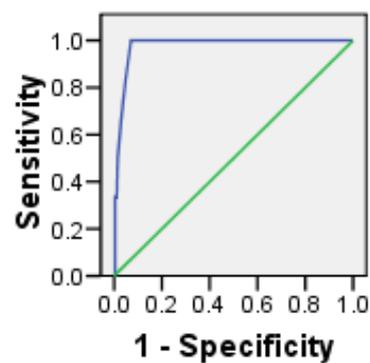


Figure 4 Rhino 1.6 High Category.

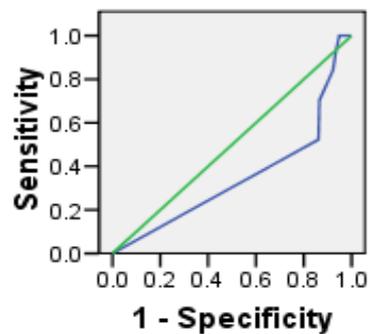


Figure 5 Rhino 1.6 Low Category.

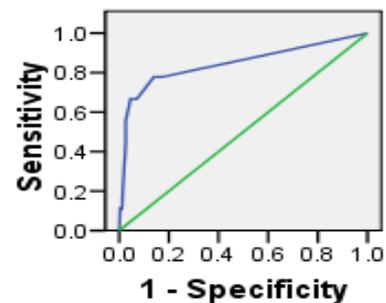


Figure 6 Rhino 1.6 Medium Category.

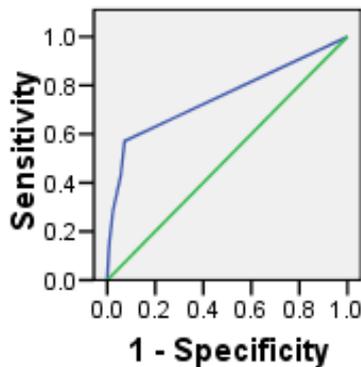


Figure 7 Rhino 1.7 High Category.

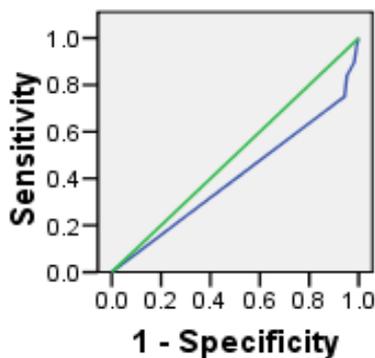


Figure 8 Rhino 1.7 Low Category.

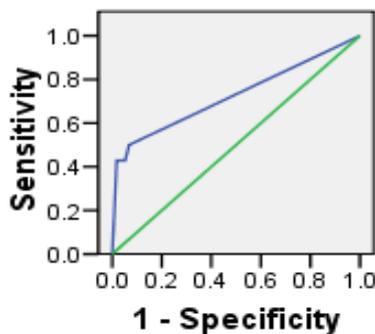


Figure 9 Rhino 1.7 Medium Category.

C. Evaluating models on successive releases

Because our goal was to predict the error-prone classes, we experimented with the use of the prediction model in one release to predict the error-prone classes in the future releases. We applied the Rhino 1.5 prediction model to the Rhino 1.6 and Rhino 1.7 data, Rhino 1.6 prediction model to the Rhino 1.5 and Rhino 1.7 data and Rhino 1.7 prediction model to the Rhino 1.5 and Rhino 1.6 data. Table VIII shows the results.

Table VIII: Application of Mmlr models on other releases

Data/Model	Category	Rhino 1.5	Rhino 1.6	Rhino 1.7
Rhino 1.5	High	0.998	0.993	0.949
	Low	0.319	0.306	0.405
	Medium	0.828	0.822	0.713
Rhino 1.6	High	0.974	0.976	0.841
	Low	0.356	0.347	0.406
	Medium	0.702	0.845	0.684
Rhino 1.7	High	0.816	0.820	0.75
	Low	0.387	0.379	0.404
	Medium	0.412	0.723	0.725

Table VIII shows application of MMLR model on other two releases of Rhino data. From the results, we can analyze that model for all the three versions of Rhino 1.5, 1.6 and 1.7 gave very good results in the high category, the values were mostly above 0.9. For the versions under the medium category, the ROC curve gave good discrimination as the values ranged between 0.70 and 0.85. But for low category model, for all the three versions the result is far below satisfaction level i.e. between 0.3 and 0.4.

VII. CONCLUSION

In this paper we have discussed software maintainability and how it can be achieved using refactoring techniques. The Bad code smells discussed help the developers in deciding whether to refactor a certain part of the software. We investigated whether the Bad code smells could predict the class error probability in the three error-severity levels in the post-release evolution of Rhino and found that some Bad code smells could still predict class error probability. Table IV-VI gave the Analysis model for error prediction. For checking the error prediction accuracy we have formed the ROC curves. ROC curves for MMLR model gave very good results in the high and medium error categories but unsatisfactory results for the low category.. And when one model is applied on other version's data, results were satisfactory (Table VIII) as it closely matched with the values of predicted model value (Table VII). So, we can conclude that predicted models can work satisfactorily for predicting the errors in general. The finding also suggests that refactoring a class, besides improving the architectural quality, reduces the probability of the class having errors in the future.

VIII. THREATS

We have collected errors with the help of open source software FindBugs. We make no claims about errors discovered using software. The Bad code smell data were collected with the help of Together tool. We make no claims about the accuracy of these tools but we believe that the Bad code smell data collected were consistent.

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To build a Patch antenna at 435 MHz

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Abstract- It is found that Patch antennas are mostly built and used for frequencies greater than 1 GHz. At such high frequencies the dimensions of the patch would be smaller and hence it would be easy to fabricate it on pcb itself. In the present study patch antenna is analyzed for its performance below 1GHz. The finding of the study revealed that the patch antennas can be used at frequencies which are lower than 1 GHz but dimensions becomes too large. Also radiation pattern, reflection coefficient, HPBW and other parameters of the antenna were tested and results were found to be satisfactory.

Index Terms- Patch antenna at lower frequencies

I. INTRODUCTION

Patch antennae are usually constructed for frequencies in GHz ranges hence their size becomes smaller. However, as the frequency for our case is in the MHz range, the Patch will be of considerable size. It is quite unusual and actually difficult to build patch at frequencies lower than 1 GHz. In this study we are designing a patch antenna at 435 MHz

II. PATCH ANTENNA

These antennas are popular for low profile application at frequencies above 1 GHz ($\lambda_0 < 0.3m$). They commonly consist of rectangular or square metal patch on a thin layer of dielectric (called the substrate) on a ground plane (Kraus 2006). These antennas are conformable to planar and non-planar surfaces, simple and inexpensive to manufacture using modern printed circuit technology; mechanically robust when mounted on rigid surfaces.

The patch of length say L and width say W sits on top of a substrate (some dielectric) of thickness h with permittivity ϵ . For a rectangular patch, the length L of the element is usually $\lambda_0/3 < L < \lambda_0/2$ (Balanis 2007). The thickness of the metallic strip $t \ll \lambda_0$ (λ_0 is the free space wavelength). Typically the height h is much smaller than the wavelength of operation $h \ll \lambda_0$ (Usually $0.003\lambda_0 \leq h \leq 0.05 \lambda_0$). This substrate ultimately sits on ground plane which is also a metallic plane.

There are numerous substrates that can be used for the design of microstrip antennas, and their dielectric constants are usually in the range $2.2 \leq \epsilon_r \leq 12$. Thick substrates have lower dielectric constant are preferable since it provides better efficiency, larger bandwidth, loosely bound fields for radiation into space but at the expense of larger element size(Balanis 2007).

Like all antennas, patch antennas work because currents in a conductive surface induce electric fields in the surrounding space. Antennas are most commonly compared to dipole antennas because they are the simplest to analyze which is also

true for patch antennas. In a patch antenna the edge of the antenna acts like a dipole antenna, inducing an electric field perpendicular to the radiating edge.

III. CALCULATING DIELECTRIC CONSTANT OF THE MATERIAL

The patch antenna was designed and built using basic equation of the patch antenna dimensions (Balanis 2007)

1. Calculating the wavelength

Wavelength of operation is calculated using the equation:

$$c = fr \cdot \lambda$$

2. Calculating Width

Width of the antenna is calculated as follows:

$$W = \frac{c}{2fr} \sqrt{\frac{2}{\epsilon_r + 1}}$$

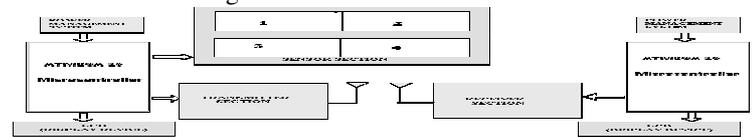
3. Calculating Effective Dielectric constant.

Effective dielectric constant of the substrate is calculated as

$$\epsilon_r(\text{effective}) = \frac{\epsilon_r + 1}{2} + \frac{\epsilon_r - 1}{2} \left\{ 1 + 12 \frac{h}{W} \right\}^{-1/2}$$

4. Calculating fringing length

Due to fringing effective length of the antenna is shorter than the actual calculated length.



5. Calculating Length.

Length of the antenna is calculated as



6. Calculating effective length.

Thus the effective length of the antenna is as follows



A. Initial design

Using above equations dimensions of the patch antenna were calculated considering frequency 435 MHz and dielectric constant of the material equal to 2. The initial design of patch antenna was as: length = 24, width=28.15, height of the substrate=6 mm and the feed point was 7.75 cm away from one of the edge.

B. Use of Simulation software

PCAAD software was used for the simulation of the patch antenna. Simulations of different antennas were done using values. After simulation was done, results were noted and these results were analysed and were to be matched by the experimental tests.

C. Fabrication

The basic design of the antenna was done. The Engineering drawing for the same was drawn and antenna was constructed in workshop. The ground plane was 3mm thick aluminum plate and the patch was 1.5 mm brass plate with a hole at the distance calculated in the design and verified in simulations. The N-type connector was used as a feed.

D. Testing

During first testing the reflection coefficient was found to be at frequency 404 MHz which was way too offset. As the dimensions were calculated accurately, we conclude that the error is either because of the error during fabrication or due to approximate value of the dielectric constant. As we were not sure, we checked both the things. The dimensions were correct. We then calculated the dielectric constant for same dimensions with newly obtained frequency. For reaching accurate results we had to do that several times. Finally dielectric constant of the material was found out to be 2.225. So for this dielectric constant, dimensions were calculated for 435 MHz and design was again simulated. The final design is as: Length=22.3, Width= 27, Height of the substrate=6mm, Distance of feed from the edge=7.25. After verification from the simulation, final testing is done for calculating other parameters such as swr, input impedance and all. Results are given in the table1.

Tab -1:Testing of Patch antenna at 435 MHz on spectrum analyzer

Parameters	Values
Return loss	-15.7 dB
Reflection Coefficient	0.163
SWR	1.39
Input Impedance	69.47 Ohm
Bandwidth	1.6%

IV. RADIATION PATTERN MEASUREMENT

The testing of the radiation pattern was done by keeping two antennas apart at a distance of nearly 12 meters. To measure radiation pattern we have to keep any one (Tx or Rx) antenna in fixed position and rotate other antenna. But as we were not interested in back lobes and side lobes; we just rotate receiving antenna around its own vertical axis. Geometrically it functions same as if the antenna is rotated around the transmitting antenna.

The response of the receiving antenna is observed on the handheld spectrum analyzer. The testing was open air and there were no antennas at same frequency near the test antenna.

Signal level for the received antenna is plotted against angle. The HPBW is found to be 70 degrees. The radiation pattern is as shown in the figure 1.

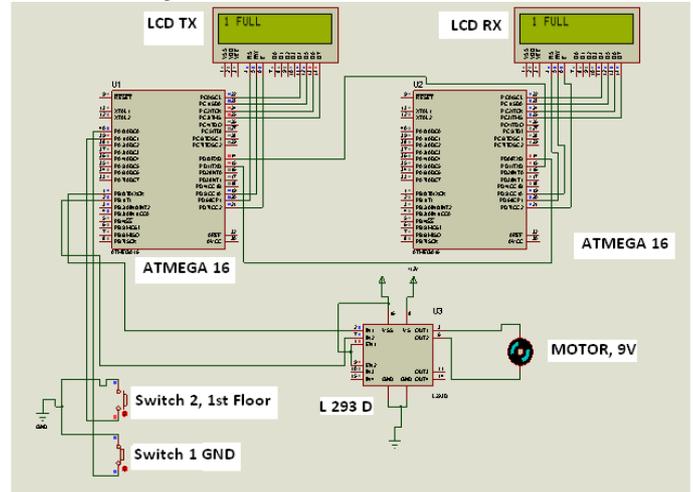


Fig- 1: Test results for the radiation pattern measurement.

V. CONCLUSION

A patch antenna is designed, simulated, fabricated and tested. The dielectric constant of the substrate was accurately found during the design of the antenna. The HPBW of the antenna was found to be 70 degrees and the gain is 3.35. The results are thus as expected.

ACKNOWLEDGMENT

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AIDS – Knowledge and Information needs of Adolescent Girls (16-18 yrs) of Jammu

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Abstract- The present study was an effort to know the AIDS knowledge and Information needs of the adolescent girls of Jammu. Sample was selected from the two Government and two Private institutions. The research was an attempt to study the knowledge level and information needs regarding HIV/AIDS among adolescent girls. The sample comprised of 100 respondents from the East Zone of Jammu City. Systematic random sampling technique was adopted. The tool used for obtaining information was close-ended questionnaire. The findings revealed that there was significant difference regarding knowledge level of HIV/AIDS between respondents of government and private school. Private school respondents had better knowledge as compare to their counter parts. Government School sample lack general knowledge regarding HIV/AIDS and related issues. Majority of the respondents from both the categories had knowledge about affected section and affected age group of society but were ignorant about the most vulnerable group and the level of risk for adolescents. A lot more still needs to be done for combating a campaign against this devastating disease. Political parties, religious leaders and NGOs should join hand for this purpose. The psychologists are also of the view that teaching alone will not solve the problem unless the programmes are framed according to the situation on correcting vicious behaviors like injecting drugs, indulging in heterosexual activity, homo sexuality etc. which would help in decreasing the number in the long run.

Index Terms- AIDS; Knowledge; Information; Adolescent.

I. INTRODUCTION

World is a beautiful place and so is the experience of living in it, it would be tragic if this beautiful experience of living life is shortened by HIV/AIDS, when its prevention is within one's control, though not the cure. AIDS is the Acquired Immune Deficiency Syndrome, where as HIV is the Human Immune Deficiency Virus HIV is the virus that causes the disease that is called 'AIDS'. AIDS has no cure and its effect is the ultimate death of the infected person (WHO, 1985)

HIV/AIDS in J&K

Jammu & Kashmir is a low prevalence state as far as AIDS and HIV positive cases are concerned (Wani. M.A. 2005). Jammu & Kashmir has recently recorded 95 cases of HIV/AIDS, while the state has so far confirmed 745 patients living with the illness (State times, March 13, 2006). Dr. Mohammad Amin Wani Director, J&K State AIDS control society said, thirty seven have died of AIDS in J&K from 2002 to Aug 2005. Low

prevalence state has below 5% HIV positive cases among the high risk groups and below one percent such cases among pregnant women The high risk groups include sex workers, intravenous drugs addicts, and males having sex with males.

ADOLESCENTS AND HIV/AIDS

Approximately one billion people-nearly one out of every six persons on the planet-are adolescents: 85% live in the countries. According to WHO estimates, half of the world's HIV infection is found in adolescents, and youth between 15 and 24 years of age. This is partly because a large part of world population i.e. about one-fifth (22-23%) is adolescents (UNFPA, 1997). Young women are sixteen times more likely to be living with HIV than young men. Amongst the people of 15-24 years old living with HIV, young women make up over 60% (Singh, 2005). Girls and young women are highly vulnerable to HIV/AIDS, and lack of education makes them so. Girls and women face heavier risks of HIV infection than men because their diminished economics and social status compromises their ability to choose safer and healthier life strategies (Mishra, 2005). Women forcibly exposed to HIV infection, for example rape, are being denied their right to life. Many socio, cultural and economic factors restrict women's right to health and right to access to health care facilities, further increasing their vulnerability to HIV (Singh, 2005).

Gaash, et al., (2003) conducted a study to assess the knowledge, attitude and belief on HIV/AIDS among the female senior secondary students in Srinagar district of Kashmir. It was interesting to note that approximately one fourth of the respondents have never heard of the disease. Those who were aware, 49.12% had no idea of the causative agent. Though the main source of information dissemination was electronic followed by print media, about 26% of the respondents had perception that the disease is yet to reach the state. Ignorance of various risk groups within the society was also very much wide spread. A majority of the respondents (87.56%) believed that the presence and spread of HIV/AIDS in the society was due to degradation of moral values among people. The above findings, in general, indicates a poor awareness of HIV/AIDS among educated adolescents in the capital city.

Mahajan and Sharma (2005) conducted a study to determine the "Knowledge level of adolescents towards HIV/AIDS." A comparative study has been conducted on 400 adolescent girls (200 adolescents girls were taken from rural areas and 200 girls were taken from urban areas of Jammu). It is revealed that there is a significant difference in the knowledge level of adolescent girls in urban and rural areas of Jammu, regarding HIV/AIDS. But urban adolescent girls have comparatively better knowledge regarding these issues than rural

adolescents girls. Adolescents need to be taught about the body functions since ignorance perpetuates myths and mis-belief. School teachers play a key role in bringing about this desirable change and serially acceptable approaches to sex education such as letterbox approach may be used for providing scientific knowledge about sex and related issues.

Rahman, et.al., (2009) conducted a study named as “Adolescent knowledge and awareness about AIDS/HIV and factors affecting them in Bangladesh. Adolescents are more vulnerable than adults of unplanned pregnancies, sexually transmitted diseases and HIV/AIDS. Among the adolescents, girls are more vulnerable to STDs including HIV/AIDS. Their knowledge about different diseases is very poor. This paper investigated adolescent's knowledge about sexually transmitted diseases including HIV/AIDS, its mode of transmission and ways of its prevention. Cross sectional study design was adopted for this study. A multistage cluster sampling technique was used to select the sample. Data on 3362 female adolescents irrespective of their marital status was analyzed. The study found that a large proportion of adolescents were not aware about sexually transmitted diseases and AIDS. More than half (54.8%) of the adolescents ever heard about AIDS respectively. On an average, about one tenth of them had better knowledge on AIDS in terms of mode of transmission and prevention. The multivariate logistic regression analysis revealed that adolescent age, years of schooling and knowledge on STDs appeared to be important predictors of the awareness about AIDS

Although, concerted efforts backed by strong political leadership, efforts by government of India and high level of public commitment are being steeped up yet, knowledge, attitude, behaviour and practices (KABP) related to HI V/AIDS reflects an overall lack of awareness coupled with wide spread complacency amongst vast populations across the globe (Sharma, 2006). Keeping this in view, this study has been undertaken with the following objectives:

- To know about the knowledge level of adolescent girls (16-18 years) regarding HIV/AIDS.
- To find out the difference in the knowledge level and information needs of students from government and private schools.

II. METHODOLOGY

The study was conducted on a sample of 100 girls (16-18 years) in Jammu city. Two government and two private schools were selected purposively from Jammu East and 25 girls were drawn randomly from each school. A close ended questionnaire was used to elicit the required information. The data was analyzed by using appropriate statistical test (t-test).

III. RESULT AND DISCUSSION

The information was elicited as per the objectives of the study. The findings of the study have been reported following section:

1. Knowledge level regarding different aspects of AIDS.
2. Information needs.

1. KNOWLEDGE LEVEL REGARDING DIFFERENT ASPECTS OF AIDS .

TABLE NO. 1.1
RESPONDENT’S KNOWLEDGE LEVEL REGARDING
VARIOUS ASPECTS OF HIV/AIDS

N = 100

Aspect of AIDS (Acquired Immune Deficiency Syndrome)	% age Average score	Govt. (Avg. Score)	Private (Avg. Score)
Physiology	71.3	68.6	74
HIV	62.7	61.2	64.2
Transmission	69.3	54	66.5
STDs	57.6	60.3	55.2
Prevention	64.5	71	58
People at risk	56.7	53	60.5
Risk behavior	47.6	44.5	51
Cure	78	74	82
Total		61	64

Table 1.1

Table No. 1.1 depicts that percentage scores obtained by students had variations for different aspects of AIDS.

- The highly scored aspects were cure (78%) and physiology (71%), which indicates that the respondents were aware about cure and physiology of AIDS. This could be possibly because the media has been emphasizing the fatality of the disease, if contracted. Still 22% of the respondents feel that there is a cure for AIDS, possibly lot of research and experimentation is going on in this direction. Moreover every other day in media, there is mention of one or the other research for curing AIDS. Regarding physiology of AIDS the respondents have highly scored, possibly the concept of AIDS has become clear to some extent among the student community. Since the topic has been introduced in the curriculum and the students often interact regarding these aspects with their teachers.
- The area concerning transmission also scored satisfactory (69.3%) and (65%) respectively which is not very high. The respondents are still confused about the preventive methods and are not confident whether these are foolproof.
- The poorly scored areas identified were the STDs (57.6%), people at risk (56.7%) and Risk behaviour (47.6%). The reason could be as these aspects are technical in nature require understanding. The media focuses only on broad aspects emphasizing on awareness, rather than in depth knowledge. The teachers even don't provide the students with detailed information. In Government institutions such topic are left for self-study. Hence the information remains as raw as anything. The educational programmes on sex and AIDS education also give scanty information moreover such programme are limited.

The respondents from Private school had comparatively better knowledge for all the aspects of HIV/AIDS except for the prevention of the disease and the STDs. The overall picture depicts that the knowledge level of all the students from the two categories for all the aspects was low except with slight ray of hope in physiology, cure and transmission. This is possibly due

to the fact the respondents are associated with this concept at the school level besides, the media propagation in this field. The facts remain that the overall awareness is quite low, needs a dynamic and substantial advocacy.

TABLE NO. 1.2
KNOWLEDGE OF STUDENTS ABOUT PHYSIOLOGY OF ADS

N = 100

Institution	Physiology of AIDS (% Av. Score)				Total Average Score	Mean Score	Standard Deviation	t-value
	Abb.	Cause	Effect	Clinical conf.				
Government (n ₁ = 50)	72	53.2	74	75	68.55	6.7	1.5	0.53*
Private (n ₂ =50)	80	57	73	86	74	6.86	1.5	

*insignificant at 5% df= 98 tcrit = 1.99

Table No. 1.2 shows that there is insignificant difference in the knowledge level of Government and Private school girls related to AIDS. Satisfactory level of knowledge was found in areas of clinical Confirmation, Abbreviation and Effect of AIDS for both Government and Private school girls. This could be possibly due to the reason that such area are now included in their curriculum. The technical areas are still of concern. The

areas related to cause were poorly scored by both Government (53.2%) and Private (57%) school girls. Study conducted by **Gaash et.al (2003)** revealed same results that majority of female secondary student in Srinagar had no idea of the causative agent of AIDS.

TABLE NO. 1.3
KNOWLEDGE OF STUDENT ABOUT HIV

N= 100

Institution	Knowledge about HIV (% Average Score)			Total Average Score	Mean Score	Standard Deviation	t-value
	Abbreviation	Spread	Relationship with AIDS				
Government (n ₁ = 50)	50	83	50.5	61.16	4.24	1.59	0.63
Private (n ₂ =50)	56	87	49.5	64.16	4.04	59	

*insignificant at 5% df= 98 tcrit = 1.99

Table NO. 1.3 shows that there is a insignificant difference in the knowledge level about aspects of HIV among Government and Private School girls. No significant difference was found in the knowledge level of Government and Private institutions. Respondents from both the categories scored low (50%) and (56%) for abbreviations and (50.5%) and 949.5%) for its relationship with AIDS. Low scores for abbreviations could be due to the frequent use of acronyms like HIV and AIDS in their day today use. High scores for spread was due to the impact of media and the chapter included in their curriculum. However, relationship of HIV with AIDS was scored very low possibly they were not aware about low HIV infection leads to AIDS.

Anaath and Koopman, (2003) showed similar that majority of the respondets knew that HIV could be passed vertically from mother to child during delivery, and 54% were aware of that breast feeding was viable mode of transmission of HIV.

TABLE NO. 1.4
KNOWLEDGE OF STUDENTS ABOUT TRANSMISSION OF AIDS

N = 100

Institution	Knowledge about transmission of AIDS (% Average Score)		Total Average Score	Mean Score	Standard Deviation	t-value
	Major route of transmission	Mode of transmission Relationship				
Government (n ₁ = 50)	62	47.7	54	2.2	0.93	0.32*
Private (n ₂ =50)	82	51	66.5	2.14	0.93	

*insignificant at 5%

df = 98

t_{crit} = 1.99

Table No. 1.4 reveal no significant difference was found in the knowledge level of Government and Private school girls about Modes of transmission. Low scores from Government (47.7%) and Private (51%) were found regarding various modes of transmission. Private school respondents scored comparatively better than Government schools. The sample from Private institutions was aware about the major routes of transmission like shaking hands, caring for AIDS patients etc. Respondents on an

average scored poorly for modes of transmission, as these aspects being technical in nature require clarity and better understanding whereas masses have attached taboos to it and the clarity about the transmission of disease have still misconceptions. **Garg (1997)** among 15-20 yrs students showed that 59.8% knew nothing about signs & symptoms, most of them had misconceptions about the mode of transmission.

TABLE NO. 1.5
KNOWLEDGE OF STUDENTS ABOUT STDs

Institution	Knowledge about STDs (% Average Score)			Total Average Score	Mean Score	Standard Deviation	t-value
	Abbreviation	Relationship	Incubation period				
Government (n ₁ = 50)	82	46.7	52	60.23	2.58	1.30	0.54*
Private (n ₂ =50)	82	37.4	46	55.13	2.72	1.30	

*insignificant at 5%

df = 98

t_{crit} = 1.99

Table No. 1.5 depicts that the difference in the knowledge level of girls of Government and Private Schools was insignificant. No variations in the scores were found among Government and Private Schools with both scoring low i.e. 46.7% and 37.4% respectively for relationship with AIDS. Both institutions scored low for incubation period. The areas identified were relationship with AIDS and Incubation Period. The respondents had relatively good level of knowledge about Abbreviation of STDs with high scores (82%) for both Government and Private Schools girls. The low scores for incubation and relationship with AIDS show that confusion still

persists in the minds of respondents about the manifestation of the disease. Similar study conducted by Ghosh, et al., (1997) showed that knowledge about HIV/AIDS/STDs was poor among males and females. Majority of the girls preferred safe sex rather than abstinence as their preference for prevention of AIDS. This clearly shows that the attitude of students towards sex and sexual practices are changing. Safe sex to them means using preventing devices like use of condoms, still, they are not sure whether this is effective or a fool proof method.

TABLE NO. 1.6
KNOWLEDGE OF STUDENTS ABOUT PREVENTION OF HIV/AIDS

N = 100

Institution	Prevention of HIV/AIDS		Total Average Score	Mean Score	Standard Deviation	t-value
	Preventive devices	Effectiveness of condoms				
Government (n ₁ = 50)	84	58	71	1.02	0.6	3.5*
Private (n ₂ =50)	88	28	58	1.44	0.6	

*insignificant at 5%

df = 98

t_{crit} = 1.99

Table No. 1.6 deals with the preventive methods and devices for the prevention of AIDS. A significant difference was found in the knowledge level of Government and Private school girls. Students scored high among Government (84%) and Private school girls (88%), clearly indicating that they were aware, that the use of condoms prevents AIDS. The low scores for its effectiveness Government (58%) and Private (28%) show that the respondents were not sure about how effective condoms are and whether it will give total protection or not. Surprisingly,

they prefer safe sex over abstinence (Table No. 1.5) which involves the use of condoms, they are ignorant about the effectiveness of condoms hence are at risk for HIV infection. Study conducted by Pun, **et al., (2003)** showed similar results that 28% of students defined "Safe sex" as condom use. Many young people believe that AIDS is a threat only to members of particular "risk groups"; relatively few believed that could get AIDS (17%).

TABLE NO. 1.7
KNOWLEDGE OF STUDENTS ABOUT PEOPLE AT RISK

N = 100

Institution	People Risk (% Average Score)				Total Average Score	Mean Score	Standard Deviation	t-value
	Affected Section	Affected age-group	Most vulnerable group	Level of risk for adolescents				
Government (n ₁ = 50)	70	82	34	26	53	2.12	0.94	2.13*
Private (n ₂ =50)	74	90	54	24	60.5	1.72	0.94	

*insignificant at 5%

df = 98

t_{crit} = 1.99

Table No. 1.7 shows a significant difference in the knowledge level was found in the two categories. It is evident from the data that the girls have a clear understanding of Affected section of society and affected age group since such information is available from their curriculum and through channels of media. Low scores of knowledge about the most vulnerable group and level of risk for adolescents show that the subject is of technical nature and required in depth knowledge and better understanding. Consequently this section of the people

are exposed to risk of carrying the HIV infection and results thereof. **Mehta (1998)** revealed that young have been recognized as a high risk group both for high risk behaviour and for susceptibility to STD infections. It is estimated that 50% of HI among people aged 15-24 yrs.

TABLE NO. 1.8
KNOWLEDGE OF STUDENTS ABOUT RISK BEHAVIOUR

N = 100

Institution	Risk behaviour (% Average score)			Total Average Score	Mean Score	Standard Deviation	t-value
	Sex related risk behaviour	Medical					
Government (n ₁ = 50)							
Private (n ₂ =50)							

*insignificant at 5%

df = 98

t_{crit} = 1.99

Table No. 1.8 deals with the section on behaviours of people which put them at risk for HIV infection. It included three aspects (a) Sex related behaviour (anal sex, oral, sex, unsafe sex) (b) Medical care related risk behaviours (sterilized needles, blood donation) (c) Social behaviour related (using a public latrine, caring for an AIDS patient). A significant difference in knowledge level of Government and Private Schools was found. Government schools scored overall (46.8%, 41.5% and 45%) in all the three aspects related to risk behaviour in comparison to the Private school respondents who scored just average. Surprisingly, the girls were aware that sex is the major route of

transmission. They were not able to associate those sex behaviours which are risky for HIV transmission. The larger number of respondents were not even aware about the option given for medical care and social behaviour. This shows that they have confusions about the routes of transmission in their mind. A study conducted by **Sharma, et.al (2001)** revealed that a small number of people believed that they would be at risk of getting the disease and majority were confident that they would never get HIV.

TABLE NO. 1.9
KNOWLEDGE OF STUDENT ABOUT CURE OF AIDS

N = 100

Institution	No cure % average scores	Total Average Score	Mean Score	Standard Deviation	t-value
Government (n ₁ = 50)	74	74	0.74	0.57	2.63*
Private (n ₂ =50)	82	82	0.44	0.57	

Table No. 1.9 shows that there is a significant difference in the knowledge level of Government and Private school girls. Among Government school girls (74%) and (82%) Private schools believed that there is no cure for AIDS. Still 26% of Government and (18%) of Private school girls feel that there is a cure for AIDS, possibly because of research and experimentation in this area. Moreover every other day in media, there is a mention of some or the other progress in the direction. Those we are aware of the facts that till date there is No Cure for AIDS only prevention can restrict. Study conducted by **Agarwal, et al., (1999)** indicated different results that 27% of pupils thought that there was a vaccine available for HIV. In one particular school studied, 47% of students thought that there was a cure for AIDS.

2. INFORMATION NEEDS IDENTIFIED

After assessing the knowledge level of students regarding AIDS, certain gaps in the knowledge level of information of students have emerged. These gaps clearly indicated a partial knowledge of students about AIDS. Since the various aspects of AIDS are inter related and inter dependent. It means that a clear understanding of their disease does not exist. Their knowledge is superficial and incomplete. With a vaccine in sight for immunization against the AIDS transmitting virus, the only method of controlling the spread of the disease is through knowledge, education and behavioral prevention (Nag, 1994).

Thus identifying the information to these will go a long way in the control of the pandemic.

The different sections are being discussed here in the order of their priority and the urgency of attention they demand:-

1. Risk Behaviour: has low score of knowledge level. All the three aspects of risk behaviours related to sex, medical care and social behaviour need urgent attention. Students were confused and not clear about the preventive risk behaviour related to sex.

2. STDs: Majority of the respondents do not clearly relates STDs relates with AIDS and hence have confusion about the manifestation of the disease.

3. People at Risk: Majority of the respondent scored low for the most vulnerable group and the level of risk for youth and were exposed to risk of carrying the HIV infection and the results thereof.

IV. SUMMARY AND CONCLUSION

Acquired Immune Deficiency Syndrome (AIDS) is recognized as the most devastating disease humankind has ever faced. The epidemic began in 1981 and by the end of the year 2004, nearly 40 million people across the globe were affected by it. Today, AIDS is rapidly wiping to the hard earned gains of human development in terms of regressing life expectancy, rising child mortality rates and killing the most productive and reproductive population in the prime of the youth. It is seen that the infection is rapidly spilling from populations with high risk behaviour to the general population and also from urban to rural areas. Since there is no cure for the disease, its prevention becomes paramount. The present study AIDS-knowledge and Information Needs among Adolescent Girls (16-18 years) of Jammu is a comparative study conducted to assess the existing level of knowledge about HIV/AIDS, and to find out the difference in the knowledge level and information needs of students from Government and Private schools. A close ended questionnaire was used as a tool for data collection, which has been adjudged by NACO Delhi. The data was subjected to quantitative analysis by using appropriate statistics test (t-test). The results were shown in table and figures. The study revealed that there was difference regarding knowledge level of HIV/AIDS between Government and Private school respondents. The difference in the knowledge level of girls of Government and Private school regarding Physiology of AIDS was found to be insignificant. Satisfactory level of knowledge was found in the areas or clinical confirmation, abbreviation and effect of AIDS for both Government and Private school girls. But the area related to cause is of still concern knowledge level about of HIV among Government and Private school girls shows insignificant difference. Both the categories scored low for abbreviations and relationship of HIV with AIDS. Private school scored comparatively higher level of knowledge about spread of HIV than Government schools. No significant difference was found in the knowledge level of Government and Private sample about transmission of AIDS. Low scores were found regarding various modes of transmission among both the categories. Private schools scored high when compared to Government about major route of transmission. Government school girls

scored high for STDS when compared to Private school girls. Both type of institutions scored low for relationship with AIDS and incubation period. The equal number of respondents of both Government and Private schools scored high for abbreviation of STDs. Majority of respondents of both categories preferred safe sex rather than abstinence as their preference for prevention of AIDS. Students of both categories scored high in the prevention of AIDS clearly indicating that they were not sure about the effectiveness of condoms. A significant difference knowledge level of Government and Private girls was found about People at Risk. Both schools scored high for affected section of society and affected age group. The areas of concern are the most vulnerable group and level of risk for adolescence. Government schools scored poorly in all the three aspects related to risk behaviour as compared to the Private schools. Private schools scored high as for as cure of AIDS was concerned.

Thus it is clear from the above findings that an overall knowledge level of respondents was low. Through Private school girls were more knowledge than Government school girls but confusion could be seen in certain areas regarding AIDS awareness and were not able to give scientific explanation about the same.

This HIV/AIDS is not a health problem alone, but a problem of such magnitude that every fact of human life is affected. So the need of the hour is to impart the right kind of information at the right time. Adolescence should be provided unbiased, moralistic information so that they are better informed and better adjusted to their changing Physical, biological and emotional needs. It is my firm belief that openness of minds clean and clear are prerequisite for awareness of the problem to arrest and prevent the havocs of the deadly disease.

V. SUGGESTIONS

- Parents especially mothers should not feel any kind of hesitation in talking to their children about sensitive issues such as sexual activity and precautions and try to impart sex education and satisfy all their queries at appropriate age.
- Teachers should encourage their students to clear their doubts related to HIV/AIDS and related topics. They should not leave such topics for self study.
- Media especially T.V. and Radio can play a key role and provide awareness about the AIDS and related issues.
- Advertisements of HIV/AIDS should be telecast at peak hours and also in the mid of the popular serials to catch the attention of the viewers.
- AIDS awareness programme targeting people in the age-group of 15-49 years could be organized at the national level on parallel lines such as the pulse polio campaign and telecast from different T.V. Channels.

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Preference of Media for Imparting Aids Education among Adolescent Girls (16-18 Years)

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Abstract- "The present study was an effort to know the preference of media for imparting AIDS education among the adolescent girls (16-18 years). Sample was selected from the Government and Private institutions, two schools from each. The research was an attempt to identify their sources of information and their preference for media and the strategies adopted for imparting HIV/AIDS education programme. The sample comprised of 100 respondents from East Zone of the Jammu City. Systematic and random sampling technique was adopted. The tool used for obtaining the information was close-ended questionnaire. The findings revealed that T. V. news, Newspaper articles and conversation with friends / peers were found to be the most preferred media for receiving the information. Majority of the respondents, from both government and private schools emphasized on imparting AIDS education. 50% of the sample from both these categories preferred 'Group Approach' but in separate group for boys and girls. Majority of sample from both of the categories preferred safe sex for the prevention of AIDS, though not sure about their efficacy. A lot more still needs to be done for combating a campaign against this dreaded disease. Political parties, religious leaders and the NGOs should join hand for this humanitarian purpose. Besides, the psychologists are also of the view that mere classroom teaching alone will not solve the problem, unless the programmes are framed as per the situation for correcting vicious behaviors like injecting drugs, indulging in heterosexual activity, homo sexuality etc. which would help in reducing the infected number in the long run.

Index Terms- Preference, Media, AIDS, Education, Adolescent

I. INTRODUCTION

As the twentieth century drew to a close, and the mankind entered into a new millennium, the world witnessed a lot of spectacular events coupled with magnanimous enthusiasm and joy. Indeed, it was time to celebrate for the mankind had achieved a lot in terms of growth and development. But, for the families of a few million people, there were no celebrations at all because they had lost their dear and loved ones to the calamity of AIDS. Unfortunately, even today the AIDS still continues to take its heavy toll of human lives despite a target, proposed to eliminate it by 2015 (Mehta and Sodhi 2006). No infectious disease in the modern era other than the HIV/AIDS has had such a debasing impact, on the world's youngest and the most vulnerable of them. The HIV/AIDS has become a human, social

and economic disaster, with far reaching implications for the individual communities and countries (Mishra, 2005).

II. FACTORS DRIVING THE AIDS EPIDEMIC

In the recent times, there has been a growing awareness of the complex, biological, socio-cultural, economic, political and psychosocial forces shaping the face of the AIDS pandemic. Meaningful strategies to reduce HIV related risks among populations are not possible without a thorough understanding of these factors. Some of the major factors fueling the AIDS epidemic have been summarized:

1. **Biological factors** a) Age at the time of initial HIV infection (b) Sexual vulnerability (c) Presence of STD.
2. **Socio-Cultural factors** a) Sex and sexuality - A Taboo (b) Machismo Behaviour (c) Violence against women (d) Norms and Practices (e) Educational and HIV (f) Myths and Misconceptions
3. **Economic factors** (a) Migration (b) Prostitution
4. **Political factors** (a) War (b) Ethnic conflict (Mehta and Sodhi 2006).

III. WORLD SCENARIO

AIDS cases were first reported in the USA in the year 1981. Today, twenty five years later, AIDS has engulfed the entire globe by transforming itself into a pandemic. According to the new estimates from the Joint United Nations programme on HIV/AIDS (UNAIDS) and the World Health Organization (WHO) more than 70 million people have been infected with this virus, out of which over 30 million have already died. At the end of the year 2004, an estimated 40 million people globally were living with the HIV infection. The number of children presently alive with the HIV problem is 2.5 million and the women nearly 43%. Global estimates indicates that more than 95% of all HIV infected people live in the developing world and has also experienced 95% of AIDS deaths till date

(UNAIDS, 2004)

As the world enters the third decade of AIDS epidemic, the evidence of its impact is undeniable. Wherever the epidemic has spread unchecked, it is robbing countries of the resources and capacities on which human security and development depends. In some regions, the HIV in combination with similar diseases is driving even larger parts of nations towards destitution.

INDIAN SCENARIO

India has the highest number of reported HIV/AIDS cases in the entire South Asia region. There are as many as 5.1 million people affected by the HIV/AIDS in India, about 85% of the South Asia as a whole, according to the recent World Bank report. In the world, India has the second highest number of reported cases of HIV/AIDS, just below South Africa's total of 5.3 million. What is alarming is that most of the HIV/AIDS affected people in India are between the age group of 15-49 (Sinha,2006).

IV. WOMEN ARE EPIDEMIOLOGICALLY MORE VULNERABLE THAN MEN

- ❖ They tend to marry or have sex with older men who may have had more sexual partners and hence be more likely to be infected.
- ❖ Women frequently require blood transfusions during child birth and abortions, as prevalence of anaemia amongst pregnant women in developing countries is usually very high (Singh,2005).

Additional it may be stated in this context that after having previewed the heavy human toll caused by HIV/AIDS epidemics, it is a high time that a great rapport is formed between the health channels and the people. The present study partly has developed this rapport to invoke people's quest of ways that can arrest the spread and also prevent as best as possible the havoc created by this deadly problem. Verma and Pauri (1997) under took a study to assess and compare AIDS awareness among students or metropolitan city (Mumda) and the smaller city (pune). Finding revealed that the most important sources of information were foreign magazines (65%) followed by Indian newspapers/magazines (43%), friends (32%), and T.V. (15%). Many students (59%) from Pune and (69%) from Mumbai expressed their willingness to join the campaign against AIDS. Bhatia, et aL, (2004) conducted an intervention study to enhance AIDS awareness among under privileged population in Chandigarh. The results revealed that, Television was the most used source of information, but school programmes on HIV/AIDS were considered the most useful source.

Ms. Sharmila Tagore, India's UNICEF Goodwill Ambassador said that we need to challenge ourselves by breaking taboos- acknowledging that children don't need myths and punishment but facts and support. And realizing that even more dangerous than HIV are complacency and neglect (UNAIDS, 2002) Keeping this in view, this study has been undertaken with the following objectives:

1. To identify the sources of information of adolescent girls regarding AIDS.
2. To assess their preference for media and strategies for an HIV/AIDS education programme for adolescent girls.

V. METHODOLOGY

The study was conducted on a sample of 100 girls (16-18 years), in the Jammu city. Two government and two private schools were selected purposively from the Jammu East and 25

girls were drawn randomly from each school. A close ended questionnaire was used to elicit the required information. The data was subjected to quantitative as well as qualitative analysis. The data was analyzed by using appropriate statistical test (t-test).

VI. RESULTS AND DISCUSSION

The information was elicited as per the objectives of the study. The findings of the study have been reported under the following section:

1. Sources of information.
2. Preference of media and strategies for imparting AIDS education.

1. SOURCES OF INFORMATION

TABLE NO. 1.1
% RESPONSES FOR SOURCE OF INFORMATION

Sources	Total (%)	Government m = 50 (%)	Private n ₂ = 50 (%)
Articles in newspaper	51	58	44
Conversation with health professionals	16	8	24
Conversation with friends	35	32	38
Radio Spots	15	18	12
Radio News	22	30	14
Longer radio Programmes other than news	12	8	16
TV Spots	24	28	20
TV News	40	34	46
Longer T.V Programmes other than news	30	28	32
Posters & billboards	23	34	12
Magazine Articles	31	32	30
Advertisements in magazines & newspaper	26	32	20

School	41	38	44
Booklets, Pamphlets, or books	25	28	22
Community leader	6	4	8
Health education talks health professionals	32	34	30

Schools & colleges should teach about AIDS & sex education	91	92	90
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Multiple responses.

"Table No. 1.1 shows the responses for the sources of information for the respondents of both types of institutions, Government and Private. Majority of respondents from Government (58%) and Private (44%) have learned about AIDS from Articles in newspaper. Majority of the households got newspaper in English or many other regional languages. Its make it easy for the youth to learn about AIDS from the newspapers. Another highest scored source of Information for respondents of both categories was Conversation with friends. Reason behind this may be, that the young people not only know the best, how to communicate with each other additionally they will also be trusted by their friends. Youngsters are often uniquely imaginative, using currently fashionable styles of music, theatre, and act as powerful vehicles for information. Other major source of information about HIV/AIDS was T.V. This could be due to the economic liberation and growth of Mass Media. The media, every now and then before and in between, the most popular and seen serials give their advertisements that related to HIV/AIDS. School was also among major source of information among both Private and Government school respondents. Since the topics likes physiology of AIDS are introduced in their curriculum and students often discuss these aspects with their teachers whom they trust. Study conducted by Mishra (2005) indicates same results that the T.V. was the most used source of information.

2. PREFERENCE FOR IMPARTING AIDS EDUCATION

TABLE NO.2.1
% RESPONSES FOR NEED OF AIDS EDUCATION
N = 100

Question	Total (%)	Government n ₁ = 50 (%)	Private n ₂ = 50 (%)
It is important to impart AIDS * education to adolescent	93	94	92

Table No. 2.1 shows that the girl respondents of Government and Private schools feel the need of AIDS education. Adolescents at this age want to discover and learn more about sex and AIDS education. Discussions can help them to prevent mistakes which can be very costly. Hence this indicates that education is vital in the fight against AIDS and that schools and colleges are recognized as the prime institution for implementing maximum number of the adolescence, who are perceived to be at greater risk of getting HIV/AIDS due to lack of knowledge and information about it. Study conducted by Bannerjee and Mattle (2000) reveal that the youth in India lack proper knowledge about HIV/AIDS and also have misconceptions about modalities of transmission, and many harbor negative attitudes towards those who test positive for HIV/AIDS. Education of course must be implemented in a culturally relevant manner.

Table No. 2.2
% RESPONSES FOR MEDIA PREFERENCE AMONG ADOLESCENCE.

N = 100

Question	Total (%)	Government n ₁ = 50 (%)	Private n ₂ = 50 (%)
Interpersonal Channel	13	16	10
Mass Media	67	68	66
Little Media	5	10	0
Institution Network	15	6	24

Table No. 2.2 shows that the mass media is the most preferred one (67%) by adolescents. The possible reasons for this may be that they perceive mass media to be the more reliable than other information sources. The preference for other sources like friends, interpersonal channels, institutional channels etc was not scoring high. Reason being that they may not feel free to discuss the issue with others, hence mass media was rated high. It must however, be acknowledged that mass media was less reliable than the health professionals of institutional networks (Pruthi, 1995).

Table No. 2.3

% RESPONSES FOR PREFERRED STRATEGIES.
N = 100

Question	Total (%)	Government nj = 50 (%)	Private (n ₂ = 50) (%)
Individual Approach	17	20	14
Group Approach	46	42	50
Mass Approach	37	38	36

Table No. 2.3 depicts that 46% of the respondents felt that group approach is the best strategy to follow for imparting AIDS education among the adolescents. Even today people have an inhibition and cannot talk freely about sex, a taboo ridden issue in our society. The parents and teachers in our society are not so free to discuss these issue individually to their children and students. Hence, the group approach is the best strategy to follow, where respondents can shed their inhibitions and feel at ease to talk with each other and discuss their queries related to the topic. Group education could facilitate wide interaction, variety of views and free discussion, contradictions and ultimately all such measures leading to a consensus.

Table No. 2.4

% RESPONSES FOR PREFERRED STRATEGY FOR AIDS AWARENESS PROGRAMME.
N = 100

Question	Total (%)	Government nj = 50 (%)	Private (n ₂ = 50) (%)
AIDS awareness programme should be held for			
* Boys and Girls separately	51	52	50
* Mixed Group	49	48	50

Table No. 2.4 shows that almost 50% of respondents preferred AIDS education in a mixed group and 50% preferred to receive AIDS education separately for different sexes. Observations regarding AIDS education among boys and girls put together is as yet not fully justified and uniformly agreed upon by the society. The reason being that the Jammu society in particular continues to be a taboo ridden society and the interaction among boys and girls is not appreciated in full. Hence, the curriculum planners can effectively use the resources, by having education for both the sexes together and also separately for each group as per the need and besides as the situation demands. By providing them sex education in mixed group the respondents would become more easy and develop relaxed social relationship between the two sexes.

Mukhopadhyay et al., (2001) found that an active NGO involves both sexes for imparting sex education, and revealed that it tends to raise more awareness about sex and sexual matters.

Table No. 2.5

% RESPONSES FOR PREFERENCE FOR AIDS EDUCATION COUNSELORS.
N = 100

Question	Total (%)	Government n _x = 50 (%)	Private (n ₂ = 50) (%)
" Teachers of School	22	18	26
Resource people from community	2	2	2
Both teacher and community resource people	10	6	14
Peers of the students	15	18	12
Combination of the above	51	56	46

Table No. 2.5 shows that majority (51%) of respondents want the combination of teachers, resourceful people, peers of the students to be the counselors for AIDS education. The trained peer educators to be used extensively in youth programmes possibly because, young people not only know the best, how to communicate with each other, additionally they will also be trusted by their peers. Youngsters are often uniquely imaginative, using currently fashionable styles of music, theatre, and act as powerful vehicles for information. As far as teachers are concerned, they are the role model of the students and can play a key role in the prevention of HIV/AIDS by imparting necessary education to the youth regarding sexual activity. Community resourceful people can also play an effective role in AIDS awareness programmes as they are trusted by the community. People listen to and follow them. Hence, it shows that they want to have combination of counselors to have better understanding about the disease. Hence the above preference could be successfully utilized by curriculum planners for imparting AIDS education to the youth. Mahajan and Sharma (2005) revealed that school teachers play a key role in bringing about desirable change and socially acceptable approaches to sex education.

Table 2.6
% RESPONSES FOR PREFERENCES OF AGE TO START AIDS EDUCATION.

N = 100

Question	Total (%)	Government nj = 50 (%)	Private (n ₂ = 50) (%)
Primary (uptil 5 th class)	2	2	2
Middle School (5 th -8 th class)	5	6	4
Secondary (9 th -10 th class)	28	24	22
Senior Secondary (11 th -12 th class)	54	54	54
College level (Graduate & Post Graduate)	11	14	8

Table No. 2.6 shows that majority of respondents (54%) feel that AIDS education should be imparted from the senior secondary level (11th - 12th class). However there are also respondents to the tune 28% who indicate a lesser age group as the basic unit where from the sex education is warranted. But it would be feasible and quite befitting to start AIDS education latest by reaching puberty age. Also studies have shown that sex education at an early age does not initiate sexual activity of any kind among children. Shilpa and Ratna Kumari (1999) showed that students expressed interest in including HIV/AIDS as one of the topics at the high school level.

VII. SUMMARY AND CONCLUSION

World is a beautiful place and so is the experience of living in it. It would be tragic if this beautiful experience of a living life is shortened by HIV/AIDS, even when its prevention is within one's control, though not the cure. AIDS is the Acquired Immune Deficiency Syndrome, where as HIV is the Human Immune Deficiency Virus HIV is the virus that causes the disease what is called "AIDS". AIDS has no cure and its ultimate effect is the death of an infected person (WHO, 1985)The present study Preference of media for imparting AIDS education among Adolescent Girls (16-18 years) of Jammu region is a study conducted to identify the sources of information and preference for sources of imparting AIDS education. A close ended questionnaire was used as a tool for data collection. The data was subjected to quantitative and qualitative analysis by using the appropriate statistics test (t-test). The results were shown in tables and figures. The study revealed that majority of the respondents from both government and private schools preferred

mass media and its allied sources of information about AIDS and other related topics. Besides, a section from private institution preferred institutional networks whereas, the respondents from government schools laid emphasis on interpersonal channels. The variation in views is primarily due to the fact that the respondents show a little of hesitation and reservation to discuss such sensitive and personal issues in public. It would be, therefore, feasible and befitting to start the AIDS education, latest by the puberty age. The need to impart AIDS education was felt by a maximum number of respondents and the majority preferred the school as an important medium to do the needful at senior secondary (11-12th class) level. To make the project effective and practical all such agencies should put in their efforts individually and collectively in this behalf. Majority of the girls of both categories showed preference for counseling through teachers, community resource persons and peers of the students. For the AIDS study a strategy of Group approach was preferred by both of the categories. 50% of girls from both government and private schools preferred that AIDS education should be imparted in separate groups of boys and girls; where as 50% preferred a mixed one. Those advocating a mixed group justify that process would help in better and broader understanding of the problems. Another section equally comprising (50%) prefer separate grouping for boys and girls, for reasons of hesitancy and reservation. They stated during informal discussions they hardly got any 'information regarding HIV/AIDS in their schools and topics like reproduction were sometime left for self study. Even their parents don't share such information with them. This shows that both teachers and parents usually feel hesitant discussing such issues with their children. As a consequence, they turn to their peers for related information which is often inadequate, imperfect and not fool proof. Thus, the information imparted remains raw. Hence they go in for self-experimentation.

Psychologists equally are concerned about the tragic consequences of the AIDS epidemic. However, besides its other aspects like spread, protection and prevention, they lay stress only upon the behavioral instinct of the people. Most effective programme would be the system of a campaigning program that would focus on changing the behaviours that place people most "at the risk" of acquiring HIV. Behaviours such as injecting drugs, using infective needles, engaging in un-protective sex, and having sex with multiple partners. They do agree the task is quite complicated, yet the combat against the risks of the infection on all fronts should be on. One may sum up that besides the academic implication of the problem, an effective campaign challenging the issue is to start from the home itself. Multiply the campaign to carry it further, on a war footing. Parents, teachers, social activists health professionals, family welfare centre's press, radio, T.V etc and even Yogi's including the religious centers should come forward and shed their hesitation and serve as preachers, defenders and protectors to save the vast multitude of the "human population from the dreaded AIDS.

VIII. SUGGESTIONS

- ❖ Parents should develop healthy relationships with their children.

- ❖ Parents should not snub their children on asking question related to sex and HIV/AIDS.
- ❖ Teachers are the role model of the students and can play a key role in imparting sex education before young people initiate sexual activity.
- ❖ To make students aware about HIV/AIDS and myths and misconceptions related to it, group discussions, question box, role play, case study, debate, painting/poster competition and quiz contest should be held in the educational institution for time to time.
- ❖ AIDS awareness programme targeting people in the age-group of 15-49 years could be organized at the national level on parallel lines such as the pulse polio campaign and telecast from different T.V. Channel.
- ❖ Teachers should encourage their students to clear their doubts related to HIV/AIDS and related topics. They should not leave such topics for self study.
- ❖ Teachers should encourage their students to clear their doubts related to HIV/AIDS and related topics. They should not leave such topics for self study.

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Scaly Neural Networks for Speech Recognition Using DTW and Time Alignment Algorithms

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Abstract- Speech recognition has been an active research topic for more than 50 years. Interacting with the computer through speech is one of the active scientific research fields particularly for the disable community who face variety of difficulties to use the computer. Such research in Automatic Speech Recognition (ASR) is investigated for different languages because each language has its specific features. Neural Networks are, in essence, biologically inspired networks since they are based on the current understanding of the biological nervous system. In essence they are comprised of a network of densely interconnected simple processing elements, which perform in a manner analogous to the most development of neural networks, and a basic introduction to their theory is outlined in this elementary functions of a biological neuron. Reduced connectivity neural networks are discussed and the scaly architecture neural network is described. Various algorithms are available to perform this time alignment of the input pattern to the neural network and the performance of the neural network is dependent upon the performance of the time alignment algorithm used. In this chapter, the various types of time alignment algorithms are described and their operation is outlined in detail.

Index Terms- The Perception, Multi-Layer Perception, Error Back Propagation Algorithm, Scaly Neural Network Architecture, Experimental Procedure, Time Alignment Algorithms, Linear Time Alignment, Dynamic Time Warping, Trace Segmentation.

I. INTRODUCTION

In addition, the published research work also provides a big weight-age to get admissions in reputed varsity. Now, here we enlist the proven steps to publish the research paper in a journal. Automatic Speech Recognition (ASR) is investigated for different languages because each language has its specific features. In this paper we present scaly neural network for speech recognition and preprocessing of speech using time alignment algorithm. Two of the major problems in speech recognition systems have been due to the fluctuations in the speech pattern time axis and spectral pattern variation [13]. Speech is greatly affected by differences in the speaker such as age and sexes as well their physical and psychological condition. The pitch and speed of the speaker will be altered by the way they feel at the time. If they are agitated, angry or short of time they will most likely speak at a faster rate and higher pitch than when they are calm and relaxed [7].

Speaking rate variation results in non-linear fluctuations in the speech pattern time axis. The length of the input pattern to the neural network in question is constrained by the number of input neurons to the neural network since this type of network architecture cannot be varied once trained. The input pattern vectors must be modified to fit the neural network while still retaining all their discriminating features.

Various algorithms are available to perform this time alignment of the input pattern to the neural network and the performance of the neural network is dependent upon the performance of the time alignment algorithm used. In this chapter, the various types of time alignment algorithms are described and their operation is outlined in detail.

II. THE PERCEPTION

The idea of the simple neuron model first emerged in the 1940s with the work of McCulloch and Pitts [11]. The cybernetics movement, which ensued, attempted to combine biology, psychology, engineering and mathematics resulting in architectures for networks of neurons, which would perform a number of tasks. In 1949, Herb's book [5] put forward the theory of neural networks developing "internal representations" related to experience.

In the 1950s, research continued initially into the development of networks to perform specific tasks but this changed and the goal became to develop machines that could learn. By the end of that decade there had been a lack of significant developments and work in this field diminished considerably.

In the 1960s, interest was revived with the publication of a book by Rosenblatt [12] where he defined the concept of the perceptions and laid down many theories about them. In their simplest form, these processing elements, also known as, nodes or artificial neurons have the structure illustrated in figure 2.1. It was proved theoretically that a perceptron could learn to perform any task as long as it was possible to program it to do so.

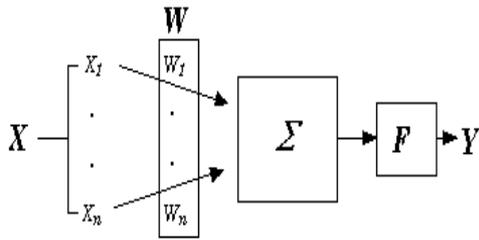


Figure 2.1 : The General Structure Of A Perceptron

A set of inputs (X_1 to X_n) is applied to each node representing the inputs from the outside world or, alternatively, they may be outputs from other nodes. Each input is multiplied by a weight (W_1 to W_n) associated with the node input to which it is connected and the weighted inputs are then summed, A threshold value (C) local for each node is added to the weighted summation and the resulting sum is then passed through a hard limiting activation function (F). The output of a node is therefore

The perception effectively splits the input patterns into two distinct regions with one region being represented by a 1 on the output and the other a 0. Rosenblatt's training algorithm for the perceptron would converge if the input patterns to the perceptron were linearly separable. The perceptron would therefore approximate the decision boundary between the two classes of outputs.

Perceptions were successfully trained to perform certain tasks but there were failures that could not be overcome. Minsky and Paper pointed out the serious shortcomings of perceptions [15] and interest in the study of neural networks again declined.

The Exclusive-Or (Ex-Or) function is a major illustration of the limitation of perceptions. For the ex-or function an output of 1 is generated if the inputs are {0,1} or {1,0} and an output of 0 is generated if the inputs are {0,0} or {1,1}. This is not a linearly separable function so the perceptron cannot learn it. A more complicated decision surface is required here and it was found that a curved decision surface is required to separate the two classes of inputs.

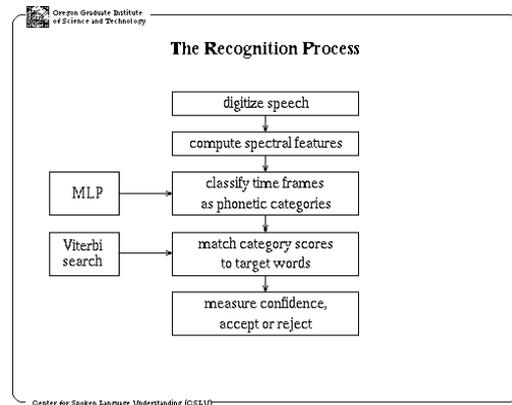
2.2 The Multi-Layer Perceptron.

Minsky and Paper had proposed a solution to the problem posed by functions such as the ex-or. They suggested that an extra layer of nodes with non-linear activation functions could be introduced. The output would now be a non-linear combination of the inputs so more complicated decision surfaces could be represented. The problem that remained was that no training algorithm was available to train such a network of perceptions at time

During the 1970s more research turned towards the representation of knowledge and away from learning and many new ideas were developed. Then, in the 1980s, there was a resurgence of interest in neural networks and it was during this time that an effective algorithm, called back propagation, for the training of multi-layer perceptron (MLP) structures was developed [16].

2.3 The Recognition Process using MLP's

There are four basic steps to performing recognition. Each step will be explained briefly



First, we digitize the speech that we want to recognize; for telephone speech the sampling rate is 8000 samples per second. Second, we compute features that represent the spectral-domain content of the speech (regions of strong energy at particular frequencies).

These features are computed every 10 msec, with one 10-msec section called a *frame*. Third, a neural network (also called an ANN, multi-layer perceptron, or MLP) is used to classify a set of these features into phonetic-based categories at each frame. Fourth, a Viterbi search is used to match the neural-network output scores to the target words (the words that are assumed to be in the input speech), in order to determine the word that was most likely uttered[21].

2.3.1 The Error Back Propagation Algorithm

Error back propagation is a gradient descent algorithm where weights and biases are adjusted to minimize a cost function equal to the mean square error in the network.

For a 3-layer neural network with N input nodes and M output nodes, the network's weights are initially set to small random values. An input/output vector pair p is presented to the network with input vector

$$x_{p0}, x_{p1}, \dots, x_{pN-1}$$

and target output vector

$$t_0, t_1, \dots, t_{M-1}$$

From this input vector an output vector is produced by the network which can then be compared to the target output vector. If there is no difference between the produced and target output vectors no learning takes place. Otherwise the weights are changed to reduce the difference. The weights are adapted using a recursive algorithm which starts at the output nodes and works back to the hidden layer.

First, we digitize the speech that we want to recognize; for telephone speech the sampling rate is 8000 samples per second. Second, we compute features that represent the spectral-domain content of the speech (regions of strong energy at particular frequencies).

These features are computed every 10 msec, with one 10-msec section called a *frame*. Third, a neural network (also called an ANN, multi-layer perceptron, or MLP) is used to classify a set of these features into phonetic-based categories at each frame. Fourth, a Viterbi search is used to match the neural-network output scores to the target words (the words that are assumed to be in the input speech), in order to determine the word that was most likely uttered[21].

The error in the network when training pair p is presented is defined as;

$$E_p = 1/2 \sum (t_{pj} - o_{pj})^2 \quad (2.1)$$

Where:

t_{pj} is the target value for the j th element of the output pattern from the training pair p .

o_{pj} is the actual value produced by the network for the j th element of the output pattern when the input pattern from the training pair p is presented to its input.

The overall error is therefore

$$E = \sum_p E_p \quad (2.2)$$

The input to node j is

$$net_{pj} = \sum_i w_{ji} o_{pi} \quad (2.3)$$

Where:

$w_{ji}(t)$ is the weight from the i th node of the previous layer to the j th node at time t than the input/output pair p is presented to the network.

o_{pi} is the output of the i th node of the previous layer.

A non-linear activation function is employed in each node such that the output of node j

To implement a gradient descent the negative derivative of E_p with respect to w_{ij} must be proportional to the change in the weight w_{ij} , $\frac{\delta E_p}{\delta w_{ij}}$. Therefore,

$$\Delta_p w_{ji} \propto - \frac{\delta E_p}{\delta w_{ji}} \quad (2.5)$$

Applying the chain rule to (2.5) gives

$$\frac{\delta E_p}{\delta w_{ji}} = \frac{\delta E_p}{\delta net_{pj}} \frac{\delta net_{pj}}{\delta w_{ji}} \quad (2.6)$$

From (2.3) it can be seen that

$$\frac{\delta net_{pj}}{\delta w_{ji}} = \frac{\delta}{\delta w_{ji}} \sum_i w_{ji} o_{pi} = o_{pi} \quad (2.7)$$

Applying the chain rule to (2.6) gives

$$\frac{\delta E_p}{\delta net_{pj}} = \frac{\delta E_p}{\delta o_{pj}} \frac{\delta o_{pj}}{\delta net_{pj}} \quad (2.8)$$

From (2.1) it can be seen that

$$\frac{\delta E_p}{\delta o_{pj}} = \frac{\delta}{\delta o_{pj}} 1/2 \sum (t_{pj} - o_{pj})^2 = -(t_{pj} - o_{pj}) = -\delta_{pj} \quad (2.9)$$

From (2.4) it can be seen that

$$\frac{\delta o_{pj}}{\delta net_{pj}} = f'_j(net_{pj}) \quad (2.10)$$

Substituting (2.7), (2.9) and (2.10) into (2.6) gives

$$- \frac{\delta E_p}{\delta w_{ji}} = -(-\delta_{pj}) f'_j(net_{pj}) o_{pi} = \delta_{pj} f'_j(net_{pj}) o_{pi} \quad (2.11)$$

As mentioned earlier, the negative derivative of E_p with respect to w_{ij} must be proportional to the change in the weight w_{ij} , D_p to implement a gradient descent.

Therefore,

$$\Delta_p w_{ji} \propto \delta_{pj} f'_j(net_{pj}) o_{pi} \quad (2.12)$$

Let,

$$\Delta_p w_{ji} = \eta \delta_{pj} f'_j(net_{pj}) o_{pi} \quad (2.13)$$

Where:

η is a small constant known as the learning rate.

Then,

$$w_{ji}(t+1) = w_{ji}(t) + \eta \delta_{pj} f'_j(net_{pj}) o_{pi} \quad (2.14)$$

$$w_{ji}(t+1) = w_{ji}(t) + hd_{pij} (net_{pj}) o_{pi}$$

Where:

$w_{ji}(t+1)$ is the weight from the i th node to the j th after adjustment.

Equation (2.14) is known as the standard delta rule and defines how weights are changed after the presentation of a training pair. The activation function must be non-linear since, otherwise, the neural network would perform a linear transformation at each layer and could therefore be reduced to its equivalent single layer network. The effectiveness of the extra layer of perceptions is then lost. The activation must also be differentiable as required by equation (2.11). The sigmoid function is the one most often used since it meets all the requirements

2.3.2 The Scaly Neural Network Architecture

A problem with fully connected neural networks is their size. When it comes to the practical implementation of neural networks size becomes an important factor. In hardware implementation this becomes a problem of scaling and the number of components required. In the case of computer simulation the problem comes with the large computational cost. The larger and more complex the network the longer it takes to train and once trained it takes longer for the network to perform its recognition task. For this work the concern is with the computational cost.

In general, it is not known what size of network works best for a given task and this problem is unlikely to be resolved since

each task demands different capabilities from the network [6]. As with the decision about the number of hidden units, the size of network tends to be decided on a trial and error basis and the designers own experience. One such approach is to start with a fully connected network and then gradually Prune it. This involves removing those weights, which are close to zero and contribute little to the solution [4]. Another approach is to base the network architecture on prior knowledge of the structure of the input data. The network topology can then be arranged to reflect the data structure. Examples of this approach are Demichelis et al [1], Hampshire and Waibel. All of these structures are similar in that the input nodes are grouped into zones, which are connected to one node or a group of nodes in the hidden layer. Krause and Hackbut used' scaly type architecture to reduce the number of connections in a network. They showed that performance of a neural network does not necessarily improve as the number of connections between the nodes is increased. This architecture uses overlapped zones and was shown to support high recognition rates for isolated word recognition. Figure 2.3 shows an example of a neural network where scaly architecture has been applied between the input layer and the hidden layer. This is the approach adopted for the work here since the localized structure of the input zones is somewhat analogous to the cochlear processing which occurs, in the human ear [4]. A preliminary investigation into the ability of a scaly architecture neural network was carried out by A.D. Smith at the University of Newcastle Upon Tyne [14]. Smith's work suggested that further investigation of this network was required to better determine the effect of changing the parameters of the network. The work in this thesis is the continuation of that preliminary work.

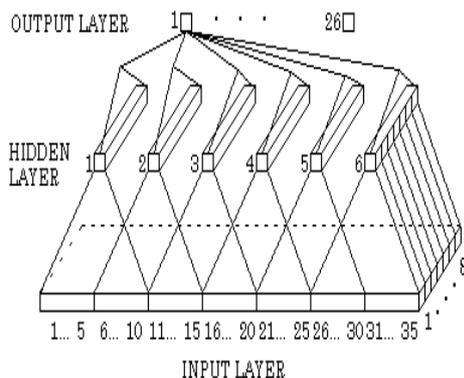


Figure 2.3 : Scaly Neural Network Architecture

The input data is processed and presented to the network such that successive feature vectors or frames are presented to the network inputs, each coefficient of the feature vectors being presented to one of the input nodes. The hidden nodes are also grouped into frames of the same size as those in the input layer. The input frames are further grouped into input zones with each frame of hidden nodes being assigned to a zone of input nodes. Each hidden node is connected to its equivalent node in the input frames of the zone associated with that hidden frame. The input

zones overlap such that some of the input frames connected to one hidden frame will also be connected to the adjacent frames.

In the example network shown in figure 2.3, the network is capable of taking input patterns of 35 feature vectors containing 8 coefficients. To accommodate this, architecture with 280 input nodes is required. The scaly neural network therefore consists of an input layer with 35 frames each of 8 nodes. The number of frames in a zone is taken as 10 frames with an overlap of 5 frames so the number of frames required in the hidden layer is 6. The hidden layer therefore consists of 6 frames each of 8 nodes equaling 48 nodes in total. The number of output classes is 26, so 26 nodes are required in the output layer.

A disadvantage of the reduced connectivity is that some of the robustness of the neural network is lost but large savings in computational cost are gained. The output of each node is calculated using equation 2.1 and the number of operations required is shown in table 2.1. In this case, the computational cost is reduced by nearly two-thirds by employing the scaly architecture.

III. PREPROCESSING OF SPEECH DATA USING TIME ALIGNMENT ALGORITHM

As mentioned in section 2.3, two of the major problems in speech recognition systems have been due to the fluctuations in the speech pattern time axis and spectral pattern variation [13]. Speech is greatly affected by differences in the speaker such as age and sexes as well their physical and psychological condition. The pitch and speed of the speaker will be altered by the way they feel at the time. If they are agitated, angry or short of time they will most likely speak at a faster rate and higher pitch than when they are calm and relaxed [7].

Speaking rate variation results in non-linear fluctuations in the speech pattern time axis. The length of the input pattern to the neural network in question is constrained by the number of input neurons to the neural network since this type of network architecture cannot be modified once trained. The input pattern vectors must be modified to fit the neural network while still retaining all their discriminating features.

Various algorithms are available to perform this time alignment of the input pattern to the neural network and the performance of the neural network is dependent upon the performance of the time alignment algorithm used. In this chapter, the various types of time alignment algorithms are described and their operation is outlined in detail.

3.2 Time Alignment Algorithms

The simplest time alignment algorithms are linear. However, they take no account of the importance of the feature vectors within the pattern vector when deleting or duplicating them to shorten or lengthen the pattern vector if required. Important features, therefore, may be lost in the process.

On the other hand, non-linear time alignment algorithms are more complicated and involve higher computational expenditure. Their advantage lies in the fact that they recognize important features and attempt to retain these features in the time aligned pattern vector. Two non-linear time alignment algorithms are dynamic time warping (DTW) and trace segmentation (TS)

3.2.1 Linear Time Alignment

Linear time alignment algorithms are the simplest algorithms to implement and they can be used for both expansion and compression of the speech pattern vector. There are various ways of implementing linear algorithms but all use the basic method of deleting feature vectors to shorten the speech pattern and duplicating feature vectors to lengthen the speech pattern. An example is to duplicate or delete vectors at regular intervals along the pattern vector until the speech pattern is the correct size. An example of a linear algorithm used in conjunction with a neural network is that of Woodland [17]. Woodland achieved recognition rates of 91% for multiple speaker recognition and 88.3% for speaker independent recognition. And while we implement in javasapi4/5 we can get around 94%.

3.2.2 Dynamic Time Warping

The DTW algorithm removes timing differences between speech patterns by warping the time axis of one speech pattern until it maximally coincides with the other. All pattern vectors are warped against a reference pattern vector of the same category, which has the same number of feature vectors, as there are frames in the input layer of the neural network.

After the relevant feature extraction has taken place, speech patterns can be represented as a sequence of feature vectors,

$$A = a_1, a_2, \dots, a_i, \dots, a_K \quad B = b_1, b_2, \dots, b_j, \dots, b_M$$

Let A be the reference speech pattern and B be the pattern vector to be aligned against A . Figure 3.1 shows A and B developed against the i and j axes.

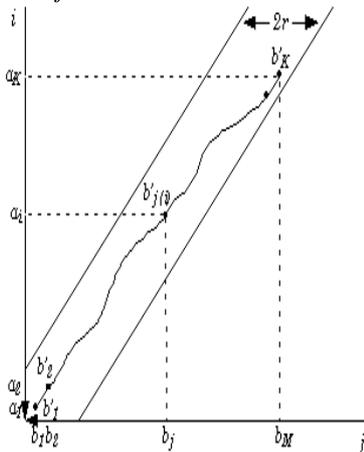


Figure 3.1 : Warping Function And Adjustment Window

Consider a warping function F between the input pattern time j and the reference pattern time i , where $j = j(i)$

A measure of the difference between the two-feature vectors a_i and b_j is the distance $d(i, j) = || a_i - b_j ||$

When the warping function is applied to B this distance becomes

$$d(i, j(i)) = || a_i - b'_j ||$$

Where:

b'_j is the j th element of B after the warping function has been applied.

The weighted summation of these distances on the warping function is

$$E(F) = \sum_{i=1}^K d(i, j(i)) * w(i)$$

Where:

$w(i)$ is a nonnegative weighting coefficient.

E reaches a minimal value when the warping function is determined to optimally align the two pattern vectors.

The minimum residual distance between A and B is the distance still remaining between them after minimizing the timing differences between them. The time-normalized difference is defined as follows:

$$D(A,B) = \text{Min}_F \left[\frac{\sum_{i=1}^K d(i, j(i)) * w(i)}{\sum_{i=1}^K w(i)} \right]$$

Certain restrictions are applied to the warping function to ensure that it approximates the properties of actual time axis fluctuation. This means it should preserve all the significant linguistic features present in the speech pattern being warped. Such properties are monotonic and continuity [12]. These can be realized by imposing the following conditions on the warping function E .

Monotonic conditions

$$j(i-1) \leq j(i)$$

Continuity conditions

$$j(i) - j(i-1) \leq 1$$

Boundary conditions are imposed as follows;

$$j(1) = 1$$

$$j(K) = M$$

An adjustment window is implemented such that

$$| i - j(i) | \leq r$$

Where r is a positive integer. The adjustment window condition is imposed since the time axis fluctuation does not yield excessive timing differences, therefore the algorithm must do likewise.

The final constraint imposed is the slope constraint condition. The results of this condition is that if $b_{j(i)}$ moves forward in one direction, m times consecutively, then it must step

n times in the diagonal direction before it can step any further in that direction. This ensures a realistic relation between A and B by ensuring that relatively short segments of one are not mapped to relatively long segments of the other. The intensity of slope constraint is measured as follows;

$$P = n/m$$

Increasing P more rigidly restricts the warping function slope but if it is too severe then time normalization is not effective.

The denominator of the time normalized distance equation can be defined as:

$$N = \sum_{i=1}^K w(i)$$

Since N is independent of the warping function F it can be put out of the bracket in $E(F)$ simplifying the equation as follows:

$$D(A,B) = \frac{1}{N} \text{Min}_F \left[\sum_{i=1}^K d(i, j(i)) * w(i) \right]$$

Minimization can be achieved by applying dynamic programming principles. There are two typical weighting coefficient definitions, which allow this simplification, one for symmetric time warping, and one for asymmetric. In symmetric time warping the summation of distances is carried out along a temporarily defined time axis $l = i + j$. The previous discussion has described asymmetric time warping where the summation is carried out along the i axis warping B to be of the same size as A . In asymmetric time warping the weighting coefficient is defined by the following

$$W(i) = j(i) - j(i - 1)$$

When the warping function attempts to step in the direction of the j axis the weighting coefficient reduces to 0, since $J(i)=j(i-1)$

Therefore,
 $W(i) = 0$

And when the warping function steps in the direction of the i axis or the diagonal, then,
 $W(i) = 1$

Then
 $N=K$

Applying Dynamic programming principles to the simplified time normalization equation gives the following algorithm for calculating the minimal value of the summation:

The dynamic programming equation is

$$g_1(i, j(i)) = \min [g_{1-1}(i-1, j(i-1)) + d(i, j(i)).w(i)]$$

The time-normalized distance is

$$D(A,B) = \frac{1}{N} g_1(K, j(K))$$

The initial condition is

$$g_1(1, 1) = d(1, 1) * w(1) = d(1,1)$$

The dynamic programming equation for $P = 0$ is

$$g(i, j(i)) = \min \begin{cases} g(i-1, j-1) + d(i, j(i)) \\ g(i-1, j) + d(i, j(i)) \end{cases}$$

The permissible paths through which the warping functions may move under this slope constraint are shown in figure 3.2(a).

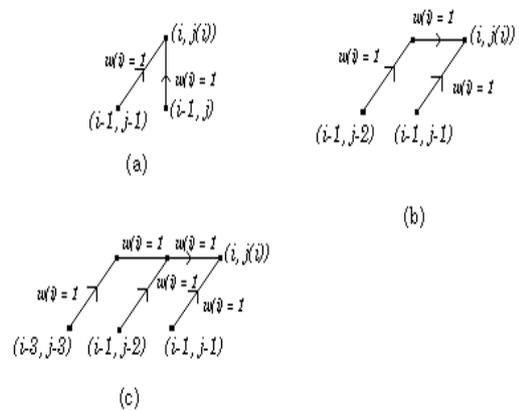


Figure 3.2 : Possible Warping Function Paths Under Different Slope Constraints

For $P = 1$ the dynamic programming equation will be

$$g(i, j(i)) = \min \begin{cases} g(i-1, j-2) + (d(i, j-1) + d(i, j))/2 \\ g(i-1, j-1) + d(i, j) \end{cases}$$

The permissible paths through which the warping functions may move under this slope constraint are shown in figure 3.2(b).

For $P=2$ the dynamic programming equation will be

$$g(i, j(i)) = \min \begin{cases} g(i-1, j-1) + d(i, j) \\ g(i-1, j-2) + (d(i, j-1) + d(i, j))/2 \\ g(i-1, j-3) + (d(i, j-2) + d(i, j-1) + d(i, j))/3 \end{cases}$$

The permissible paths through which the warping functions may move under this slope constraint are shown in figure 3.2(c).

The entailing result is that, for the initial condition, the first feature vector of B is taken as the first feature vector of the warped pattern vector b_1' . Subsequent feature vectors for the

warped pattern vector are chosen such that the n th feature vector is that feature vector from the input pattern vector B closest to the n th feature vector of the reference pattern vector.

The asymmetric dynamic time warping algorithm only provides compression of speech patterns. This means that a linear algorithm must be used with any speech patterns that need to be expanded. This is acceptable since no feature vectors are being deleted when a linear algorithm is used in this form and there is no danger of losing important features of the speech pattern.

3.2.3 Trace Segmentation

Trace segmentation (TS) was introduced by Kuhn et al in 1981 and was used on its own and in conjunction with dynamic programming (DP) methods for isolated word recognition [9]. Two databases were used to train and test the speech recognition systems. The TS algorithm on its own performed worse than DTW on its own yielding error rates of around 10%. When the TS algorithm was used as a preprocessing step to DP it performed better than the DP alone. This method was also found to offer savings in computational expenditure of a factor of 10 or more over the DP algorithm used on its own. TS is based on the assumption that despite timing differences, for speech signals of the same category, fluctuations in the frequency spectrum with time will occur in the same sequence but over different lengths of time.

Assuming speech patterns of the same form as A and B in the previous section e.g.

$$A = a_1, a_2, a_i, a_K$$

And also assuming that each feature vector contains N features

$$a_i = (a_{i1}, a_{i2}, \dots, a_{iN})$$

Which can be represented as a point in N -dimensional space, the speech pattern can therefore be seen as a trace of points in N -dimensional space.

Where there is no change in frequency there will be a high density of points and where the frequency changes are rapid the points will be widely spaced. Removing those, which occur during the stationary portions of the speech pattern, can reduce the number of feature vectors in a trace. Kuhn et al achieved this by summing the Euclidian distances between successive feature vectors of a pattern vector to give the total length D of the trace [9]. If F feature vectors are required in the time aligned pattern vector then D is divided into $F-1$ segments of length L where $L = D/(F-1)$

The most suitable vectors from the pattern vector are selected as follows. The first feature vector of the input pattern vector is taken as the first feature vector of the time aligned pattern vector. Successive feature vectors of the time aligned pattern vector are then chosen such that the Euclidian distance between each of them is as close to L as possible. The final time aligned pattern vector should therefore consist of F feature vectors with Euclidian distances between them of approximately L .

Lienard and Soong used the TS algorithm for the recognition of the P-set from the English alphabet which consists of the letters "P", "B", "T", "D", "V" and "Z" spoken by 4

speakers and obtained promising results [10]. Nadeu et al also applied TS to isolated word recognition of the ten Catalan digit words spoken by one speaker [11]. It was found that the recognition did not significantly degrade when TS was applied to the speech signal prior to recognition unless the number of frames removed from the speech signal by the algorithm was very high.

Gauvin and Mariani applied the TS algorithm to connected speech recognition comparing it to a linear time alignment algorithm and another non-linear time alignment algorithm, comparing fixed length and variable length versions of the algorithms [2]. The variable length trace segmentation algorithm gave the best recognition results. The TS algorithm was used in conjunction with a neural network by Demichelis et al [1] for the recognition of isolated digits. They achieved 86.4% performance and compared this to an hidden Markov model (HMM) approach where a 95% recognition rate was achieved. TS is used in conjunction with a neural network for the research. The DTW time alignment algorithm and the TS algorithm are compared when used in conjunction with neural networks.

As with the asymmetric DTW, trace segmentation algorithm only provides compression of speech patterns. This means that a linear algorithm must be used with any speech patterns that need to be expanded. As mentioned previously, this is acceptable since no feature vectors are being deleted when a linear algorithm is used in this form and there is no danger of losing important features of the speech pattern.

IV. METHODOLOGY

Using the multilayer back propagation algorithm used to test the network of the spoken words for the five speakers. Each speaker has to test the network by 11 words repeated four times. Each speaker, tests the word four times and the node with the higher number in the output will be the winner node. Comparing this node with the input word to the network will indicate the correct answer.

As a result, vocalizations can vary widely in terms of their accent, pronunciation, articulation, roughness, nasality, pitch, volume, and speed; moreover, during transmission, our irregular speech patterns can be further distorted by background noise and echoes, as well as electrical characteristics (if telephones or other electronic equipment are used). All these sources of variability make speech recognition, even more than speech generation, a very complex problem.

V. IMPLEMENTATION AND TESTING

Cloud Garden has produced a full implementation of Sun's Java Speech API, allowing a large range of SAPI4 and SAPI5 compliant Text-To-Speech and Speech-Recognition engines (in many different languages) to be programmed using the standard Java Speech API[19]. The Java TM Speech API, developed by Sun Microsystems in cooperation with speech technology companies, defines a software interface that allows developers to take advantage of speech technology for personal and enterprise computing. By averaging the inherent strengths of the Java platform, the Java Speech API enables developers of speech-

enabled applications to incorporate more sophisticated and natural user interfaces into Java applications and applets that can be deployed on a wide range of platforms.

Testing

The Java Speech API defines a standard, easy-to-use, and cross-platform software interface to state-of-the-art speech technology. Two core speech technologies are supported through the Java Speech API: speech recognition and speech synthesis. Speech recognition provides computers with the ability to listen to spoken language and to determine what has been said. In other words, it processes audio input containing speech by converting it to text. Speech synthesis provides the reverse process of producing synthetic speech from text generated by an application, an applet or a user. It is often referred to as text-to-speech technology [20].

Microphone: Desktop speech recognition systems get audio input through a microphone. Some recognizers, especially dictation systems, are sensitive to the microphone and most recognition products recommend particular microphones. Headset microphones usually provide best performance, especially in noisy environments. Table-top microphones can be used in some environments for some applications.

VI. RESULTS AND DISCUSSION

Using the same multilayer back propagation algorithm to test the network of the spoken words for the five speakers. Each speaker has to test the network by 11 words repeated Four times. Each speaker, tests the word four times and the node with the higher number in the output will be the winner node. Comparing this node with the input word to the network will indicate the correct answer. So by testing the words said by each speaker the performance can be found by this equation.

$$\text{Performance} = \frac{\text{Total succeeded number of testing words}}{\text{Total number of words}} * 100\%$$

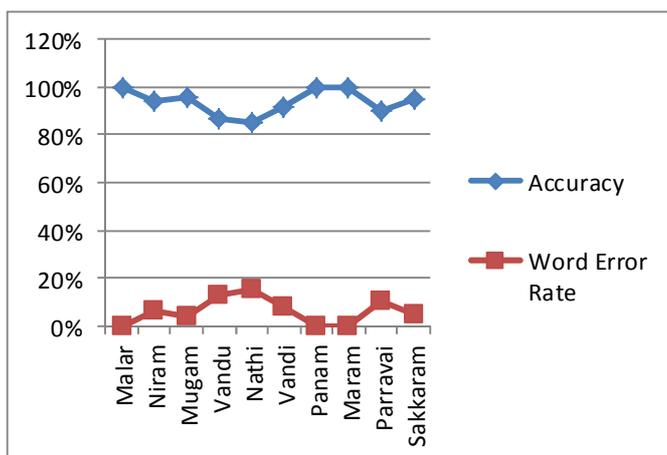
Word recognition or word accuracy percentage rates for each condition were found using the formula:

$$\text{Word Accuracy} = \frac{\# \text{ of words correctly recognized} * 100}{(100 - \# \text{ of words/commands skipped} - \# \text{ of words mispronounced})}$$

Table 1: Results of Neural Network Based Speech Recognitions:

Word	Malar	Niram	Mugam	Vandu	Nathi	Vandi	Panam	Maram	Parravai	Sakkaram
Accuracy	100%	94%	96%	87%	85%	92%	100%	100%	90%	95%
Word Error Rate	0%	6%	4%	13%	15%	8%	0%	0%	10%	5%

1.1 Graph Represents the Accuracy and Error Rate of Words



VII. SUMMARY

An introduction to the basic theory of neural networks in general and scaly neural networks in particular has been given in this chapter. This thesis deals with the performance of scaly neural networks for isolated word reognition . The next we will deal with the specific problem of preprocessing the speech signals so that they can be presented in an appropriate form to the neural network inputs.

The concept of time alignment algorithms for preprocessing the speech pattern before it is presented to a neural network was introduced the two types of algorithm available, linear and non-linear, were described. Possible implementations of a linear algorithm were outlined and two non-linear algorithms were described in detail. The first was the widely used dynamic time warping algorithm which has been used both with and without neural networks for speech recognition and the less well known trace segmentation algorithm. Non-linear algorithms take into account the importance of feature vectors when adding or discarding them to change the length of speech patterns. This means they offer less danger of losing important features of the speech signal. For this reason, non-linear algorithms are the main interest of this thesis. The trace segmentation algorithm offers

great computational savings over the dynamic time warping algorithm so in chapter 4 the performances of the two are compared to find out if there is any loss in performance incurred by the TS algorithm

VIII. CONCLUSIONS

The scaly type architecture neural network has been shown to be suitable for the recognition of isolated words in the form of letters of the English alphabet achieving high recognition rates for small vocabularies. When it came to the harder task of recognizing the whole English Words the scaly architecture could not compete with the fully connected architecture. Many more permutations of the scaly architecture than were looked at here are available and further investigation of the scaly architecture is carried

The trace segmentation was shown to be a good choice for use as a time alignment algorithm with the neural Network. It offers high computational saving over the dynamic time warping algorithm with very little or no drop in performance. In some cases it actually outperforms the dynamic time warping algorithm. Recognition of the words was carried out in speaker independent mode. In this mode the tested data is presented to the network are different from the trained data. The linear prediction coefficient (LPC8) with 12 parameters from each frame improves a good feature extraction method for the spoken words.

Since the first 12 in the cepstrum represent most of the formant information. In all speech recognition systems, the data is recorded using a noise-cancelling microphone, since this type of microphone is not available, the data was recorded using a normal microphone, but recorded in a closed room without any type of noise. Hence using the first type of microphone would give even better results.

Recognition of the letters was carried out in multiple speaker modes. The data will be used in speaker independent mode since this is very much suitable and useful in real world situations. In this mode the test speakers never before heard by the network have spoken data presented to the network. This is a much more practical implementation when we use high quality microphones in closed room we can achieve around 96% accuracy and performs better results for future use.

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An Appraisal of MFIs in Sri Lanka

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Abstract- Small and Medium Scale Enterprises (SMEs) comprise essential elements in the lubrication and development of any economy. In Sri Lanka, the story makes no remarkable difference as SMEs outnumber the large business in the economy. Over the years the government of Sri Lanka has devised a number of policies aimed at developing SMEs. While most policies actually failed due to poor implementation, others however, succeeded. Few studies have been made in the past to identify the role of SMEs to the development of Sri Lanka's economy, its problems and prospects which created a vacuum on the role of government and other financial institutions in the development of SMEs. This article evaluates the role of Micro Finance Institutions (MFIs) as a powerful tool for the poverty alleviation and entrepreneurial development in Sri Lanka. The paper reviews the existing literature. The findings of the literature reveal that Sri Lankan SMEs face many domestic challenges in achieving economies of scale. The challenges are question marks on the viability of the MFIs, absence of a cohesive regulatory and supervisory system for the micro finance, shortage human capital, inadequacy of IT knowledge, difficulty in up-to-date services access by the sub urban practitioners, and entrepreneurs' personal shortcomings. Hence there is a need exist for a development of fully fledged micro finance industry. This paper attempts to identify the challenges as a positive step toward formulating a workable framework for the SMEs to overcome them.

Index Terms- Challenges, Employment generation, MFIs, Small Businesses

I. INTRODUCTION

The growing concern on employment generation in Sri Lanka poses a challenge not only to individuals but also to the government. At the individual level, the establishment of business enterprises particularly Small or Medium Enterprises in their own has been an alternative to lucrative employment (Muktar, 2009). Unfortunately, several problems have presented as limitations to most of the business which not only affects the growth of the enterprises but also survival susceptible. Among these numerous limitations are the problems of readily access to capital, lack of managerial expertise, poor or absence of infrastructural facilities—especially power to support smooth, effective and efficient operations.

According to Bharti and Shylendra (2011) access to capital is critical in the promotion of entrepreneurship development particularly microenterprises. Similarly, Simtowe and Phiri (2007) and Muktar (2009) stated credit as a precondition to the growth of enterprises/entrepreneurship. To enhance the growth

and development of the nation and control redundancy, various efforts had been made by the government of Sri Lanka such efforts include the promulgation and establishment of Microfinance Institutions (MFIs).

Microfinance refers to all types of financial intermediation services (savings, credit funds transfer, insurance, pension remittances, etc.) provided to low-income households and enterprises in both urban and rural areas, including employees in the public and private sectors and the self-employed (Robinson, 2003). Hence it is the provision of credit and other financial services to the low-income group and micro entrepreneurs to enable them build sustainable enterprises.

In Sri Lanka, Small and Medium Enterprises have played a great role. It has been a significant provider of employment. It is estimated that in terms of value, the sector accounts for about 25 per cent of the manufacturing output. The sector is estimated to employ about 15 lakh persons in over 20 thousand enterprises throughout the country. Further, this sector has consistently registered a higher growth rate than the rest of the industrial sector. There are over 1000 products ranging from traditional to high-tech items (SMEDeF, 2010-11). It is well known that the MSMEs provide good opportunities for both of poverty alleviation and to reduce the social ills associated with unemployment in the economy. It provides the raw materials needed by the manufacturing sector hence vehicle for industrialization. Its role in the local supply of raw materials has twin positive effects of cost-saving to the manufacturing firms as well as moderation of tendency of balance of payment deficit.

Due to low assets base, bank demand for collateral denies most SMEs access to capital. Kanak and Iiguni (2007) explains that the poor who often engage in SMEs produce at subsistence level have difficulty to increase their savings or assets that could guarantee access to credit from formal finance. The contribution of MF to SME's growth lies in its support to overcome their capital problem. MFIs type of loans are usually small size and collateral is de-emphasized, greater access is avail SMEs to capital. The report by Dirk Steinwand and David Bartocha on 'How microfinance improves lives in Sri Lanka (2008) states that microfinance is a multifaceted benefactor that affords them the means to rebuild livelihood, plan for client future and that of their children, empower women with self esteem, integrate in to social fabric by enjoying access to social networks and making contributions towards welfare of their families and that of the community.

II. CONTRIBUTION OF MFIS TO THE SOCIETY

A. *Establish livelihood and Income Generation*

The most important impact the MFIs foresee among their clients is the increase of income. Dulan de Silva and Sunimal Alles (2008) found that 71% of microfinance borrowers interviewed report an increase their sales and profits via microfinance support. The study by Tilakaratna, G., Wickramasinghe, U., & Kumara, T in (2005) found that high income clients have greater potential to have increased income from microfinance than those who have less income. Outreach of Financial Services in Sri Lanka (2008) a nation-wide “demand side” survey conducted among 2,945 households in all districts except war torn districts of Killinochi, Mullaittivu and Manner reveals that 36.9% of the microfinance clients enhanced their income whilst 2 % stated it increased substantially as a result of taking credit. This portrays that microfinance is a better tool for income augmentation for poor in peaceful areas than war torn areas.

The most widespread objective among MFIs was to establish micro enterprise livelihood opportunities for poor. Aheeyar (2005) stated that the size of the loan had an effect on success rate of the business. Loans less than Rs.10,000 had less chance of success with less than 50% succeeding. Furthermore, Dulan de Silva and Sunimal Alles (2008) found that more than 90% of those who borrowed from Janshakthi for the first time to start a business had succeeded in the business while only 10% percent has failed. Hence the microfinance is well-proved as an effective tool for micro enterprise development; the tool should be used in a right manner to accomplish desired results as is common to any tool people use in their life.

B. *Improving Housing Conditions*

Quality of life goes hand in hand with the quality of living conditions and both are a part of a value added future for poor. Improved housing conditions strongly impact the physical and emotional wellbeing of a family and microfinance has played its part in maintaining this wellbeing of thousands of Sri Lankan families. Either through direct housing or related loans for the improvement of living condition or indirectly through an increased household income, which is then invested in to improving housing conditions microfinance has been instrumental in adding value to the lives of microfinance clients. Tilakaratna, G., Wickramasinghe, U., & Kumara, T (2005) have shown in their study that 38.3% of microfinance borrowers reported an improvement in housing whilst only 21% of those in the control group who had not taken microfinance showed an improvement in housing.

C. *Empowering Women (Gender Impact)*

Tilakaratna, G found that women play an active role in microfinance: they borrow as well as save. The loans they have borrowed have mainly been used in self employment, cultivation and other productive activities. The findings reveals that while the provision of microcredit can enhance a woman's status within a household as she is a source of an important resource to the household, the social intermediation process of many MFIs in conjunction with microcredit, is likely to have a higher significant effect than credit alone.

D. *Saving Habit*

MFIs have played a crucial role in including savings habits among their members, particularly those from the poorest

categories. A significant proportion of households do not have savings in any institutions before joining in a MFI.

III. CHALLENGES TO MFIS IN SRI LANKA

Although the variety of MFIs provides many benefits to the clients across the country the challenges face by the sector are many and they exist at all levels, macro and micro.

A. *Absence of a cohesive Regulatory System*

This is a key barrier to transformation and scaling-up of many MFIs. Sathis De Mel (2009) illustrates that savings has been recognized as a key financial product required by the poor. Savings was seen as the tool to enhance one's own resources as well as confidence on his/her way out of indebtedness and poverty. Savings used as a form of informal collateral as well as an indicator of financial discipline. The savings is a strong capital base for MFIs. Although the acts of parliament within which most of the MFIs are registered do not provide legal power, savings mobilization were promoted among MFIs by donors as well as government managed poverty alleviation projects. The need for a comprehensive regulatory system was recognized by the Mahinda Chintana which stated that “the absence of a unique supervisory and policy framework for microfinance has allowed the proliferation of fundamentally unsustainable MFIs.....”. Though this issue was highlighted in many studies indicating that the government fails to enforce laws against microfinance NGOs in mobilizing savings deposits, there is no clear legal path has been offered for those institutions subject to cautious supervision.

B. *Poor Quality of human resources*

The quality and skill levels of MFI staff seem to be issues that cut across the institutional types. In the MFI survey, staff issues ranked among the top 5 challenges faced by most MFIs. The cause of the problem however, differs across institutional types. The Samurdhi Bank Societies face overstaffing as they are frequently used to achieve political objectives by providing employment for political supporters. The Sanasa societies work through a large number of voluntary staff. Qualified individuals usually seek better paid jobs as permanent job elsewhere, hence less qualified individuals volunteering for positions in the societies. Relatively poor remuneration and difficult working conditions for microfinance providers working in remote rural areas are also contributory factors in the issue of attracting and retaining qualified staff. In the NGO-MFIs most of which originated as social service organizations, the staff still have a more “development and social welfare” approach and are unsuited to the task of managing a financial services business since the basic knowledge of accounting, IT and human resource management is very low. This has resulted in weak organizations, especially at middle management level.

C. *Involvement of government in retail credit provision*

Participation of government in retail credit provision is common as more than half of microfinance clients are with government owned or controlled institutions. This lay concrete on the way for political interference in these institutions and a mixing of social, political and financial objectives to the damage the name of the institution.

D. *Inadequacy of IT Knowledge*

The use of information technology in the microfinance sector is still very limited. Over the past 6 years that computerized

systems were introduced with the installation of the MicroBanker. The need of ICT, in improving delivery technologies and reducing transaction costs is now being explored by an increasing number of institutions. However, very low IT knowledge among the staff of MFIs, particularly in the NGO sector, has been a preventive factor to get into the full potential use of technology to improve basic information and monitoring systems.

E. Lack of transparency and standardization

There is an overall lack of transparency and reluctance to share even the most basic, nonfinancial operational information among MFIs, even those who are not direct competitors. This is due in part to manual systems being used, resulting in unreliable operational and financial information.

Lack of standardized information is also an issue. Different MFIs have different indicators for monitoring their performance, measuring portfolio quality, etc. Some MFIs, particularly unregulated institutions in the NGO sector, are unaware of what information should be collected and which indicators should be used to monitor their performance.

IV. CONCLUSION

Reviews of the existing literature find out the influence of MFIs on SMEs. The existing reviews confirm the favorable contributions of MFIs loans/insurance/services towards promoting its clients' market share, production efficiencies and competitiveness. Although the viability of MFIs in Sri Lanka are faced with many challenges such as absence of a cohesive regulatory and supervisory system for the micro finance, shortage human capital, inadequacy of IT knowledge, and difficulty in up-to-date services access by the sub urban practitioners.

V. RECOMMENDATIONS

- Introduce academic programmes in microfinance through universities and recognized institutions.
- Monetary rewards and increased compensation flexibility to retain qualified employees.
- Initiate Quality Oriented Position Management System in MFI – NGOs.
- Impose legislation for Personnel Ceiling.
- Government should limit their interference in activities of MFIs.
- Government of Sri Lanka should introduce regulatory and supervisory framework for microfinance.

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Influence of Illness Perception on Depression & Quality of Life among Haemodialysis Patients

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Abstract- Chronic dialysis imposes a considerable burden on patients and families. Psychosocial issues are an important concern in the overall health of haemodialysis patients. Over recent years, there has been increasing attention given to the individual characteristics of patients with an emphasis placed on understanding the effects of the patients' social situation, perceptions and responses to the illness, their physicians and healthcare providers, their spouses and families, and their socio-economic status have on outcomes. This study sought to assess the influence of illness perception on depression and quality of life in haemodialysis patients. The sample included 31 males and 21 females with the age range of 20 -60 years and illness duration of 1 year to 5 years. Patients were evaluated with comprehensive psychological testing. Result shows that there was significant relationship found between depression and quality of life in relation to illness perception. Understanding of illness was significantly different in male and female haemodialysis patients.

Index Terms- Illness perception, Depression, Quality of Life, Chronic kidney disease, Haemodialysis

I. INTRODUCTION

Chronic kidney disease is a world wide public health problem affecting more than 50 million population. Most individuals with chronic kidney disease or hypertension are not diagnosed until long after the illness has developed. More over when they are diagnosed they too often are treated sub optimally or not at all. In most part of the world, end stage renal failure patients do not have access to maintenance haemodialysis treatment and simply die. Kidney disease is a significant interactive disease in patients with diabetic mellitus, hypertension and cardiovascular disease with major morbidity and mortality consequences and high cost to health care system.

Physical and emotional symptoms are the principal manifestations of chronic illness and play a central role in patients' experience with life-limiting disease. It seems that a similar relationship exists in the chronic haemodialysis population (Weisbord et al, 2005). It was reported that the incidence of some psychological disorders such as depression and anxiety are increased in patients who were being treated with haemodialysis due to end-stage renal failure, which led to 1.5-3 times more hospitalizations than end stage renal failure patients without any psychological disorder (Kimmel et al. 1998).

A. Prevalence

The incidence of chronic disease in India was 53% in 2005 (Reddy et al, 2005). One billion populations in India are in need of specialized and expensive tertiary care. The prevalence of chronic renal failure is 0.16 per cent in the community in 2003. Agarwal and co-workers (2003) arrived at an estimate of 0.78 per cent of chronic kidney disease in a community-based sample in New Delhi.

B. End-Stage Renal Disease (ESRD)

Renal failure refers to temporary or permanent damage to the kidneys that result in loss of normal kidney function. Kidney damage for less than or equal to 3 months as defined by structural and functional abnormalities of kidney with and without decreased glomerular filtration rate (GFR), manifest by either pathological abnormalities, markers of kidney damage, including abnormalities in composition of blood or urine or abnormalities in imaging test. End-stage renal disease is when the kidneys permanently fail to work.

C. Risk factors for development of chronic kidney disease

- Underlying disease: Hypertension, Diabetes Mellitus, Dyslipidemia etc.
- Lifestyle factors: Tobacco and Inactivity
- Family history
- Aging
- Prenatal factors: Maternal Diabetes mellitus, Low birth weight, delay in gestational age status.

Causes

Although chronic kidney disease sometimes results from primary diseases of the kidneys themselves, the major causes are diabetes and high blood pressure. Glomerulonephritis (inflammation and damage of the filtration system of the kidneys and can cause kidney failure), Polycystic kidney disease (hereditary cause of chronic kidney disease wherein both kidneys have multiple cysts), Analgesic nephropathy (use of analgesics regularly over long durations or certain other medications), Ischemic nephropathy (Clogging and hardening of the arteries (atherosclerosis), Obstruction of the flow of urine by stones, an enlarged prostate, strictures (narrowings), or cancers and other causes include HIV infection, sickle cell disease, heroin abuse, amyloidosis, kidney stones, chronic kidney infections, and certain cancers.

Symptoms

The kidneys are remarkable in their ability to compensate for problems in their function. The chronic kidney disease may progress without symptoms for a long time until only very minimal kidney function is left. Notably, most patients have no

decrease in urine output even with very advanced chronic kidney disease. The symptoms are: a) Fatigue and weakness (due to anemia or accumulation of waste products in the body), loss of appetite, nausea, vomiting, decreased sexual interest and dysfunction) need to urinate frequently, especially at night, swelling of the legs and puffiness around the eyes (fluid retention), c) itching, easy bruising, and pale skin (from anemia), headaches, numbness in the feet or hands, disturbed sleep, altered mental status and restless legs syndrome and d) high blood pressure, chest pain due to pericarditis (inflammation around the heart), shortness of breath from fluid in lungs, bleeding (poor blood clotting), bone pain and fractures.

Treatment

End stage renal disease is a chronic disease with treatment options of either life-long hemodialysis or renal transplant (Tsay and Healstead 2002).

Hemodialysis and peritoneal dialysis have been done since the mid 1940's. Dialysis, as a regular treatment, was begun in 1960 and is now a standard treatment all around the world. Peritoneal dialysis began in 1976.

Hemodialysis involves circulation of blood through a filter on a dialysis machine. Blood is cleansed of waste products and excess water. The acid levels and the concentration of various minerals such as sodium and potassium in the blood are normalized. The blood is then returned to the body. It typically takes three to five hours and is needed twice or thrice in a week based on the severity of the problem. It may be performed as traditional three times a week treatments, long nocturnal (overnight) hemodialysis, or short daily hemodialysis. Daily hemodialysis and long nocturnal hemodialysis offer advantages in quality of life and better control of high blood pressure, anemia, and bone disease.

Peritoneal dialysis utilizes the lining membrane (peritoneum) of the abdomen as a filter to clean blood and remove excess fluid. A catheter is implanted into the abdomen by a minor surgical procedure. Peritoneal dialysis may be performed manually or by using a machine to perform the dialysis at night. Peritoneal dialysis offers much more freedom compared to hemodialysis since patients do not need to come to a dialysis center for their treatment. They can carry out many of the usual activities while undergoing this treatment.

Kidney transplantation offers the best outcomes and the best quality of life. Transplanted kidneys may come from living related donors, living unrelated donors, or people who have died of other causes (cadaveric donors). In people with type I diabetes, a combined kidney-pancreas transplant is often a better option. Transplants from a living related donor generally have the best results. Transplant surgery is a major procedure and generally requires four to seven days in the hospital. All transplant recipients require lifelong immunosuppressant medications to prevent their bodies from rejecting the new kidney. Immunosuppressant medications require careful monitoring of blood levels and increase the risk of infection as well as some types of cancer.

Psychological consequences on Chronic Kidney Disease

"Psychosocial parameters" include the vast number of psychological variables and aspects of the social environment that affect the patient's perception of quality of life. The biopsychosocial model posits many intersecting levels of variables that might determine overall health status. Patients on dialysis sustain multiple losses in all areas of their lives (Kimmel, 2002).

Depression

Depression is the most common psychological problem in patients undergoing dialysis (Finkelstien 2000). It is believed that having a chronic disease coupled with numerous restrictions, patients face with, during the course of the disease can cause physical as well as psychological problems. Depression standing at the forefront, mental disorders (Sagduyu and Erten 1998) and depressive mood are frequently observed (Elal and Krespi 1999; Kimmel and Peterson 2005). Frequency of major depression among hemodialysis varies between 5-8.1% (Craven et al 1987; Hinrichsen et al. 1989; Smith et al. 1985), whereas minor depression is observed in 17.7% of the cases (Hinrichsen et al. 1989).

Quality of life

Haemodialysis patients have diminished quality of life compared to healthy patients. The quality of life was equally diminished in haemodialysis and peritoneal dialysis patients (Wasserfallen et al, 2004). They usually have many losses, with all their activities being hindered (Ozatalay 1990), and the quality of their lives is poor (Mollaoglu and Arslan 2003). It is plausible that poor quality of life is, in part, due to concomitant depression (Vazquez et al 2005). Ozgur et al (2003) found that physical wear secondary to hemodialysis caused deteriorations in psychological and social parameters and the level of depression in the patient group was higher than the cut-off point determined for the population. However, many patients continue to feel hopeless, anxious, and worry about finances, loss of sexual function, family burden, and loss of independence.

Illness perception

Perception of illness is defined as patients' assessment of how the disease interferes with their lives in personal, social, familial, and occupational contexts. Patients with the same medical diagnoses can have divergent views regarding the intrusive effects of their illness, depending on age, gender, ethnic and cultural background, personality, and extent of social support or marital satisfaction. The existence of other medical problems, for example, congestive heart failure, angina, recent surgery, or infection, also can modify patients' perceptions of illness. Perception of illness is likely an important aspect of coping with or adjustment to chronic illness.

A study done by Bulman and Wortman (1977) suggests that self-blame can lead to guilt, self-recrimination, or depression. Self-blaming patients may be poorly adjusted to their illness because of the focus on things they could have or should have done to prevent it. Self-blame for chronic illness is wide-spread. Patients frequently perceive themselves as having brought on their illnesses through their own actions. In some cases, these perceptions are correct. Poor health habits such as smoking, improper diet, or lack of exercise can produce heart-disease, stroke or cancer. In some cases the patient's self-blame can be

inappropriate when the disease is caused by a genetically based defect (Bulman&Wortman, 1997).

Need for the study

Although the area of "psychonephrology" has been a subject of research for many years, recent works in patients with and without renal disease has advanced our understanding of the interaction of psychological factors with medical outcomes.

The medical risk factors associated with increased psychological co morbidities in haemodialysis patients are well known, but the psychosocial factors that may affect the coping and illness perception have not been clearly defined. The purpose of this study was to evaluate the influence of illness perception on the levels of depression & quality of life in outpatient with end-stage renal disease undergoing haemodialysis.

II. MATERIALS AND METHODS

The aim of the study is to evaluate the influence of illness perception on the level of depression and quality of life among patients undergoing haemodialysis. Hypotheses are formed to find out the relationship between depression and quality of life in relation to illness perception and to find out the gender difference in all these variables among haemodialysis patients.

The target samples for this study were adult patients diagnosed with End Stage Renal Disease (ESRD) by concerned physician who are on maintenance haemodialysis on regular outpatient basis. The samples size consists of 52 ESRD patients. (M=31 & F=21). The samples were collected from Department of Nephrology, Sri Ramachandra University, Chennai. Purposive sampling technique was used.

Inclusion criteria

- 1) Those patients diagnosed with End Stage Renal Disease (ESRD) by the concerned physician
- 2) Patients age range between 25-60 years
- 3) Males and Females
- 3) Speaks and understands Tamil or English
- 4) Minimum educational qualification of 8th standard
- 5) Duration of illness ranging from more than one year to less than 5 years.
- 6) Patients under medication for diabetes, hypertension and other medication for dialysis maintenance.

Exclusion criteria

- 1) Illiterate
- 2) Past or present history of psychiatric illness
- 3) Past or present history of head injury, clinically apparent neurological disorder.
- 4) Other physical disorders such as with AIDS, Hepatitis B or any other viral infectious disease.

Tools Used:

1. WHO Quality of Life – BREF
2. The Brief Illness Perception Questionnaire (BIPQ)
3. Beck Depression Inventory (BDI-II)

World Health Organization Quality Of Life – BREF

The WHO quality of life (QoL) questionnaire was developed by the World Health Organization (1998). The WHO Quality of

Life-BREF was used in this study to measure patients' subjective perception of quality of life. The WHOQoL-BREF consists of 26 questions and its items are distributed into four domains: physical health (7 items), psychological health (6 items), social relationship (3 items), and satisfaction with the environment (8 items). The other two items are used to test overall perceptions of quality of life and general health. To provide a broad and comprehensive assessment, one item from each of the 24 facets contained in the original WHOQoL-100 has been included.

Participants are asked to self-report their subjective perception of their quality of life in the two weeks prior to completing the questionnaire. A five-point Likert scale is used in the questionnaire. The four subscale scores are calculated by summing up the scores of the corresponding items in each subscale. The overall score is the summation of all subscale scores and two global item scores. The higher the score obtained, the higher the quality of life perceived by the respondent. It takes about 20 minutes to administer this questionnaire.

The internal consistency tested by Cronbach alpha coefficient for overall QOL was good at 0.85. Subscale alphas ranged from 0.45, 0.62, 0.64 and 0.67 for social relationship, physical health, satisfaction with the environment and psychological well-being respectively.

The Brief Illness Perception Questionnaire (BIPQ)

The BIPQ was developed by Broadbent et al (2006). It provides a rapid assessment of illness perception which could be particularly helpful in ill population. It consists of 8 items plus one item regarding causal factors.

There are two scales; Cognitive illness representation (5 items) and Emotional illness representation (2 items). One item assesses illness comprehensibility. An additional item assesses the causal representation by an open-ended response item which asks the patient to list the three most important causal factors in their illness (item 9). All of the items except causal question are rated using 0-10 response scale.

The Brief IPQ allows a very simple interpretation of scores: increase in item scores represent linear increases in the dimension measured.

The Brief IPQ showed good test-retest reliability (above 0.60 for all the items) and concurrent validity with relevant measures (IPQ-R).

Beck Depression Inventory (BDI-II)

The BDI was developed by Beck, A.T., et al (1988) to measure the severity of depression. It is a 21 item self-report instrument intended to assess the existence and severity of symptoms of depression. BDI has a high coefficient alpha, (.80), its construct validity has been established, and it is able to differentiate depressed from non-depressed patients. It is a 4 point scale for each item ranging from 0 to 3. Total score is the sum of all items. The internal consistency of total scores was 0.86 and correlation of BDI with clinical rating of depression was >0.60 for psychiatric patients and normal adults.

Procedure for data collection

The sample for the study was collected from the Department of Nephrology, SRU, Chennai. The patients were explained individually about the purpose of the investigation and rapport

was established. Those who were willing to participate in the study were included. An written informed consent form was obtained from them. The socio-demographic details and clinical data sheet was filled. The tests were conducted in a distraction free setting. The assessment was completed in 2 sessions which lasted for 45 minutes each.

The order of presentation of the psychological tests for all subjects was the same. They were WHOQoL – BREF, Marital Quality Scale, Brief Illness Perception Questionnaire and Brief Cope scale, Beck Depression Inventory II (BBI II), Female Sexual Function Index (FSFI) or Brief Sexual Function Inventory (BSFI). Tests were administered at the bedside of the patients. The questionnaires took about a total of 1-1½ hours to complete (2 sessions of 45minutes each).

III. RESULTS AND DISCUSSION

The collected data was analyzed using Statistical Package for Social Sciences – 15 (SPSS-15). Descriptive statistics such as mean, standard deviation and percentages are used. Parametric test (t test) was used to find out the significant difference between means and Pearson’s correlation to find out the relationships between variables under study.

Table 1a: Percentage Distribution of Socio Demographic Characteristics

Variables	Frequency	Percentage
Gender		
Male	31	60
Female	21	40
Age		
20 - 40 years	11	21
41 - 50 years	20	39
51 - 60 years	21	40
Education		
Secondary	25	48
Higher secondary	14	27
Graduates	13	25
Occupation		
Employed	6	12
Unemployed	23	44
Self employed	4	8
House wife	19	36
Socio economic status		
Low	15	29
Middle	36	69
High	1	2
Religion		
Hindu	41	79
Christian	8	15
Muslim	3	6

The sample of 52 consists of 60% males and 40% females. Among them 21% were in the age range of less than 40 years, 39% were in the age range of 41-50 years. In the age group of 51-60 years, 40% coming under this category. With regard to education 48% of them have completed secondary level, 27%

have completed higher secondary level and rest 25% are graduates. With regard to occupation 12% were employed, 44% were unemployed. Self-employed were 8% and rest 36% were house wives. In socio economic status 29% were from low socio economic status, 69% were from middle socio economic status and the rest 2% were from high socio economic status. With regard to religion, 79% were Hindus, 15% were Christians and 6% were Muslims.

Table 1b: Percentage Distribution of clinical Characteristics of the patients

Variables	Frequency	Percentage
Duration of illness		
< 2 years	30	58
2years – 5 years	22	42
Duration of dialysis		
<12 months	30	58
12-24 months	13	25
>24 months	9	17
Frequency of dialysis / week		
Once	6	12
Twice	35	67
Thrice	11	21
Total number of dialysis		
<50	18	35
51-150	25	48
>151	9	17
Comorbidity		
Hypertension (HT)	31	44
Diabetic mellitus(DM)	15	30
Hypertension + Diabetic mellitus(HT+DM)	6	11
Others (cardiovascular disease, arthritis etc)	8	15
Financial support		
Self	38	73
Insurance	14	27
Adequate	18	35
Inadequate	34	65
Family support		
Adequate	34	65
Inadequate	18	35

The above table shows the clinical details of the subjects. With regard to the duration of illness 57.7% have the illness for the past two years and 42.3% have the illness duration of 2 years to 5 years. With regard to the duration of dialysis 57.7%% were on dialysis for less than 12 months, 25% were on dialysis for 13-24 months and the rest 17.3% were for more then 25 months to 60 months. The frequency of dialysis per week is one for 11.6%, two for 67.3% and thrice for 21.2%. With regard to total number of dialysis 34.6% have finished less than 50 number of dialysis, 48% have finished 51-150 number of dialysis and the rest 17.3% have finished more than 151 number of dialysis.

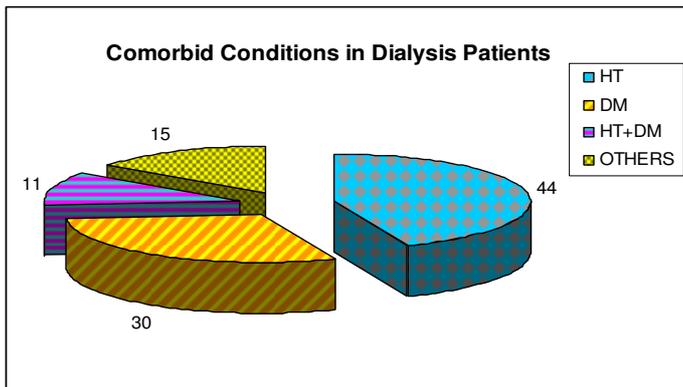


Figure1: Comorbid Conditions in Dialysis Patients

With regard to comorbidity 44% have hypertension and 29% have diabetic mellitus, 11% have both hypertension and diabetic mellitus. The rest 15% have other comorbid conditions like cardiovascular disease, arthritis etc. The financial support was by self for 73% of individuals and 27% receive insurance for their financial needs. The financial support was perceived adequate by 35% of samples and inadequate by 65% of samples. With regard to family support 65% of individuals perceived as adequate and 35% of individuals perceived it as inadequate.

Table 2: Correlation between the Depression, Marital Quality and Quality Of Life in Relation to Illness Perception

Variables	Emo R	Udrsnd	IP	Depre	QoL
1. Cog.R	.033	.158	.707**	.007	-.143
2. Emo R	1.000	-.143	.470**	.560**	-.402**
3. Udrsnd	-	1.000	.427**	-.280*	.356**
4. IP	-	-	1.000	.170	-.020
5. Depre	-	-	-	1.000	-.649**
6. QoL	-	-	-	-	1.000

**correlation is significant at the 0.01 level (2 tailed)

*correlation is significant at the 0.05 level (2 tailed)

Table 2 shows, there is no correlation between total score of illness perception in relation to depression, marital quality and quality of life. In considering the subscales of illness perception, positive correlation is observed between Emotional representation (concern and emotional response to illness) and depression which was found significant at 0.01 level. This shows when there is increased concern about the illness and the patient responds emotionally to it, there is tendency to be more depressed. Negative correlation was observed between Emotional representation (concern and emotional response to illness) and Quality of life which was found significant at 0.01 level, indicates when concern and emotional response towards illness is increased Quality of life tend to be decreased. Fowler & Baas (2006) reported strong relationship between the emotional component of illness perception and quality of life provides support for pursuing further examination of the Common-Sense Model and holistic outcomes in persons with chronic kidney disease undergoing haemodialysis.

Similarly the domain understanding or comprehension of illness was negatively correlated with depression which was found significant at 0.05 level. This shows that when understanding about the illness is better there is tendency to be less depressed since the understanding of the illness helps them adjust to the demands of the illness. A positive correlation was observed between understanding or comprehension of illness and quality of life which was found significant at 0.01 level. Hence better understanding or comprehension of the illness increases the adjustment to the illness and improves the quality of life. Similar findings are seen by Sack and Kimmel (1990), Kimmel (2000), Covic et al. (2002) and Timmer et al (2007).

Depression is found to be significantly correlated to Quality of life at 0.01 level, suggesting that alleviation of depressive symptoms could improve the Quality of life of patients with end stage renal disease. Management of depression would imply improving coping strategies used, as coping is found to be negative correlation with depression. This has implications for the patient care interventions done for end stage renal disease; mainly identifying the presence of depressive symptoms if any and improves coping strategies to manage depressive symptoms. Similar findings reported by Finkelstein, Watnick, Finkelstein & Wuerth, Kimmel (2002), found depression is the most common psychiatric abnormality seen in patients on dialysis and has been demonstrated to be the strongest predictor of quality of life.

Table 3: Comparison of Scores on Depression of Male and Female patients

Variable	Gender	N	Mean	SD	t	P
Depression	Male	31	2.87	.991	.055	NS
	Female	21	2.86	.727		

NS=not significant

The above table shows no significant difference between depression and gender distribution. The t-value was found to be .055. There are discrepancies in the results of studies that investigated depression in dialysis patients. Despite some studies reporting that there no significant difference in the level of depression between males and females (Astan 2001; Akman et al. 2004), there are also studies reporting that males suffered from depression significantly more than females.

Table 4: Comparison of Scores on Illness Perception of Male and Female patients

Variable	Gender	N	Mean	SD	t	P
Cognitive Representation	Male	31	31.39	2.290	1.398	NS
	Female	21	30.38	2.889		
Emotional Representation	Male	31	14.29	1.465	1.563	NS
	Female	21	13.48	2.250		
Understanding	Male	31	5.23	1.230	2.559	0.05*
	Female	21	4.24	1.546		
IP	Male	31	50.58	3.314	2.540	0.05*
	Female	21	48.10	3.673		

*P<0.05

NS=not significant

The above table indicates the comparison of scores on illness perception of male and female patients. The t-value was found to be 1.398 for cognitive representation, 1.563 for emotional representation, shows no significant difference between male and female patients. The t value for comprehension of illness or understanding is 2.559 and t value for total score is 2.540. It is seen from the table that there is significant difference between males and females in total score of illness perception and also in the understanding of illness. Similar findings have been reported by Nolen-Hoeksema, Larson, & Grayson (1999). They found that females tend to perceive that they have less control over their lives than males in general. Another similar study by MacInnes (2005), found that women had a perceived lack of control over the illness and a belief that the illness was inevitable.

Table 5: Comparison of Scores on Quality of Life of Male and Female patients

Variable	Gender	N	Mean	SD	t	P
Quality of Life	Male	31	1.42	.50	-.731	NS
	Female	21	1.52	.51		

NS=not significant

Table 5 shows, the comparison of scores on quality of life of male and female patients. The t-value of the total score was found to be -.731. It is seen from the table that there is no significant difference between males and females in relation to quality of life. The above finding is in agreement with the studies of Wasserfallen et al. (2004) that quality of life was substantially diminished in both.

IV. SUMMARY & CONCLUSION

The present study was carried out to find the influence of illness perception on depression and quality of life sexual functioning. The sample of present study consists of 52 patients on maintenance haemodialysis. This study shows there is significant relationship between depression and quality of life in relation to illness perception among haemodialysis patients. Though there is no significant difference in level of depression, and quality of life in male and female haemodialysis patients, statistically significant difference in illness perception is established.

V. LIMITATIONS OF THE STUDY

The small sample size (52) and the disproportionate number of men (31) and women (21) and the characteristics of the haemodialysis population included in this analysis: prevalent with no significant baseline comorbidities. Due to the use of self-report questionnaires, it is possible that some human factors, such as social desirability, may have influenced the results of the study. The demographic homogeneity of participants and majority of respondents in this study were elderly and we were unable to recruit enough patients and plan intervention for the findings of the study due to time constraints and business practices of dialysis centers.

VI. IMPLICATION OF THE STUDY

In dialysis treatment, patients face with multiple stresses. In addition to a total dependence to a machine and care takers, patients have to cope with a disease that restricts and renders him/her unfit. They usually have many losses, with all their activities being hindered and the quality of their lives is poor. The demands of patients on chronic dialysis have been suggested to be the most stressful of all other illnesses and treatment regimens. The most common emotional changes following the initiation of dialysis and need for life style changes interferes substantially with patient's social life.

VII. RECOMMENDATIONS FOR FURTHER STUDY

Future studies can be carried out using a bigger sample size and quality and quantity of the relations between patients and their relatives (caregivers) be addressed. A comparison group comprising subjects with other chronic diseases such as diabetes, hypertension or other disorders can be included. Developing a package of psychosocial interventions such as treatment for depression or interventions designed to increase social support may improve the quality of life and to increase coping skills and enrich self-control experience with inclusion of daily life arrangements can be recommended in patients with CKD.

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Study of Watermarking Techniques Used in Digital Image

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Abstract- The imaging technology is being improving day by day, there are a lot of chances of reproduction and manipulation of digital contents such as digital image, digital audio and digital video, hence a strong digital copyright mechanism must be developed in place. So the protection of data content from unauthorized users and the issue of copyright management play very important role. Digital watermarking is being used to secure the data of researchers and to hide the information inside a signal which cannot be easily detected by unauthorized users. A digital watermarking can be defined as a stream of bits embedded in a data file that offers features such as IPM (Intellectual Property Management) and proof of ownership. The digital watermarking has two basic concepts- first is content protection and second is copyright management. In this paper, an overview of some Digital Watermarking techniques is discussed such as Discrete Cosine transform (DCT) and Digital Wavelet Transform (DWT) and its purpose, methods, limitations and applications.

Index Terms- Human Visual System (HVS), Human Auditory System (HAS), Copyright Protection, Digital Watermarking.

I. INTRODUCTION

Digital watermarking is a burgeoning field that requires continuous efforts to find best possible way in protecting multimedia content its security concern [1]. Watermarking is a process that embeds data into a multimedia object to protect the owner's ownership to the objects. A watermark is a pattern of bits embedded into a digital image audio or video files that give the file copyright information. Unlike printed watermarks, which are intended to be somewhat visible (like the very light compass stamp watermarking). Digital watermarks are designed to be completely invisible, or in the case of audio clips, inaudible [2]. Now a day due to internet connection it has become very feasible to download any data worldwide through web. So watermarking is a useful technique to reduce piracy. Intellectual property management and protection (IPMP) motivated the researchers and service providers to seek efficient encryption and data hiding techniques [2]. A simple idea is to include password or a key that is relatively difficult to be "hacked" in a given time. There are many types of digital information and data such as Digital Image, Digital Audio and Digital Video.

Digital audio and video watermarking techniques rely on the perceptual properties of a human auditory system (HAS) and human visual system (HVS) respectively. The HVS is less sensitive as compared to the HAS. More challenging idea is to embed imperceptible audio watermarks. HAS consists of larger dynamic range. The stream of bits embedded in an audio file is

much smaller in size as compared to the auxiliary information in a video file for watermarking [3]. Watermarked image is transformed image in which the original image remains intact, recognizable, remains persistent in viewing and printing and retransmission and dissemination. The functioning of digital watermarking concept is shown in figure (1):

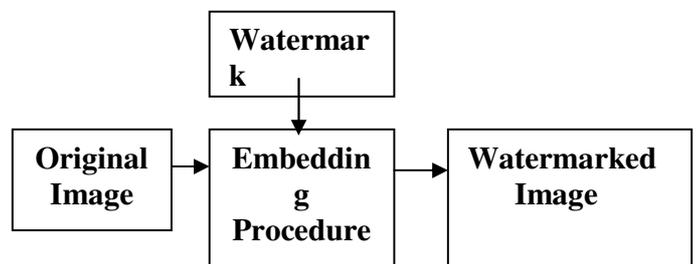


Fig.1 Functioning of Digital Watermarking

In order to have effective watermarking, following properties are being followed such as unobtrusive, robust, secure and high capacity and protect intellectual property. The details of these properties are described below [4]:

1. Unobtrusive- The idea watermark should be completely invisible.
2. Robust- The watermark should be resistant to distortion introduced during normal use or in a continuous attempt to remove the present watermarking.
3. Secure & High Capacity- The identification of the owner should be degrade gracefully in the face of attack.
4. To Protect Intellectual Property-Watermark must service image modification.
 - a. There should be imperceptibility in visible watermark, so that it will not affect the experiences of viewing.
 - b. A proper authority can easily detect the watermark embeddd.
 - c. It is very difficult or impossible to remove a watermark at least without visibly degrading the original image.

II. METHODOLOGY TO BE ADOPTED IN WATERMARKING

The process of watermarking is done two ways namely Watermark Embedding and Watermark Extraction [1].

Consider the function f which is a function of I and W , where I =original Image, W =watermark to embed and I' denotes the watermarked image which is also the function of I and W .

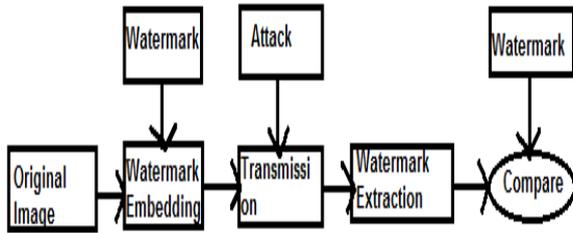


Fig.2 Process of watermark embedding and extracting methods

$$I' = f(I, W)$$

Common approach is as follows:

Select a subset of coefficients from the original image I :

$$J = j_1, j_2 \dots j_n$$

Corresponding watermark sequence is given below:

$$X = x_1, x_2 \dots x_n$$

When X embeds into J then adjusted sequence can be written as

$$J' = J + X = j'_1, j'_2 \dots j'_n$$

Put j' back and take the place of J , then we get the watermarked image I' . Let E denote the extraction function and I' the image to be examined. Extract the watermark W' from the watermarked image I' . If the correlation function $C(W, W')$ satisfies

$$C(W, W') \geq T, \text{ where } T \text{ is the threshold value}$$

Then we consider, there is a watermark W in I' image.

Signal-to-noise ratio (SNR) is common theory in signal processing. Suppose the original image is $I(m,n)$ and the output image is $I'(m,n)$ then SNR is defined as:

$$SNR = 10 \log_{10} \left[\frac{\sum_m \sum_n I^2(i,j)}{\sum_m \sum_n \{I(i,j) - D^2(i,j)\}} \right]$$

When SNR approaches infinity, the original image and output image are totally the same.

Another similar one is Peak SNR (PSNR). For images with 255 gray levels, the PSNR is defined as:

$$PSNR = 10 \log_{10} \left[\frac{\sum_m \sum_n (255)^2}{\sum_m \sum_n \{I(i,j) - D^2(i,j)\}} \right]$$

III. CLASSIFICATION

Watermarking techniques are categorized into four methods such as text watermarking, image watermarking, audio watermarking and video watermarking [1]

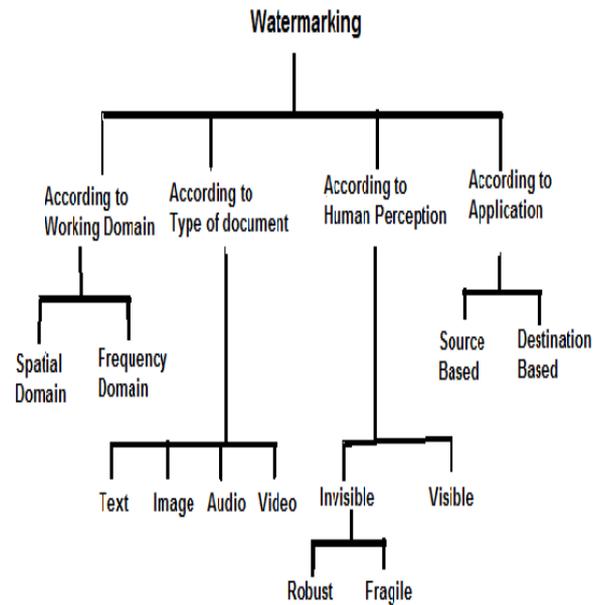


Fig.3 Classification of Watermarking

In the case of images, watermarking techniques are commonly distinguished based on two working domains: Spatial domain and frequency domain. In spatial domain, the pixels of one or two randomly selected subsets of an image are modified based on perceptual analysis of the original image [5]. However in the Frequency or transform domain, the values of certain frequencies are altered from their original image. Meanwhile, based on human perception, digital watermarks are divided into three categories as follows:

- (a) Visible watermark, where the secondary translucent overlaid into the primary content which would be seen visible by careful inspection [6].
- (b) Invisible-Robust watermark is embedded in such a way that alterations made to the pixel value are perceptually unnoticed.
- (c) Invisible-Fragile watermark is embedded in such a way that any manipulation of the content would alter or destroy the watermark.

From application point of view, digital watermarks could also be Source based where a unique watermark identifying the owner is introduced to all the copies of a particular content being distributed [7]. Destination based is where each distributed copy gets a unique watermark identifying the particular buyer.

IV. TECHNOLOGY USED IN WATERMARKING

Watermark in Frequency and wavelet domain is more robust and compatible to popular image compression standards as

compared to spatial-domain. Thus the frequency and wavelet domain watermarking is being explored much more by researchers. To embed a watermark, the frequency or wavelet transformation is applied to the host data. Then, modifications are made to the transform coefficients. Possible frequency image transformations include the Discrete Fourier Transform (DFT), Discrete Cosine Transform (DCT). However, in the wavelet domain, the Discrete Wavelet Transform (DWT) is being used by the researchers.

1) Discrete Cosine Transform (DCT) Domain watermarking Technique- The first efficient watermarking scheme was introduced by Koch[7]. He pointed out that the image is first divided into square blocks of size 8x8 for DCT computation. A pair of mid-frequency coefficient is chosen for modification from 12 predetermined pairs. Bors and Pitas developed a method that modified DCT coefficients satisfying a block site selection constraint [8]. After dividing the image into blocks of size 8x8, certain blocks are selected based on a Gaussian network classifier decision. The middle range frequency DCT coefficients are then modified, using either a linear DCT constraint or a circular DCT detection region. A DCT domain watermarking technique based on the frequency masking of DCT blocks was introduced by Swanson [9]. Cox developed the first frequency domain watermarking scheme [10]. After that a lot of watermarking algorithms in frequency domain have been developed [13].

The watermarking concept has been elaborated through block diagram. Insert watermark into the block, transformed block back into spatial domain and move on to the next block, and write the watermarked image out to a file. Finally separate the watermark from the image using DCT block [10]. Compare the watermark extracted image from the original image, and then if the change is less than threshold then the image is not distorted.

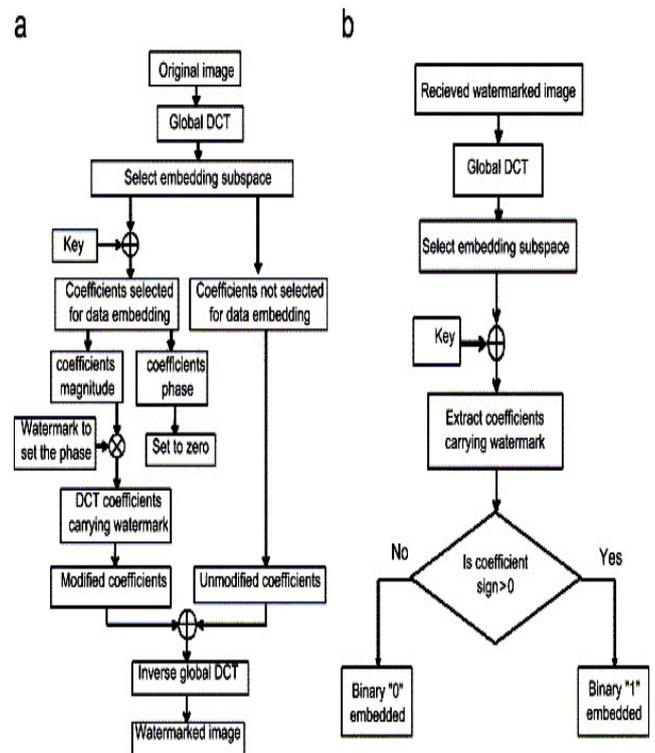


Fig.4 DCT Domain Watermarking Technique for embedding and extracting of an image[6]

Experimental Analysis- The experiment is carried out on various images. One major reason why frequency domain watermarking schemes are attractive is their compatibility with existing image compression standards, in particular, the JPEG standard. The compatibility ensures those schemes a good performance when the watermarked image is subject to lossy compression, which is one of the most common image processing methods today. In consequence, those schemes become particularly useful in practical applications [12].



Fig.5 DCT Domain Watermarking Technique going from Top Left to Right A. Original Image B. Watermarked Image C. Watermark D. Extracted Watermark

2) Wavelet Domain Watermarking Technique: Another possible domain for watermark embedding is that of the wavelet

domain. The DWT (Discrete Wavelet Transform) separates an image into a lower resolution approximation image as well as in horizontal, vertical and diagonal detail components [4]. The process can then be repeated to compute multiple “scale” wavelet decomposition, as in the 2 scale wavelet transform. Wavelet transform has more accurate model aspects of the HVS as compared to the FFT or DCT [1]. This allows us to use higher energy watermarks in regions where HVS is known to be less sensitive, such as the high resolution detail bands {LH, HL, HH}. Embedding watermarks in these regions allow us to increase the robustness of our watermark, at little to no additional impact on image quality [14].

One of the most straightforward technique is to use a similar embedding technique to that used in the DCT, i.e. the embedding of a CDMA sequence in the detail bands according to the expression shown as under:

$$I_{W_{u,v}} = \left\{ \begin{array}{l} W_i + \alpha |W_i| x_i, u, v \in HL, LH \\ W_i, u, v \in LL, HH \end{array} \right\}$$

Embedding of a CDMA Watermark in the Wavelet Domain where W_i denotes the coefficient of the transformed image, x_i the bit of the watermark to be embedded, and α a scaling factor. To detect the watermark we generate the same pseudo-random sequence used in CDMA generation and determine its correlation with the two transformed detail bands. If the correlation exceeds some threshold T , the watermark is detected[15].

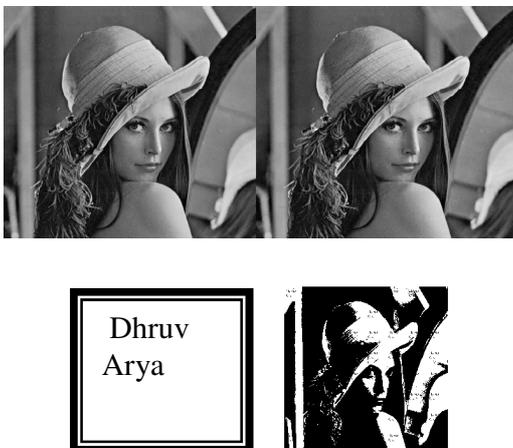


Fig.6 Wavelet Domain Watermarking Technique – Going from Top Left to Right A. Original Image B. Watermarked Image C. Extracted Watermark D. Watermark

This can be easily extended to multiple bit messages by embedding multiple watermarks into the image. During detection, if the correlation exceeds T for a particular sequence a ‘1’ is recovered; otherwise a zero. The recovery process then iterates through the entire pseudo noise sequence until all the bits of the watermark have been recovered [16].

Furthermore, as the embedding uses the values of the transformed, the embedding process should be rather adaptive; storing the majority of the watermark in the larger coefficients.

This technique would prove resistant to JPEG compression, cropping, and other typical attacks.

V. APPLICATIONS

There are a large number of applications such as:

- 1) **Identification of the owner-** It is used to establish ownership of the content similar to copyright protection.
- 2) **Copy protection-** It is used to prevent people from making illegal copies of copyrighted content.
- 3) **Content authentication-** It detects all the types of modifications in the content and shows it as a sign of invalid authentication.
- 4) **Fingerprinting-** It is used to trace back illegal duplication and distribution of content.
- 5) **Broadcast monitoring-** It is specifically used for advertisements and entertainment industries.
- 6) **Medical application-** It is known as invertible watermarking and it is used to provide authentication and confidentiality in a reversible manner without effecting medical image in any way.

VI. CONCLUSIONS

This paper presents a comprehensive study of some techniques of watermarking of image data and detailed descriptions and implementation of recent techniques have been explored. DCT and DWT domains watermarking are comparatively much better than the spatial domain encoding since DCT domain watermarking can survive against the attacks such as noising, compression, sharpening, and filtering. However, the DWT technique for the insertion of digital watermark is efficient because embedded information in the image can be recovered. It is completely secured since the embedded information is not visible to any non authorized person. The DWT techniques always achieve a higher performance of recovery. Hence DCT and DWT techniques both are much better than any other transformation technique.

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Agricultural Subsidies in India: Case Study of Electricity Subsidy in Punjab State: An Analysis

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Abstract- The Indian agrarian economy on the eve of independence was critical in situation. It could be characterized totally primitive, deteriorative and turbulent. During the British imperial regime, no pervasive and conductive measures were taken to boost the agriculture. The partition of country worsened the food situation in the country. This reduced the agricultural production and created difficulties both for food grains and commercial crops. The cultivators were under heavy debt and most of the holdings were uneconomic. In view of this, after independence tremendous efforts were made to boost the economy through agriculture as one of the tools for development. On the recommendations of food grain price committee (Jha Committee), the Government of India started the scheme of subsidies on purchase of various agriculture inputs to facilitate the farmers (Singh, 1994). This paper tries to analyse the impact of free electricity to Punjab farmers on various aspects of economy like Punjab State Electricity Board, Punjab Government and farmers etc. The empirical results reveal that farmers are ready to pay bills for irrigation as uninterrupted supply of electricity is given to agriculture sector. As a result, government should impose flat rates on electricity supply given to agriculture sector. Government should keep aside its motive to please voters or strengthen the vote bank, it should frame rational policy in the favour and welfare of the state.

Index Terms- Agriculture, Cultivators, Production, Electricity Subsidy.

I. INTRODUCTION

Agricultural development is a condition precedent for the overall development of the economy. A progressive agriculture serves as a powerful engine of economic growth. In view of this, after independence tremendous efforts were made to boost the economy through agriculture as one of the tools for development. The Government of India adopted a positive approach and hence a well-defined policy of integrated production programmes with defined targets and a proper distribution programme was adopted along with other measures for the overall economic development of the country. Since the mid-sixties India has been using a new technology in agriculture. The new agricultural technology was in the form of a package programme which included the use of high yielding varieties of seeds, assured irrigation, chemical fertilizers, insecticides and pesticides and machinery (Government of India, 1994- 95). Indian farmers being poor are not in a position to buy these expensive inputs. Then India started the scheme of subsidies on

purchase of various agriculture inputs to facilitate the farmers (Singh, 1994).

In India, at present, centre as well as state governments are providing subsidies on fertilizers, irrigation (canal water), electricity and other subsidies to marginal farmers and farmers' cooperative societies in the form of seeds, development of oil seeds, pulses, cotton, rice, maize and crop insurance schemes and price support schemes etc. Out of these subsidies, at present, the central government pays subsidies to the farmers on the purchase of fertilizers. Fertilizers are an important component of agricultural technology. Whereas initially organic fertilizers were mainly used in the fields, however, chemical fertilizers have played a very important role in enhancing the agricultural production. To ensure availability of fertilizers to farmers at affordable prices, the government of India provides huge subsidies to fertilizers manufacturing industry from 1977. Hence, the government of India provides indirect subsidies to farmers for the purchase of fertilizers (State Environment of Punjab – 2005)

Many years ago, the function of state governments was mainly to maintain law and order in the country and to protect it from foreign invasion. So far as the economic affairs of the country were concerned, a complete laissez faire policy was followed. However, the situation has changed now. The concept of welfare state has taken deep roots. The central government encouraged the strategy of enhancing food grains production in states, particularly wheat and rice, for meeting the emergent food demand in the country. Punjab state leads other states in terms of contribution of wheat and rice to central pool (Karnik, 1996).

For the development of agricultural sector, at present, Punjab Government is giving subsidy on electricity as well as on irrigation. Energy in the form of electricity plays a key role in performance of agricultural sector, in Punjab as it is used in pumping ground water for irrigation purposes. At present government of Punjab is giving electricity to Punjab farmers, free of cost, through Punjab state electricity board, now is unbundled into Punjab state power cooperation limited and in Punjab state transmission cooperation limited (Government of Punjab, Punjab State Electricity Board). The water being supplied to the farmers for irrigation purpose is free of cost. It is quite difficult to estimate the values of this water being supplied to agriculture sector, therefore, total amount of subsidy on this account could not worked out on actual basis (Government of India, Pricing water policy, 2010).

The tariff structure of Punjab State Electricity Board (now is unbundled in Punjab State Power Cooperation Limited (PSPC Ltd) and Punjab state Transmission Cooperation Limited (PSTC Ltd)) is built on principles of cross subsidization with certain

categories of consumers (commercial and large industry) subsidizing other categories (agricultural pump sets and domestic). The tariff for agricultural pump sets is quite low till 1996-97. But in February 1997, the power supply to agricultural pump sets is made free. In the 'Election Manifestos' issued by the Shiromani Akali Dal and Indian National Congress Committee (I) Punjab issued from time to time before the elections, the electricity supply to the Agricultural Pump sets (AP) consumers in the State is given free of cost from 14.2.1997 to 31.3.2002 by Punjab Government leading by Shiromani Akali Dal (Badal) and again the then Chief Minister of Punjab, of Indian National Congress Committee (I), Capt. Amarinder Singh announced the subsidy in the shape of free power to farmers in Punjab from 15th August, 2005 'Indian Independence day' which is still continued.

In addition, the free electricity supply has also been given to some domestic consumer's i.e. Scheduled Caste (SC) domestic consumers, having connected Load of 300/500 watts. The Punjab Government, later on, also decided to give free electricity supply up to 200 Units per month to Non Scheduled Caste/Below Poverty Line (SC-BPL) domestic consumers (DS) with connected load up to 1000 watts with effect from December 1, 2006. These facilities have been allowed by the Punjab Government by way of giving Subsidy to the consumers through Punjab State Electricity Board.

In this paper, an attempt is made to analysis the electricity subsidies given by Punjab government to agriculture sector. The following section presents a review of related literature. The next section describes the methodology used for analysis. The succeeding section briefly reviews the electricity subsidy given to Punjab farmers, cost of production, sale of electricity to agriculture sector, financial position of Punjab State Electricity Board (PSEB) and fiscal deficit of Punjab Government and the next section deals with primary survey in Punjab state. The last section gives the conclusion and policies suggestions of the study.

II. REVIEW OF LITERATURE

An attempt is made to analyse the nature of the work done during the past in the related field. Mukherji, (1990) tried to examine economic of electricity subsidy in West Bengal. He has conducted a study to describe the electricity subsidy in West Bengal. The author found that electricity subsidies benefit only big farmers than that of the small size category farmers. The author suggested that electricity subsidy should be given to small size category farmers only. Howes, (2002) tried to examine the distribution pattern of electricity subsidy and conducted a study to show the distribution pattern of electricity subsidy in farmers of Karnataka State. The author concluded that electricity subsidies are regressive because large size category farmers are much more likely to have pump sets than small size category farmers and because large size category farmers with pumps use more electricity than small size category farmers with pumps. The author suggested that electricity subsidy should be given to only small size category farmers.

Pachauri, (2006) pointed out that past election, Punjab has announced to implement the provision of free electricity for farmers and for some other sections like scheduled caste and below poverty line consumers. This policy of free electricity is

imposing additional financial burden on the Punjab Government. However, free power to farmers, leads to installation of inefficient pump sets, which use excessive energy, wastage of energy, for given output. Therefore, if India has to attain a level of economic success globally, then a strong policy to install power stations is an essential pre-requisite and urged the Prime Minister of India putting an end to politicians promising free electricity to the farmers which has not remained a demand of farmers.

Jain, (2006) made an attempt to analyse the provision of agricultural subsidies, which have burdened Punjab's exchequer heavily. This study highlighted the existence of disparities in the flow of electricity subsidy between the progressive and backward areas. The author conducted a primary survey in two districts viz. Mansa and Ludhiana to make a comparative study of the flow of electricity subsidy to different classes of the farmers. The results showed that the proportion of farmers having electricity connections in the progressive area was 51 per cent higher than the backward areas. The author also observed that the provision of electricity subsidy has a negative impact on the sustainability of agriculture as it has implications for depletion of underground water. On the basis of this evidence, the author put forward the case for user charges-based open access to electricity to speed up the pace of economic development of an agro-based economy as this policy, apart from bringing hope for the sustainability of the electricity utility, will ensure enough economic returns to the farmers depended on non-electrical means of irrigation.

From the above, it may conclude that to accomplish integrated rural development, a substantial amount of energy is required for various activities. Electricity is, at present, perhaps the most efficient and convenient sources of this energy. But the Indian Power Sector is struggling with formidable difficulties to meet with the heavy demands of electricity due to higher amount of power losses.

At present, Government of Punjab is giving free electricity to Punjab farmers. Some politicians are in favour and some are against it. But it is true that electricity subsidy is being given to all the farmers without keeping in view the level of farmers. While the benefit of free electricity is being enjoyed by the big and rich farmers, the small and poor farmers are not covered due to their non-possession of electricity connection. Further, this policy is imposing additional financial burden on Punjab Government.

III. NEED OF THE PRESENT STUDY AND OBJECTIVES

The electricity subsidy is often criticized for their financial burden. Some researchers assert to the extent that these should be withdrawn, such a step will reduce the fiscal deficit, improve the efficiency of resources use, funds for public investment in agriculture. On the other hand, there is a fear that income of farmers would decline if electricity subsidy is curtailed. These are very important issues, which need serious investigation. Following are the main objectives of this study:-

1. To study the current status of power sector in Punjab.
2. To analyse free electricity to Punjab farmers.
3. To study the impact of free electricity to Punjab farmers.
4. To suggest ways and means for giving free electricity to Punjab farmers in future.

IV. METHODOLOGY

The present study is based on primary as well as secondary data. The districts of Punjab have been divided into three regions on the basis of levels of agricultural productivity. Average productivity is estimated by aggregation of the output of ten major crops of the state for the year 2006-07. Keeping in view the differences in agro-climate conditions and to avoid the geographical contiguity of sampled districts, it is deemed fit to select Ludhiana from high productivity zone, Bathinda from medium productivity zone and Rupnagar from low productivity zone. There are six tehsils of Ludhiana, three tehsils of Bathinda and Rupnagar each. Following random sampling, one village from each tehsil is selected, thus twelve villages are

selected from three districts. Sampled farmers have been divided into three categories on the basis of their farm size, small size category farmers are those who own land up to five acres, medium size category farmers own land between five to ten acres and large size category farmers own land above ten acres. A detailed questionnaire is prepared for collecting information about the agriculture subsidies. Standard statistical tools like chi-square, percentages have been used while carrying out tabular analysis.

In addition to primary data, secondary data is used in this study. The main sources of secondary data are Punjab State Electricity Board, Statistical Abstract of Punjab, Economic Survey of Punjab, Punjab Human Development Report, Punjab State Electricity Regulatory Commission etc.

Hypothesis and Statistical Method

The hypothesis of the study is that “Punjab farmers are ready to pay bills if uninterrupted electricity supply is given to them”. The hypothesis has been tested by using chi-square :-

$$\text{Chi - square} = \frac{\sum (O_{ij} - E_{ij})^2}{E_{ij}}$$

O_{ij} → Observed frequency of the cell in ith row and jth column.
 E_{ij} → Expected frequency of the cell in ith row and jth column.

The degree of freedom is:-

$$\text{d.f.} = (c-1)(r-1)$$

c - The number of columns.

r - The number of rows.

V. ELECTRICITY SUBSIDY IN PUNJAB STATE

Punjab State Electricity Board, which was constituted by the Government of Punjab in 1959 under the Electricity Act 1948, is a vertically integrated utility being responsible for generation, transmission and distribution of electricity within the State of Punjab. The majority of energy requirement of the state is met by generation at State’s own three Thermal Plants, five Hydel Power Stations and State’s share from Common Pool of Bhakra Beas Management Board (BBMB). Three Thermal Plants in Punjab are Guru Nanak Dev Thermal Plant (GNDTP) at Bathinda, Guru Gobind Singh Super Thermal Plant (GGSSTP) at Ropar and Guru Hargobind Thermal Plant (GHTP) at LehraMohabat. Five Hydel Power Stations are Shanan Power House at Joginder Nagar (HP), MukerianHydel Project in Hoshiarpur District, Anadpur Sahib Hydel Project in Ropar District, RanjitSagar Project, Micro Hydel Projects and Upper Bari Doaba Canal (UBDC) Hydel Project.

The distribution of free electricity to Punjab farmers during 1996-97 to 2010-11 is shown in the table 1. This table reveals that subsidy of electricity has increased from Rs. 404 crores in 1996-97 to Rs.1,219 crores in 1999-00 and further increased to Rs.3,487 crores in 2010-11.

Table 1: Distribution of Free Electricity to Punjab Farmers during 1996-97 to 2010-11

Years	Amount of Subsidy (Rs. Crores)
1996-97	404
1997-98	604
1998-99	928
1999-00	1,219
2000-01	1,462
2000-01	1,862
2005-06	1,386
2006-07	1,768.86
2007-08	2,159.84
2008-09	2,294.90
2009-10	2,804.94
2010-11	3,487

Source:- PSPCL, Petition for Aggregates Revenue Requirement and Determination of Tariff for the FY 2011-12

As the year 2000-01 is compared to the year 1996-97, it is observed that this subsidy has increased by 3.62 times more and in 2010-11, this has risen up by 2.52 times more as compared to the year 2005-06.

VI. FINANCIAL POSITION OF PUNJAB STATE ELECTRICITY BOARD

The Punjab State Electricity Board (PSEB) is a Commercial Organization. Therefore, it is necessary to discuss about the financial position of PSEB. In brief, as per data, the financial position of the Board is not up to the mark, mainly due to the reasons that on one side the PSEB is generating the electricity by spending huge money and on the other side, supplying the electricity on lower rate and even free of cost to some sections of consumers. In addition, to meet with the requirement of the consumers, after purchasing the electricity at higher rate, the same is being given to agriculture pump sets as well as other small domestic consumers on free of cost. The revenues gap of Punjab State Power Cooperation Limited during 1996-97 to 2010-11 is shown in the table 2. The revenue surplus has declined from Rs. 108 crores in 1996-97 to Rs. 49 crores in 1997-98 and further declined to Rs.4 crores in 1999-00.

Table 2: Revenue Gap of Punjab State Power Cooperation Limited during 1996-97 to 2010-11

Year	Revenue Gap/ Surplus
1996-97	108
1997-98	49
1998-99	51
1999-00	4
2000-01	-32
2001-02	-31
2002-03	-352.73
2003-04	-164.9
2004-05	-618.6
2005-06	13
2006-07	-1,92.3
2007-08	-1,189.77
2008-09	-1,366.45
2009-10	-1,978.05
2010-11	-5,427.72
2011-12	-9,656.53

Source:-PSPCL, Petition for Aggregates Revenue Requirement and Determination of Tariff for the FY 2011-12.

The revenue gap has increased from Rs. 32 crores in 2000-01 to Rs.352.73 crores in 2002-03 and further increased to Rs.9, 656.53 crores in 2011-12.

VII. COST OF GENERATING POWER IN PUNJAB STATE

PSEB is producing the electricity by spending huge amount of money as well as due to higher demand of electricity, also purchasing the power from other traders. The average cost of power as well as purchasing cost from traders during 2006-07 to 2009-10 is shown in the table 3. This table indicates that generation as well as purchasing cost is increasing throughout the study period. Average generation cost has increased from Rs.3.39 per unit in 2006-07 to Rs.3.67 per unit in 2008-09 and further increased to Rs.4.01 per unit, whereas average purchasing cost increased from Rs.4.85 per unit in 2006-07 to 6.21 per unit in 2008-09 and further increased to Rs.7.33 per unit in 2009-10.

Table 3: Average Cost of Power Generation and Average Cost of Power Purchaseduring 2006-07 to 2009-10

Years	Average Generation cost per unit (In Rs.)	Average Purchase cost per unit from Traders (In Rs.)
2006-07	3.39	4.85
2007-08	3.53	5.74
2008-09	3.67	6.21
2009-10	4.01	7.33

Source: PSPCL, Petition for Aggregates Revenue Requirement and Determination of tariff for the FY 2011-12.

It is observed that the cost of purchasing power is higher than that of generation of electricity. The purchasing cost is near about two times as compared to generation cost during 2007-08 to 2009-10.

VIII. DISTRIBUTION OF ELECTRICITY TO PUNJABFARMERS

PSPCL is providing the electricity to various categories like industrial, agriculture, domestic etc. It is economically important to find out the percentage share of agriculture sector in total sale of electricity. Total sale of electricity and sale to agriculture pump sets during 2007-08 to 2011-12 is shown in the table 4. In 2007-08, total sale is 31540 Million Units (MU), out of which 9537 MU sold to agriculture pump sets, whereas in 2010-11, total sale is 33432 MU out of which 10989 MU sold to agriculture pump sets.

Table 4: Distribution ofEnergy according to sale to Agriculture Pump Sets during 2007-08 to 2011-12

Sr. No.	Particulars	2007-08	2008-09	2009-10	2010-11	2011-12
1.	Total sale (in MUs).	31,540	33,315	32,350	33,432	36,165

2.	Energy sales to agriculture consumers (in MUs).	9,537 (30.24)	10,014 (30.06)	10,505 (32.47)	10,898 (32.6)	12,253 (33.88)
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Source: PSPCL, Petition for Aggregates Revenue Requirement and Determination of Tariff for the FY 2011-12. Percentage share is shown in parentheses.

The above table reveals that the percentage share of sale of electricity to agriculture pump sets has increased from 30.24 in 2007-08 to 32.47 in 2009-10 and further increased to 33.88 in 2011-12.

IX. FINANCIAL POSITION OF STATE GOVERNMENT

At present, Government of Punjab is giving various schemes to the people of the State. The main reason is to improve the living standard of the People, whereas the financial status of Government of Punjab, it is not up to mark. Government of

Punjab is in revenue deficit from 1996. The financial position of Punjab State government during 1996-97 to 2010-11 is shown in the table 5. The fiscal deficit of Punjab government has increased from Rs.1, 464.68 crores in 1996-97 to Rs. 4,383.58 crores in 2006-07 and further increased to Rs. 6,690.45 crores in 2008-09, whereas subsidy to agriculture sector has also increased from Rs.404 crores in 1996-97 to Rs.2, 159.84 crores in 2007-08 and further increased to Rs.3,487crores in 2010-11.

Table 5: Financial Position of Punjab state government during 1996-97 to 2010-11

Years	Fiscal Deficit (Rs. Crores)	Electricity subsidy(Rs.Crores)	Percentage share of electricity subsidy in Fiscal deficit
1996-97	1,464.68	404	27.58
2005-06	2,653.97	1,386	52.22
2006-07	4,383.58	1,768.86	40.35
2007-08	4,603.843	2,159.84	46.91
2008-09	6,690.45	2,294.9	34.30
2009-10	NA	2,804.96	—
2010-11	NA	3,487	—

Source: - (1) PSPCL, Petition for Aggregates Revenue Requirement and Determination of Tariff for the FY 2011-12. (2) Government of Punjab, Economic survey, various years.

The percentage share of subsidy in fiscal deficit has increased from 27.58 in 1996-97 to 52.22 in 2005-06 and declined to 40.35 in 2006-07 and increased to 46.91 in 2007-08.

X. IMPACT OF ELECTRICITY SUBSIDY ON PUNJAB FARMERS

Punjab Government is giving the free electricity to Punjab farmers through Punjab state electricity Board. It is important to find out the impact of this subsidy on farmers, then a primary survey is conducted in three districts of the same state. The distribution of farmers according to their income from agriculture

per year is shown in the table 6. Out of total 235 farmers, 18.30 per cent are getting less than two lakhs, 25.96 per cent between two lakhs to three lakhs, 22.13 per cent between three lakhs to four lakhs and 33.62 per cent more than four lakhs. Majority (51.19 per cent) of small farmers are earning less than two lakhs, 48.48 per cent of medium farmers between 3 lakhs to four lakhs, whereas most (33.62 per cent) of large farmers above four lakhs income from agriculture sector.

Table 6: Distribution of Farmers in Punjab according to their Income

Income Level	Small	Medium	Large	Total
Less than 2 Lac	43 (51.19)	0 (0.00)	0 (0.00)	43 (18.30)
2-3 Lac	39 (46.43)	22 (22.22)	0 (0.00)	61 (25.96)

3-4 Lac	2 (2.38)	48 (48.48)	2 (3.85)	52 (22.13)
Above 4 Lac	0 (0.00)	29 (29.29)	50 (96.15)	79 (33.62)
Total	84 (100)	99 (100)	52 (100)	235 (100)

Source: - Field Survey, 2010-11.

Percentage share is shown in parentheses.

At present farmers are using various types of sources for irrigating their crops. Table 7 shows the distribution of farmers according to use of source of water to crops. This table reveals that the majority i.e. 58.72 per cent of total farmers are using submersible as well as diesel pump sets, 27.66 per cent are using submersible, diesel pump sets and water canal, 8.09 per cent used

submersible and canal water, 3.83 per cent has only submersible pump sets and only 1.70 per cent are using mono-block pump sets. This table reveals that maximum number (57.14 per cent) of small size category farmers, 57.58 per cent of medium and 63.46 per cent of large size category farmers are using submersible as well as diesel pump sets.

Table 7: Distribution of Farmers according to Use of Source of Water to Crops

Particulars	Small	Medium	Large	Total
Mono Block Pump set	4 (4.76)	0 (0.00)	0 (0.00)	4 (1.70)
Submersible Pump set	9 (10.71)	0 (0.00)	0 (0.00)	9 (3.83)
Submersible Pump set and diesel Pump set	48 (57.14)	57 (57.58)	33 (63.46)	138 (58.72)
Submersible Pump set and water canal	11 (13.10)	8 (8.08)	0 (0.00)	19 (8.09)
Submersible Pump set, diesel Pump set and water canal	12.00 (14.29)	34.00 (34.34)	19.00 (36.54)	65 (27.66)
Total	84 (100)	99 (100)	52 (100)	235 (100)

Source: Field Survey 2010-11

Note: Percentages are shown in parentheses

Submersible pump sets are very useful for irrigation purposes, the reason is that it produces more water than that of other pump sets. It is observed that few farmers (10.7 per cent) having less than 2 acres of land are using mono-block pump sets as they are unable to afford the expenditure of submersible as well as diesel pump sets due to the low income level.

During survey it is found that maximum numbers of farmers are using diesel pump sets for irrigating the crops. Large size category farmers are spending more on diesel pump sets as compared to small and medium size category farmers. The main reason behind it, is poor supply of electricity to agriculture pump sets. Comparing the diesel cost with the electricity charges even if the subsidy is withdrawn by Punjab Government, it is found that that of the diesel cost is higher than electricity charges (flat rate). The farmers are ready to pay the bills for electricity, at the condition that supply of electricity should be regular. Table 8

reveals that out of 235 total sampled farmers 172 farmers are ready to pay bills, whereas 63 farmers are against of bills.

To test the Hypothesis, chi-square test is applied.

Table 8: Farmers Ready to Pay Bills if Electricity is Given Uninterrupted

Particulars	Small	Medium	Large	Total
Those who do not want to pay	57	75	40	172

Those who want to pay	27	24	12	63
Total	84	99	52	235

Source: - Field survey, 2010-11

Value of chi-square = 1.92

Value of freedom = 2, $\chi^2_{0.05} = 3.84$

The table value is greater than the calculated value. Hypothesis is accepted. Hence, Farmers are ready to pay bills if electricity is given to them uninterrupted.

XI. MAJOR FINDINGS AND POLICY IMPLICATIONS

This paper analysed the electricity subsidy in Punjab state during 1996-97 to 2011-12. The main purpose of this study is to help the farmers, so that they can use the new technology and reduce the cost of production. Secondary data reveal that Punjab State Government is giving free electricity to Punjab farmers through Punjab State Electricity Board. These both departments are in fiscal deficit and major share of income is going to for giving free electricity to agriculture sector. From primary survey it is observed that the income of farmers is depending on the agriculture. According to them, due to free electricity, cost of inputs on agriculture is reduced as compared to the previous years when free electricity was not given. The electricity subsidy is regressive as large farmers, who have capacity to pay the electricity charges are getting more benefit from this subsidy than the small and medium farmers. The main reason is that they have more land, more electric load, new types of pump sets and more than one electricity connections. Due to irregular supply of electricity farmers have to use diesel pump sets to irrigate the crops. The expenditure of diesel pump sets is very high as compared to flat rates of electricity.

From farmers point of view they are ready to pay bills for irrigation as uninterrupted supply of electricity is given to agriculture sector. As a result, government should impose flat rates on electricity supply given to agriculture sector. If implemented, it will reduce state electricity board's burden and this amount can be used for production of more electricity, reducing the need of purchasing electricity at very high prices, which adds to the deficit of state finance. Government should keep aside its motive to please voters or strengthen the vote bank, it should frame rational policy in the favour and welfare of the state.

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Signal Processing of ECG Using Matlab

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Abstract- The ECG signal, even rest ECG, is often corrupted by artifacts produced by various sources of either artificial or biological nature. Main artificial artifacts are power line interference, Impulse noise, Electrostatic potentials and noise of electronic devices. The main biological artifacts are motion artifacts and muscle artifacts (EMG signal) The present work introduces the digital filtering method to cope with the noise artifacts in the ECG signal. The ECG lead-II signal is taken. The Butterworth IIR filter and FIR type I filters are applied on the ECG signal. The basic bandwidth used for the ECG monitoring is from 0.5 Hz to 100 Hz.

Index Terms- ECG (Electrocardiogram), IIR (Infinite impulse response), FIR (finite impulse response)

I. INTRODUCTION

The biomedical signal in the present work is the ECG signal and the filtering technique suggested is Butterworth filter or simply FIR Type-1 filter. This ECG gets corrupted due to different kinds of the artifacts. The different types of artifacts are Power line interference, motion artifacts, base line drift and instrumental noise. Due to these types of the artifacts ECG gets corrupted and correct information not transfers to the cardiac specialist. The care must be taken to nullify the artifacts to avoid wrong diagnosis. Certain type of the noise may be filter directly by time domain filters using signal processing techniques or digital filters. The advantage of the time domain filtering is that the spectral characterization of the filter may not be required (at least in the direct manner). Different researchers are working on noise reduction in the ECG signal. Wu Y, Yang Y in his article given new method for the ECG noise reduction by using 50 persons ECG based on Levkov method [22]. The Wang H, Dong X has suggested filter method with in filtered QRS wave can be exactly regarded as the mark identifying other physiological Signal. [23]. The method for the removal of the power line interference suggested by ferd Jallah M, Barr RE based on iterative division or multiplication of a set of frequencies centered at 60 Hz [17]. The Choy TT, Lenng PM has suggested in his literature the real time microprocessor based notch filter for ECG [9]. The Mc manus CD, Neubert KD has compared the digital filtering methods [6,17]. The technique for suppressing transient states of ECG the IIR notch filter is investigated by Pie SC and T Seng CC [18]. The work on the ECG beat detection using filter bank is carried out by the Tompkins W J and Luos [1]. Other method like Signal averaging for line interface reduction is also suggested by the scientists [11,13].

1.1. The ECG Leads

Two electrodes placed over different areas of the heart and connected to the galvanometer will pick up the electrical currents resulting from the potential difference between them. For example, if under one electrode a wave of 1 mV and under the second electrode a wave of 0.2 mV occur at the same time, then the two electrodes will record the difference between them, i.e. a wave of 0.8 mV. The resulting tracing of voltage difference at any two sites due to electrical activity of the heart is called a "LEAD" (Figs 1.1 (a) - (d)).

Bipolar Leads: In bipolar leads, ECG is recorded by using two electrodes such that the final trace corresponds to the difference of electrical potentials existing between them. They are called standard leads and have been universally adopted. They are sometimes also referred to as Einthoven leads (Fig 1.2 (a)).

In standard lead I, the electrodes are placed on the right and the left arm (RA and LA). In lead II, the electrodes are placed on the right arm and the left leg and in lead III, they are placed on the left arm and the left leg. In all lead connections, the difference of potential measured between two electrodes is always with reference to a third point on the body. This reference point is conventionally taken as the "right leg". The records are, therefore, made by using three electrodes at a time, the right leg connection being always present.

In defining the bipolar leads, Einthoven postulated that at any given instant of the cardiac cycle, the electrical axis of the heart can be represented as a two dimensional vector. The ECG measured from any of the three basic limb leads is a time-variant single-dimensional component of the vector. He proposed that the electric field of the heart could be represented diagrammatically as a triangle, with the heart ideally located at the centre. The triangle, known as the "**Einthoven triangle**", is shown in the fig 1.3. The sides of the triangle represent the lines along which the three projections of the ECG vector are measured. It was shown that the instantaneous voltage measured from any one of the three limb lead positions is approximately equal to the algebraic sum of the other two or that the vector sum of the projections on all three lines is equal to zero.

In all the bipolar lead positions, *QRS* of a normal heart is such that the *R* wave is positive and is greatest in lead II.

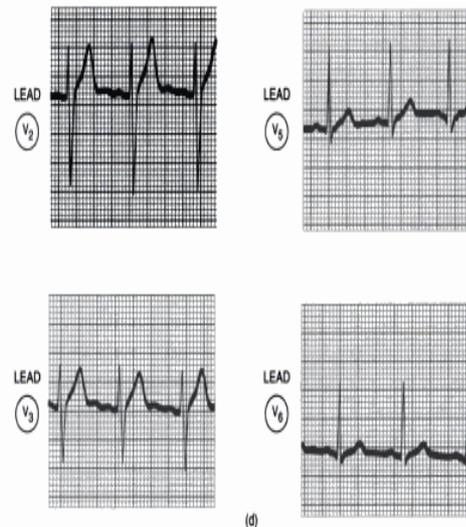
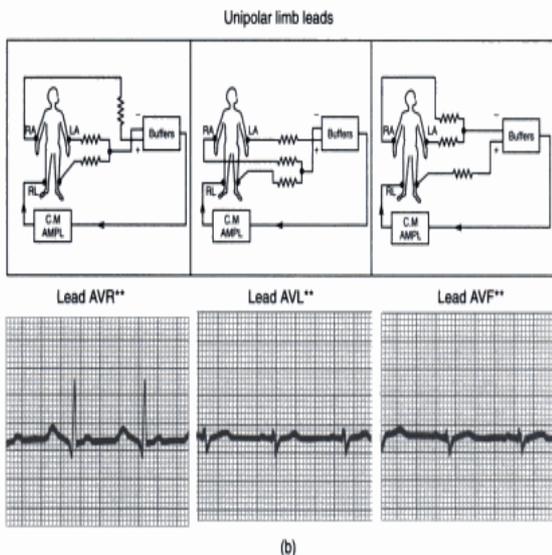
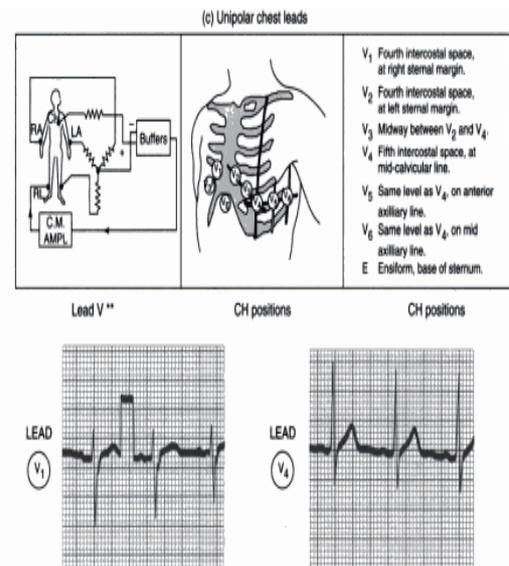
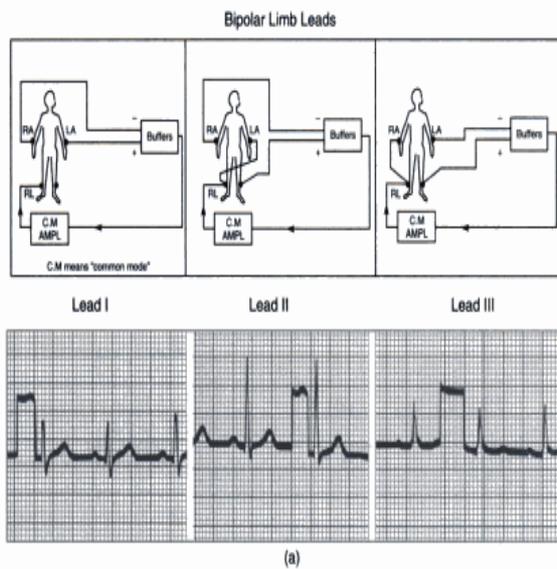


Fig1.1- Types of lead Connection with typical ECG waveforms
 (a) Bipolar limb leads
 (b) Unipolar Limb Leads

Fig 1.2- Types of lead Connections with typical ECG waveforms
 (c) Position of chest lead in unipolar pericardial lead recording (d) C Leads

Unipolar Leads (V Leads): The standard leads record the difference in electrical potential between two points on the body produced by the heart's action. Quite often, this voltage will show smaller changes than either of the potentials and so better sensitivity can be obtained if the potential of a single electrode is recorded. Moreover, if the electrode is placed on the chest close to the heart, higher potentials can be detected than normally available at the limbs. This led to the development of unipolar leads introduced by Wilson in 1894. In this arrangement, the electrocardiogram is recorded between a single exploratory electrode and the central terminal, which has a potential corresponding to the centre of the body. In practice, the reference electrode or central terminal is obtained by a combination of several electrodes tied together at one point. Two types of

unipolar leads are employed which are: (i) limb leads, and (ii) pericardial leads.

(i) **Limb leads** In unipolar limb leads, two of the limb leads are tied together and recorded with respect to the third limb. In the lead identified as AVR, the right arm is recorded with respect to a reference established by joining the left arm and left leg electrodes. In the AVL lead, the left arm is recorded with respect to the common junction of the right arm and left leg. In the AVF lead, the left leg is recorded with respect to the two arm electrodes tied together. They are also called augmented leads or 'averaging leads'. The resistances inserted between the electrodes-machine connections are known as 'averaging resistances'.

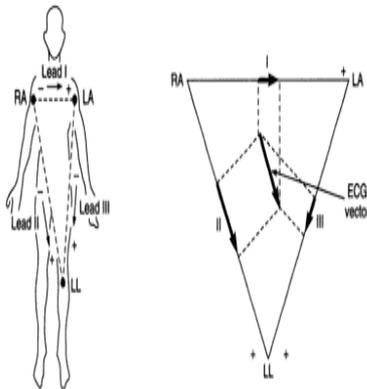


Fig 1.3- The Einthoven triangle for defining ECG Leads

(ii) **Precordial leads** the second type of unipolar lead is a pericardial lead. It employs an exploring electrode to record the potential of the heart action on the chest at six different positions. These leads are designated by the capital letter 'V' followed by a subscript numeral, which represents the position of the electrode on the pericardium. The positions of the chest leads are shown in Fig. 1.3.

1.2 Effects of Artifacts on ECG Recordings

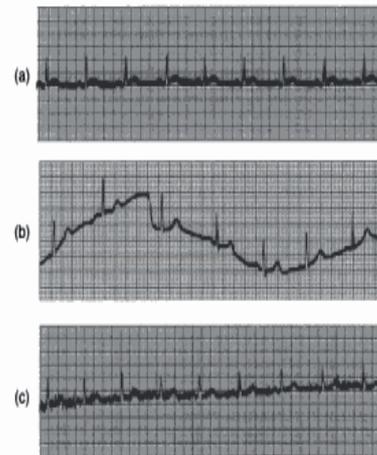
Abnormal patterns of ECG may be due to pathological states or on occasion they may be due to artifacts. To diagnose the presence of undesirable artifacts on the ECG trace, a few recordings are illustrated below:

Interference from the Power Line: Power line interference is easily recognizable since the interfering voltage in the ECG would have a frequency of 50Hz. This interference may be due to the stray effect of the alternating current on the patient or because of alternating current fields due to loops in the patient cable. Other causes of interference are loose contacts on the patient cable as well as dirty electrodes. When the machine or the patient is not properly grounded, power line interference may even completely obscure the ECG waveform.

The most common cause of 50 Hz interference is the disconnected electrode resulting in a very strong disturbing signal. It is often strong enough to damage the stylus of an unprotected direct writing recorder, and therefore needs quick action.

Sometimes static charges on the synthetic uniform of the operator may result in a random noise on the trace. This noise is very difficult to remove except in those machines which have

very high CMRR. The noise can be reduced by partially shielding the patient by means of the bed springs. Connection of the springs to the instrument case helps to compensate for a poor CMRR (Spooner, 1977).



**Fig1.4 (a) ECG Recording with regular spreading of the curve with super imposed 50 Hz power line interference signal
(b) Recording with irregular trembling of the ECG trace without wandering of the base line but otherwise normal ECG Trace
(c) ECG Trace without wandering of the base line**

Electromagnetic interference from the power lines also results in poor quality tracings. Electrical equipment such as air-conditioners, elevators and X-ray units draw heavy power-line current, which induce 50 Hz signals in the input circuits of ECG machines. Due to unbalanced linkages, common mode rejection circuits almost prove ineffective against them. A practical solution to minimize this problem is physical separation between the interference causing sources and the patient. Levkov *et al* (1984) developed a method of digital 50 Hz interference elimination by computing the interference amplitudes and subtracting these data from the original signal, thereby greatly reducing the requirements of amplifiers, shielding, earthing, electrode quality and application procedures.

Electrical power systems also induce extremely rapid pulses or spikes on the trace, as a result of switching action. Use of a transient suppressor in the mains lead of the machines helps to solve this problem.

Shifting of the Baseline: A wandering baseline but otherwise normal ECG trace is usually due to the movement of the patient or electrodes. The baseline shift can be eliminated by ensuring that the patient lies relaxed and the electrodes are properly attached. Baseline wander is usually observed immediately after application of the electrodes. It is due to a relatively slow establishment of electrochemical equilibrium at the electrode-skin interface. This can be minimized by selecting the proper electrode material, which will reach equilibrium quickly with a good electrode jelly.

Muscle Tremor. Irregular trembling of the ECG trace, without wandering of the baseline occurs when the patient is not relaxed or is cold. It is generally found in the case of older patients. Muscle tremor signals are especially bothersome on

limb leads when a patient moves or the muscles are stretched. Therefore, for long-term monitoring, the electrodes are applied on the chest and not on the limbs. For normal routine ECG recordings, the patient must be advised to get warm and to relax so that muscle tremor from shivering or tension is eliminated.

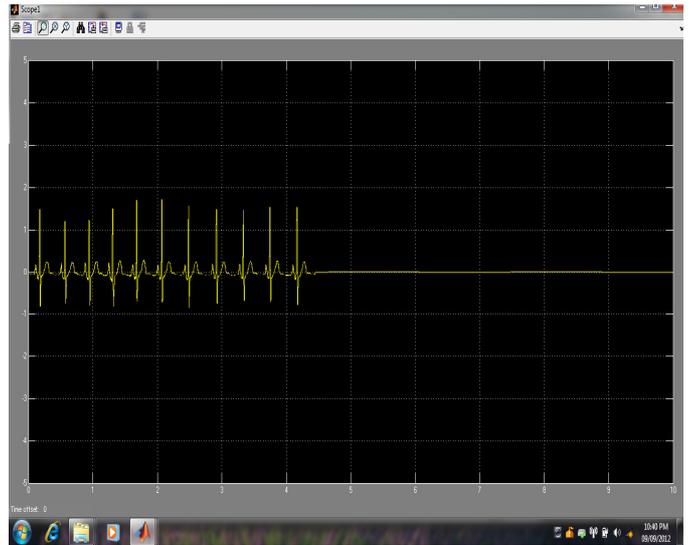
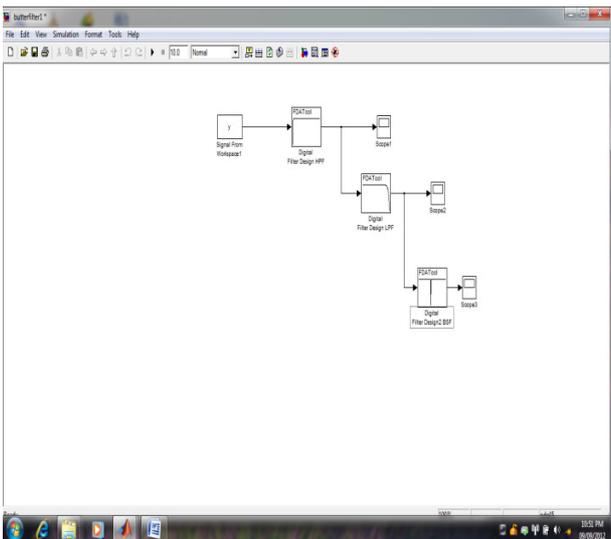
The most critical component of the ECG recorder is the patient cable. The conventional PVC insulation gets degraded and becomes rigid and breakable because of the arification of the softener. Some manufacturers supply a patient-cable made of silicon-rubber, which provides better elasticity over long periods

II. SIMULATION RESULT

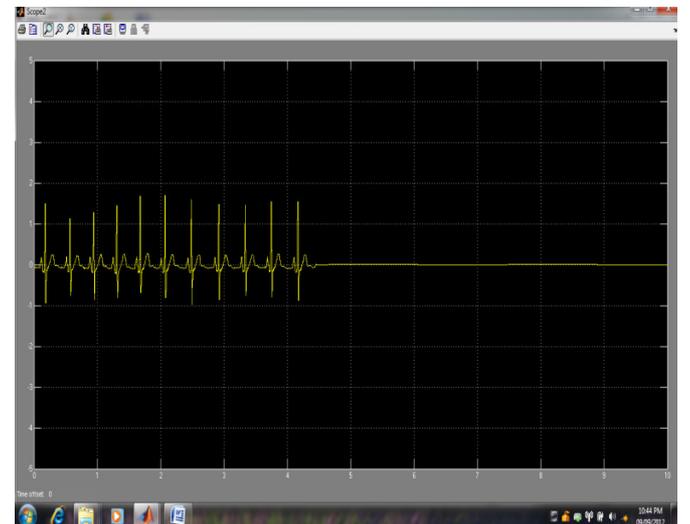
Design of IIR filter (Butterworth):-

IIR filter have infinite duration impulse response, hence they can be match to analog filter , all impulse of which generally have infinitely long response .Therefore the basic technique of IIR filter design transforms well know analog filter into digital filter using complex value mappingdesigned to have linear phase ,no distortion.

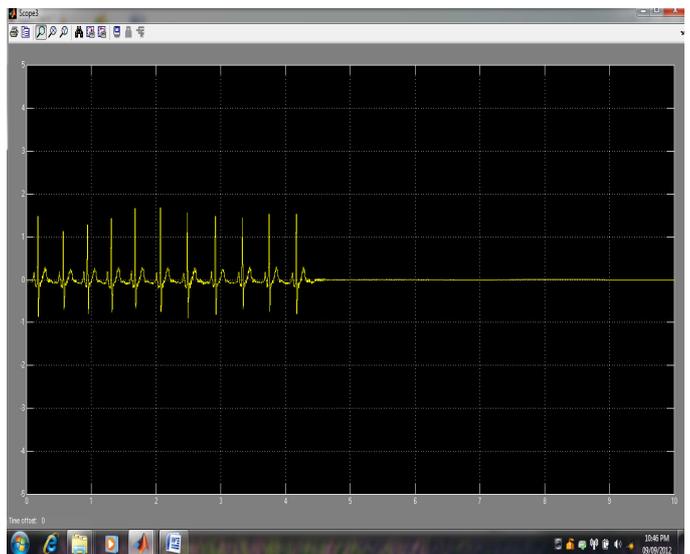
FDA Butterworth Filter



FDA Butter HPF, Scope



FDA Butter LPF, Scope-1

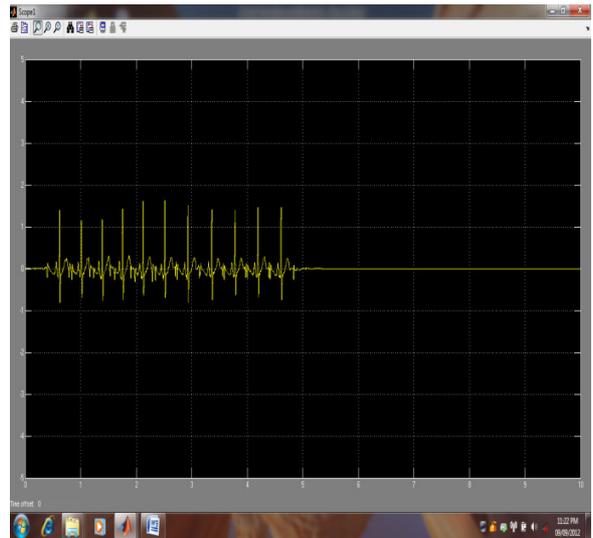
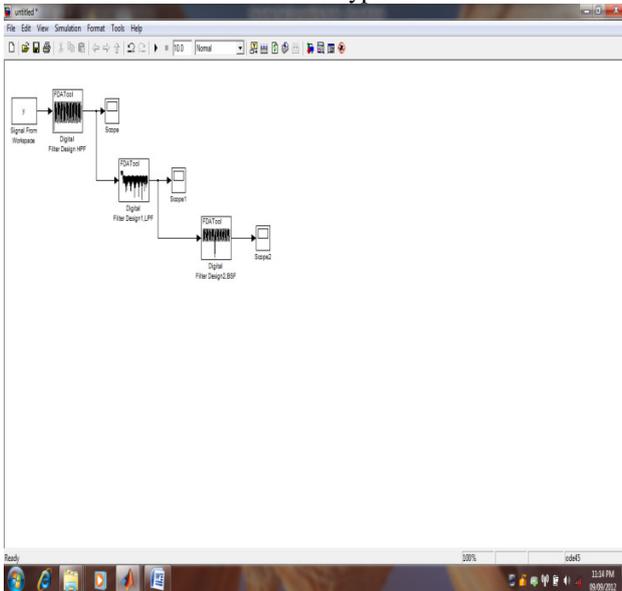


FDA Butter BSF, Scope-2

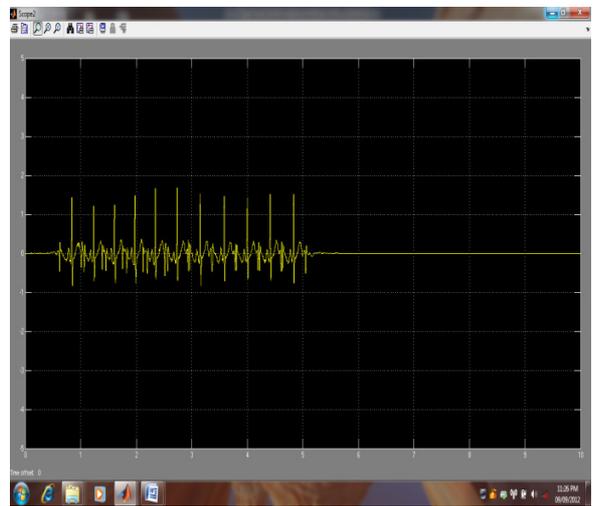
Design of FIR Type -1 filter:-

FIR filter involves finding the coefficient $h(n)$ that result in frequency response that satisfies a given set of filter specification. FIR filter have two important advantages over IIR filter ,first they are generated to be stable, even after filter coefficient have been quantized ,second they may be easily constrained to have linear phase.

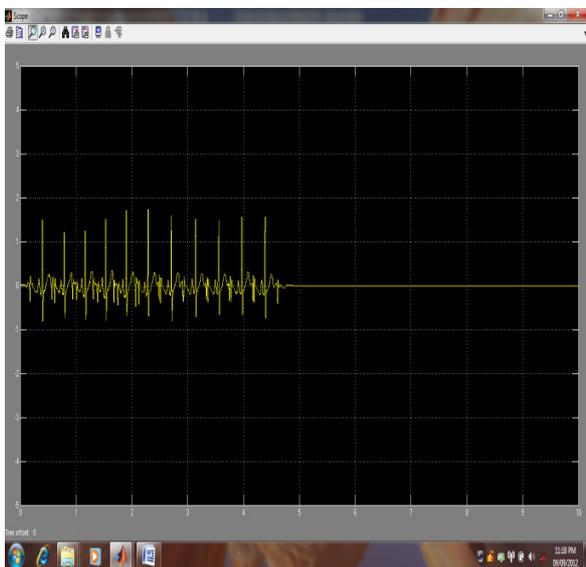
FDA FIR Typr-1



FDA FIR Type-1 LPF Scope-1



FDA FIR Type-1 BSF Scope-2



FDA FIR Type-1 HPF Scope

Comparison of Butterworth & FIR-Type1 filter for HPF,LPF&BSF

Types of Filter	Filter order	Effects on PQRST Wave form
Butterworth filter	2	Modified
FIR-Type1 filter	100	Less modified

III. CONCLUSION

The present work introduces the digital filtering method to cope with the noise artifacts in the ECG signal. The butterworth

IIR filter and FIR type-1 filters are applied on the ECG signal. From the result to see that both the filter reduces the low and high frequency noise. It is seen that tip of the QRS complex is distorted in case of Butterworth highpass filter of order two. Where as in case of FIR type-1 QRS complex is less modified.

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To Study of Vegetable Oils and Their Effects on Diesel Engine Performance

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Abstract- The rapid increasing the industrialization, motorization, in the world has remarkably raised the demand of the petroleum products. The reservations of such a petroleum based fuels are limited in the world. Furthermore, they are exhaustible and cost is rapidly increasing day to day. For those countries having not ability of petroleum recourses, are importing the petroleum fuels. So, it is quit necessary to focus on an alternative fuels which can be derived from the material available in the country. This paper reviews the combustion parameter and exhaust emission characterizes of different bio-fuels such as plastic oil, cocking oil, rubber seed oil, palm bio-diesel, ethanol etc. the paper also reviews the experimental works carried out in various countries in this field and scope, challenges being faced in this area of research are clearly described.

Index Terms- Alternative fuel; Vegetable oil; Bio-diesel; Renewable energy.

I. INTRODUCTION

In recent time, the world is facing problems with energy crises due to depletion of conventional energy sources and increase environmental problems. This situation has led to the search for an alternative energy resources, which should be not only in exhaustible but also less harmful to environment. For developing countries, fuels of bio origin such alcohol, vegetable oils, bio-mass, bio-gas, synthetic fuels etc. are becoming most popular. Such fuels can be used directly, while others need some modification before they are used as fuel. And also by the application of the bio-fuels the harmful emission from engine such as CO, SO₂, soot, hydro carbon, etc. can be controlled. Increasing air pollution is the most important problems of developed countries today. Exhaust emission from motor vehicle have a main role in this pollution. It is not enough to change the design of engine of vehicle to cope with the legal regulation, so it is quit necessary to focus on alternative fuels. These alternative fuels can be produced from renewable energy sources such as sugar-cane, cassava, jetropha, karanja, soybean oil, sunflower oil, cotton seed oil, ground nut oil, sesame oil, palm kernels oil, castor oil. Furthermore bio-fuels have some advantages' over petroleum fuels, such as the reduction CO and hydro carbon emissions and well antiknock performance, which allow the use of higher compression ratio of engines. And also self-ignition temperature and fleshing point of bio-fuel are higher than those of petroleum fuels.

Due to low evaporation losses it safer for transportation and storage. Many researchers have been conclude that with the use

of bio-fuels as a fuel in engines a reduction in harmful emissions as well as a comparable engine

Performance with petroleum fuels can be possible. Performance parameter such as specific fuel consumption, thermal efficiency, break power, ignition qualities, viscosity, torque, etc. can be comparable.

II. PRODUCTION AND USAGE OF BIO-DIESEL

Many standardized procedures are available for the production of bio-diesel fuel oil. The commonly used methods for bio-fuel production are elaborated onbelow.

A. Blending

Vegetable oil can be directly mixed with diesel fuel and may be used for runningan engine. The blending ofvegetable oil with diesel fuel were experimented success-fully by various researchers. A diesel fleet was powered with a blend of 95% filteredused cooking oil and 5% diesel in 1982. In 1980, Caterpillar Brazil Company usedpre-combustion chamber engines with a mixture of10% vegetable oil to maintaintotal power without any modification to the engine. A blend of20% oil and 80%diesel was found to be successful[2]. It has been proved that the use of100% vegetable oil was also possible with some minor modifications in the fuelsystem. Thehigh fuel caused the major problems associated with the use of pure vegetable oilsas fuel viscosity in compression ignition engines. Micro-emulsification, pyrolysisand trans esterification are the remedies used to solve the problems encountered dueto high fuel viscosity.

B. Micro emulsification

To solve the problem ofhigh viscosity ofvegetable oil, micro emulsions withsolvents such as methanol, ethanol and butanol have been used. A micro emulsionis defined as the colloidal equilibrium dispersion of optically isotropic fluidmicrostructures with dimensions generally in the range of1–150 mm formedspontaneously from two normally immiscible liquids and one or more ionic ornon-ionic amphiphiles. These can improve spray characteristics by explosive vaporization ofthe low boiling constituents in the micelles. All micro emulsions withbutanol, hexanol and octanol will meet the maximum viscosity limitation for dieselengines. Czerwinski[3] prepared emulsion of53% sun flower oil, 13.3% ethanoland 33.4% butanol. This emulsion had a viscosity of6.3 centistokes at 40°C, acetane number of25. Lower viscosities and better spray patterns were observedwith an increase in the percentage ofbutanol.

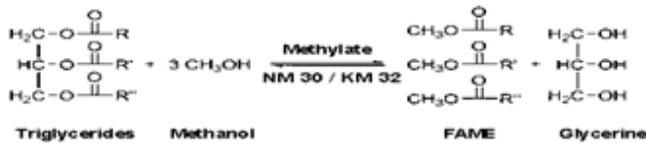
C. Cracking

Cracking is the process ofconversion ofone substance into another by means ofheat or with the aid ofcatalyst. It involves heating in the absence ofair or oxygenand cleavage ofchemical

bonds to yield small molecules. The pyrolyzed material can be vegetable oils, animal fats, natural fatty acids and methyl esters of fatty acids. The pyrolysis of fats has been investigated for more than 100 years, especially in those areas of the world that lack deposits of petroleum [4]. Since World War I, many investigators have studied the pyrolysis of vegetable oil to obtain products suitable for engine fuel application. Tung oil was saponified with lime and then thermally cracked to yield crude oil, which was refined to produce diesel fuel and small amounts of gasoline and kerosene.

D. Transesterification

Transesterification is otherwise known as alcoholysis. It is the reaction of fat or oil with an alcohol to form esters and glycerin. A catalyst is used to improve the reaction rate and yield [5].



Among the alcohols, methanol and ethanol are used commercially because of their low cost and their physical and chemical advantages. They quickly react with tri-glycerides and NaOH and are easily dissolved in them. To complete a transesterification process, 3:1 molar ratio of alcohol is needed. Enzymes, alkalis or acids can catalyze the reaction, i.e. lipases, NaOH and sulphuric acid, respectively. Among these, alkali transesterification is faster and hence it is used commercially.

A mixture of vegetable oil and sodium hydroxide (used as catalyst) are heated and maintained at 65°C for 1 h, while the solution is continuously stirred. Two distinct layers are formed, the lower layer is glycerin and the upper layer is ester. The upper layer (ester) is separated and moisture is removed from the ester by using calcium chloride. It is observed that 90% ester can be obtained from Table 1 [26].

Yield of methyl esters of vegetable oils by transesterification process vegetable oils.

Table 1: The percentage yield (by weight) of some common vegetable oil methyl esters.

Temperature (K)	Sunflower oil (%)	Corn oil (%)	Cotton oil (%)	Soybean oil (%)
620	79.6	80.5	82.3	84.2
630	93.6	95.8	96.5	96.8
640	96.8	97.2	97.6	97.9

III. PROPERTIES OF DIFFERENT VEGETABLE OILS [7]

Fuel type	Calorific value (kJ/kg)	Density (kg/m ³)	Viscosity at 27°C (mm ² /s)	Cetane No.
Diesel	43,350	815	4.3	47.0

Sunflower oil	39,525	918	58.5	37.1
Sunflower methyl ester	40,579	878	10.3	45.5
Cotton seed oil	39,648	912	50.1	48.1
Cotton seed methyl ester	40,580	874	11.1	45.5
Soybean oil	39,623	914	65.4	38.0
Soybean methyl ester	39,760	872	11.1	37.0
Corn oil	37,825	915	46.3	37.6

IV. EXPERIMENT

A large number of experiments were carried out with vegetable oils as a replacement of I.C. engine fuel by researchers from various parts of the world. Most of these experiments were reported from US, Europe, India, Malaysia and Germany. A summary of these experimental results is given below.

Christopher et al. [8] conducted two tests in Chicago using bio-diesel as an alternative fuel for in-service motor coaches. This was an exploratory investigation to determine the effect of fuel on the engine performance characteristics and infrastructure needed to use this fuel. The testing proved that the bio-diesel could be used as a feasible alternative fuel. Montagu [9] conducted experiments by using rapeseed oil in diesel engines. The introduction of 5% of RME led to a reduction in the volumetric efficiency around 0.4%. It has been reported that, even after a 71,50,000 km run by vehicles no abnormal aging was observed. The increase in NOx and decrease in HC were detected. The increase of noise and smoke level occurrence during cold start was also noted.

The Ministry of Research and Technology in the Federal Republic of Germany, is promoting the use of agricultural raw material. In Germany, rapeseed oil was analyzed and found to be one of the major agricultural renewable materials. Hammerstein et al. [10] conducted experiments on naturally aspirated exhaust gas turbo-charged air cooled and water cooled engines using rapeseed oil. Experiments were conducted using filtered rapeseed oil. It has been reported that the brake power and torque using rapeseed oil as fuel are 2% lower than that of diesel. The heat release rate is very similar for both fuels. With all the engines tested, maximum brake power was obtained with rapeseed oil. Also, lower mechanical stresses and lower combustion noise were observed. The emission of CO and HC are higher, whereas NOx and particulate emission were lower in comparison with diesel fuel.

Tadashi et al [11], evaluated the feasibility of rapeseed oil and palm oil for diesel fuel in a naturally aspirated direct injection diesel engine. It was found that vegetable oil fuels gave an

acceptable engine performance and exhaust emission levels for short-term operation. However, they caused carbon deposit buildups and sticking of piston rings with extended operation.

Chio[12] conducted tests on bio-diesel blended with diesel fuel in the concentration of 20 and 40% by volume on a single cylinder caterpillar engine, using both single and multiple injection strategies. At high loads using single injection, particulate and CO emissions were decreased. A slight increase in NO_x was noticed as the bio-diesel concentration increased. But in the case of multiple-injection, a decrease in particulate emission was observed with little or no effect on NO_x. At low loads, addition of bio-diesel and multiple injection schemes were found to be detrimental to particulate matter and CO emission. Rapeseed oil esters are mixed with diesel and performance and emission characteristics studied by Peter[13]. This study has shown that there was a reduction in emissions when rapeseed oil was used as fuel.

A turbocharged diesel engine has been tested under steady state conditions to investigate the combustion characteristics of the blends of methyl isopropyl and methyl esters of soyabean oil with diesel. All the fuel blends revealed a significant emission reduction of CO, HC, particulate matter and solid carbon with similar engine performance. All ester blends experienced shorted ignition delay under both 100 and 20% load engine conditions.

Ghormade et al.[14] Used Soyabean oil as fuel to run a compression ignition engine. He found that there was only a slight variation in part loads efficiency. And there was no improvement in brake specific fuel consumption by blending.

Pangavhane et al.[15] conducted experiments by using soyabean oil in diesel engines. From the experiments it was reported that CO emissions and HC emissions reduced by 21 and 47%, respectively. However, NO_x was found to increase with load.

Jacobus et al.[16] conducted trials on four vegetable oils, namely sunflower, cottonseed, soyabean oil and peanut oil blend with diesel. They compared the engine performance and emission characteristics and reported that all the oils provided almost similar characteristics.

Mariusz et al.[17] conducted experiments on sunflower oil and recommended incorporating dual fuel pre-heater for durability improvements of diesel engines. The durability of the engine increased through the prevention of engine operation at low load and low speed conditions, reduced exposure time of fuel injection system at very high temperature conditions during transition process from high to light loads and elimination of fuel injection of oil during shut down period. Samaga operated a single cylinder water-cooled dual fuel engine using sunflower oil and groundnut oil. The performance characteristics obtained are comparable to that of diesel. He suggested some remedies to the practical problems encountered in the dual fuel operation of I.C. engines. Periodic cleaning of the nozzle tip is necessary to ensure adequate spray characteristics. Starting and stopping with diesel oil while running with vegetable oil eliminates filter clogging. Bio-diesel produced from vegetable oil is of higher unsaturated fatty acids and bio-diesel from animal fats is of higher content in saturated fatty acids. Kelvin et al.[18] attempted to identify the mechanism for bio-diesel emission reduction and engine performance by blending. He concluded that bio-diesel's particulate reducing effect could be attributed to its displacement

of aromatic and short chain paraffin hydrocarbon and its oxygen content.

Barsic et al.[19] conducted experiments using 100% sunflower oil, 100% peanut oil, 50% of sunflower oil with diesel and 50% of peanut oil with diesel. A comparison of the engine performance was presented. The results showed that there was an increase in power and emissions. In another study, Rosa et al.[20] used sunflower oil to run the engine and it was reported that it performed well. Blends of sunflower oil with diesel and sunflower oil with diesel were used by Zeiejerdki et al.[21] for his experimentation. He demonstrated the least square regression procedure to analyze the long-term effect of alternative fuel and I.C. engine performance.

Dynamometer tests have been carried out by Masjuki et al.[22] to evaluate the performance, emission and wear characteristics of an indirect diesel engine fueled by blends of coconut oil and diesel fuel. The performance and emission characteristics results showed that 10-30% coconut oil blends produced a slightly higher performance in terms of brake power than that of diesel. All the coconut oil blends produced lower exhaust emissions including polycyclic aromatic hydrocarbons and particulate matter. The wear and lubricating oil characteristics results showed that coconut oil blends up to 30% produced similar results to that of diesel.

In India, karanja oil was experimented for analyzing its performance characteristics by Srinivasan Rao[23], Karanja oil was found to give a better performance compared to that of diesel. Senthil Kumar et al. conducted experiments by blending jatropha oil with diesel. It has been reported that exhaust gas temperature, smoke, HC and CO are higher compared to diesel. Deshpande[24] used blends of linseed oil and diesel to run the CI engine. Minimum smoke and maximum brake thermal efficiency were reported in this study.

Masjuki et al.[25] used preheated palm oil to run a compression ignition engine. Preheating reduced the viscosity of fuel and hence better spray and atomization characteristics were obtained. Torque, brake power, specific fuel consumption, exhaust emission and brake thermal efficiency were found to be comparable to that of diesel.

Recently experimental investigations are carried out in a single cylinder DI diesel engine to examine the suitability of different vegetable oils such as Neem, Mahua, Linseed and Castor as alternate fuels.

Smoke emission of Castor and Mahua followed by Neem is lower compared with other oils. For Linseed oil smoke emission is on higher side for entire range of operation[27].

V. ENGINE PERFORMANCE COMPARISON

Recap et al.[7] ran a single cylinder engine with various types of vegetable oils. Some of the results obtained by them are presented here in the form of bar charts (Figs. 1-6)[26].

The engine was operated at 1300 rpm. Diesel fuel performance was used as reference. The observed maximum torque differences between the reference value and peak values of the vegetable oil fuels were about 10% obtained with that of raw sunflower oil, raw soyabean oil and opium poppy oil fuels Fig.1 [26]. The maximum power differences between the reference value and peak values of the vegetable oil fuels were about 18% obtained with raw cottonseed oil and raw soyabean oil fuels

Fig.2 [26]. The minimum torque and power difference was about 3% between reference value and oils. These results may be due to the higher viscosity and lower heating values of vegetable oils.

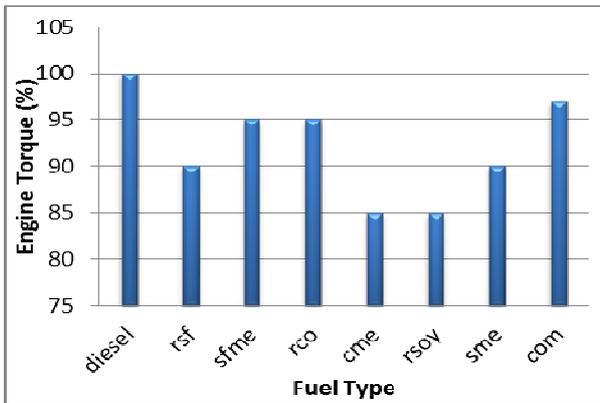


Fig.1 Maximum engine torque obtained at 1300 rpm.

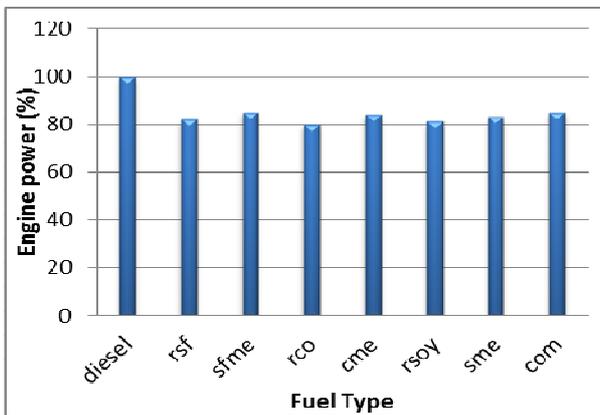


Fig.2. Maximum engine power obtained at 1300 rpm.

The specific fuel consumption of diesel was very low in comparison with all vegetable oils and their esters. Specific fuel consumption values of methyl esters were generally less than those of the raw oil fuels.

The higher specific fuel consumption values of vegetable oils are due to their lower energy content Fig.3 [26].

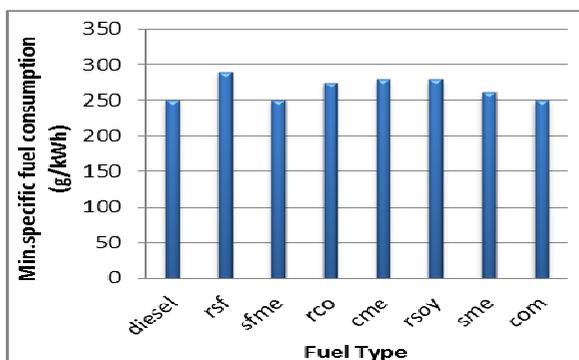


Fig.3 Minimum specific fuel consumption at 1300 rpm.

Relatively low CO emissions were obtained with the esters in comparison with raw vegetable oils Fig.4 [26]. Maximum CO₂ emissions were about 10.5% with diesel fuel and slightly lower with vegetable oil. It was due to better spraying qualities and more uniform mixture preparation of these esters Fig.5 [26]. NO_x emissions with vegetable oil fuels were lower than those with diesel fuel and NO_x values of methyl esters were higher than those of raw fuels. NO_x formation was due to maximum combustion temperatures. Since the injected particle size of the vegetable oils were greater than those of diesel fuel, the combustion efficiency and maximum combustion temperatures with each of the vegetable oils were lower and NO_x emissions were less Fig.6 [26].

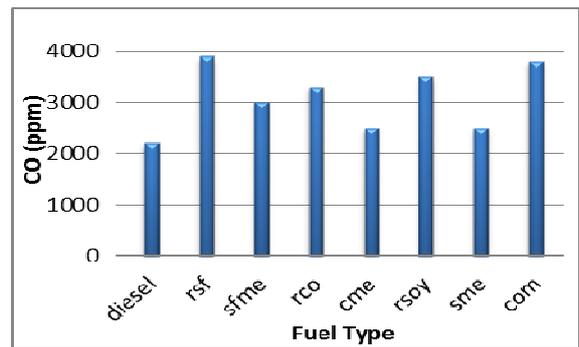


Fig. 4.CO emission at 1300 rpm (engine torque ¼ 35N-m).

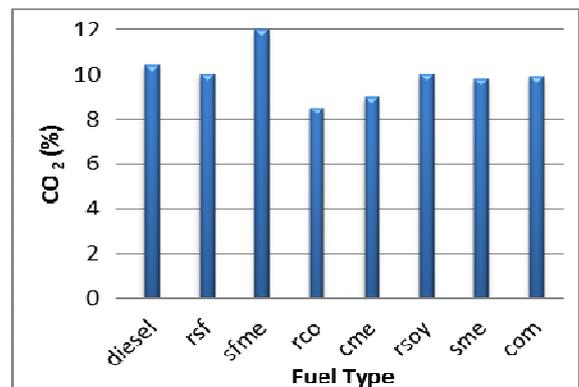


Fig.5 CO₂ emissions at 1300 rpm (engine torque ¼ 35 N-m).

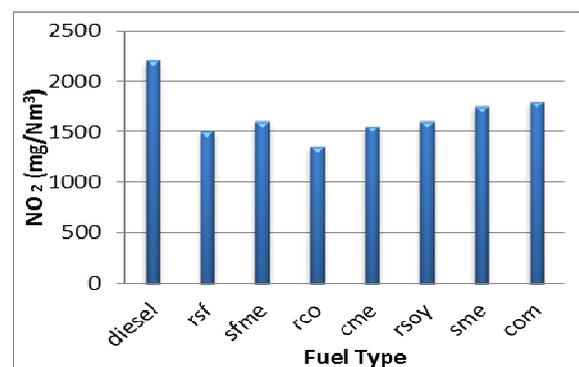


Fig.6. NO₂ emissions at 1300 rpm (engine torque ¼ 35 N-m).

VI. ADVANTAGES

The following are some of the advantages of using vegetable oil as I.C. engine in India:

1. Vegetable oil is produced domestically which helps to reduce costly petroleum imports;
2. Development of the bio-diesel industry would strengthen the domestic, and particularly the rural, agricultural economy of agricultural based countries like India;
3. It is biodegradable and non-toxic;
4. It is a renewable fuel that can be made from agricultural crops and or other feed stocks that are considered as waste;
5. It has 80% heating value compared to that of diesel;
6. It contains low aromatics;
7. It has a reasonable cetane number and hence possesses less knocking tendency;
8. Low sulphur content and hence environment friendly;
9. Enhanced lubricity, thereby no major modification is required in the engine;
10. Personal safety is improved (flash point is 100^{°C} higher than that of diesel);
11. It is usable within the existing petroleum diesel infrastructure (with minor or no modification in the engine).

VII. CHALLENGES

The major challenges that face the use of vegetable oil as I.C. engine fuels are listed below:

1. The price of vegetable oil is dependent on the feed stock price;
2. Feed stock homogeneity, consistency and reliability are questionable;
3. Homogeneity of the product depends on the supplier, feed stocks and production methods;
4. Storage and handling is difficult (particularly stability in long term storage);
5. Flash point in blends is unreliable;
6. Compatibility with I.C. engine material needs to be studied further;
7. Cold weather operation of the engine is not easy with vegetable oils;
8. Acceptances by engine manufacturers are another major difficulty;
9. Continuous availability of the vegetable oils needs to be assured before embarking on the major use of it in I.C. engines.

VIII. TECHNICAL DIFFICULTIES

The major technical areas (with respect to the use of vegetable oils as fuels in I.C. engines), which need further attention are the following:

1. Development of less expensive quality tests;
2. Study of the effects of oxidized fuel on engine performance and its durability;
3. Co-product development like the recovery of glycerol at reduced cost;

4. Continued engine performance, emissions and durability testing in a variety of engine types and sizes need to be developed to increase consumer and manufacturer confidence;
5. Studies are needed to reduce the production cost, develop low cost feed stocks and identify potential markets in order to balance cost and avail ability;
6. Research on the effect of glycerol on engine durability, emission and material compatibility;
7. Development of additives for improving cold flow properties, material compatibility and prevention of oxidation in storage, etc.

IX. CONCLUSION

Researchers in various countries carried out many experimental works using vegetable oils as I.C. engine fuel substitutes. These results showed that thermal efficiency was comparable to that of diesel with small amounts of power loss while using vegetable oils. The particulate emissions of vegetable oils are higher than that of diesel fuel with a reduction in NO_x. Vegetable oil methyl esters gave performance and emission characteristics comparable to that of diesel. Hence, they may be considered as diesel fuel substitutes. Raw vegetable oil can be used as fuel in diesel engines with some minor modifications. The use of vegetable oils as I.C. engine fuels can play a vital role in helping the developed world to reduce the environmental impact of fossil fuels.

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wave, and the output of the XOR gate drives the control counter, strobed with a frequency at least twice that of square wave. All signal processing is digital, and analog conversion is made only when interfacing the gyro.

This method relates to means for controlling the path length of a ring laser gyro, and has particular relation to such means which are as completely digital as possible.

In a ring laser gyro(RLG), an optical ring is formed, and two laser beams are directed around the ring in opposite directions. When the beams are combined, rotation of the ring appears as an interference shift in the combined beams.

It is apparent that precise control must be maintained over the optical length of the path which the beams take around the ring. The conventional method is analog dithering. Referring now to Fig.1.2, the intensity of light produced by a laser is schematically plotted as a function of the path length of the RLG. At point 10, the path length is too short to produce its maximum output: at point 12 it is too long: and at point 14 it is just right.

IV. METHOD OF CONTROLLING THE PATH LENGTH

The path length of an RLG can easily be controlled by controlling the position of one (or more) of mirrors which bounce the laser beam around the ring. This may most conveniently be accomplished by placing a piezoelectric transducer(PZT) on the back of the mirror, and controlling the thickness of the PZT by controlling the voltage which is fed to the PZT. If the RLG is operating at point 10, then the voltage to the PZT is increased: If the RLG is operating at point 12, the voltage is decreased: and if the RLG is operating at point 14, the voltage is kept constant. The PZT is constructed such that increasing the voltage makes the PZT thinner which(PZT is on the back of the mirror) increases the path length. Voltage polarity, PZT position and PZT operation(increased voltage makes it thicker) may be reversed in pairs if convenient.

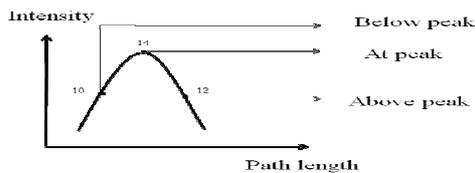


Fig.1.2 Path length Vs Intensity

Dithering is used to determine the point at which the RLG is operating. Dithering is the application of a small AC sinusoidal voltage signal to the PZT causing the path length of the RLG to likewise vary sinusoidally. Turning now to Fig.1.3 the operation of dithering is shown. If the RLG was operating at point 10 without dithering, then it will operate at point 16 and point 18, and at every point in between, with dithering. If the RLG was operating at point 12 without dithering, it will instead operate between points 20 and 22, and if previously operating at point 14, it will now operate between points 24 and 26.

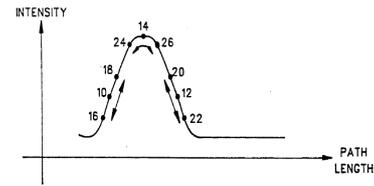


Fig.1.3 Effects of Dithering

Since the gain curve shown in above figures are relatively flat at the peak point 14, in comparison with the sides 10 and 12, the amplitude of modulation of the light intensity is less when RLG is operating at its peak, in comparison to when it is operating with a path length which is either under or over the peak path length. The modulation at peak is therefore difficult to detect. Also at peak the peak intensity modulates with a frequency twice that of the dithering voltage.

The prior art uses analog components to form a phase comparator, into which is fed the dithering voltage and a pick-off voltage, that is the voltage produced by photodetector actuated by a small sample of light which has been picked off from the laser beam. If the two signals are in phase, then the voltage to the PZT is increased; if they are out of phase, it is decreased. An analog phase comparator and voltage feedback device suffers from the drawbacks of analog devices generally: radiation softness, bulk, weight, lack of tolerance for variation in component parameters, and the like. It is another objective to minimize the use of analog components.

It is a feature that it uses analog components only when interfacing with the laser beam, i.e., at the PZT and around the photodetector. The output from the photodetector is first amplified to a useful level, is then band-pass filtered to eliminate both inevitable noise which is present at frequencies higher than the highest frequency of interest(the modulation frequency when RLG is operating at peak) and any dc component, and is then immediately fed to specially designed analog to digital converter(ADC). Likewise, the PZT is driven directly by a digital to analog converter(DAC). It is an advantage that signal processing takes place between ADC and DAC and is entirely digital.

V. ALGORITHM FOR PATH LENGTH CONTROL

Fig.1.1 shows in block form, the components of the apparatus and how they are connected to one another.

Step 1: The first necessity is to establish a digital dither signal. The most convenient way is with a counter, which increments by one each clock cycle when its control input is logic 0, decrements by one when its control input is logic 1. As shown in the Fig1.1, a clock drives both a square generator and a dither counter. The dither counter is also driven by the square wave generator is first passed through a quarter cycle delay apparatus the purpose of which is described below. For as long as the output from the quarter cycle delay apparatus is logic 0, the dither counter increments by one each clock cycle, and its output therefore shows a descending ramp. The clock signal itself is not shown since there should be a large multiplicity of clock pulses for each square wave pulse. For example a clock frequency can have 213*1.5 KHz, while the square wave itself has a frequency of

only 1.5 KHz. The large number of clock pulses cannot be shown and makes its presence felt in the smooth ramps rather than having these ramps being stair steps.

Step 2: The dither counter drives a dither DAC. This dither DAC in turn drives a PZT, which modulates the path length of the RLG. Since the dither DAC produces a triangular wave, the PZT also moves in a triangular wave rather than in a sine wave. The resulting modulation of the laser beams intensity is therefore also a triangular wave. The triangular wave is not only more easily produced than in a sine wave, it also has a more sharply defined peak than does a sine wave. The more sharply defined peak facilitates the task of actively controlling the path length of the RLG.

Step 3: A photodetector samples a picked off portion of the laser beam propagating in RLG. This signal from photodetector is amplified by amplifier. As has been pointed out, the highest frequency of interest is the frequency detected by the photodetector when the RLG is operating at the peak intensity point 14, i.e., twice the modulation frequency of the signal produced by the square wave generator. Noise is generally of higher frequency and is eliminated by a band-pass filter.

Step 4: Noise is generally of higher frequency and is eliminated by a band-pass filter. The low end of the band-pass filter may be conveniently set at one fifth of the modulation frequency of the signal produced by the square wave generator. This will eliminate any dc component without excessively affecting the square wave frequency. If desired, the band-pass filter may be replaced with a double band-pass filter, passing only the frequency produced by the square wave generator and twice that frequency. Such measures are generally not necessary.

Step 5: Now the output of the band-pass filter is fed to a voltage comparator. The voltage comparator compares the output of the filter with ground. It produces logic 1 when the filter output is positive with respect to ground and produces a logic 0 when the filter output is negative with respect to ground. Since the filter output is centered on 0 volts, the voltage comparator produces a square wave. However the filter output is a triangular wave it crosses the zero voltage horizontal axis a quarter cycle out of phase with quarter cycle delay apparatus which ultimately produced it. However, it is exactly in phase with the output of the square wave generator which drives the quarter cycle delay apparatus. Thus, the square wave generated by the voltage comparator is exactly in phase with the square wave generated by the square wave generator.

Step 6: The square wave generator and the voltage comparator thus both produces digital square waves. These two signals are fed to the two inputs to an XOR gate. When these two signals are in phase, XOR gate produces a steady logic 0 which is shown in Fig.1.9. This summarizes the situation when the RLG is operating below peak path length. Also when these two signals are out phase, XOR gate produces a steady logic 1 which is shown in Fig.1.8. This summarizes the situation when the RLG is operating above peak path length and finally when comparator output is twice that of square wave, XOR gate produces a steady logic 0 and 1 which is shown in Fig.1.10. This summarizes the situation when the RLG is operating at peak path length. All these operating conditions are depicted in the following diagrams with their waveforms.

Step 7: The feedback signal produced by the XOR gate drives a control counter, which decrements by one with each pulse from the strobe when the signal produced by XOR gate is a logic 0 and increments by 1 with each pulse when it is a logic 1. This is the reverse of the operation of the dither counter as is to be expected in a negative feedback control loop.

Step 8: The control counter drives a control DAC which outputs its voltage to one of the terminals of the PZT. It will be recalled that the other terminal of the PZT is driven by the dither DAC. Here the thickness of the PZT (and consequent position of the mirror controlling the path length of the RLG) does not depend upon the absolute or average voltage impressed on its terminals, but on the voltage difference between them. Thus the single PZT responds both to the dither DAC and the control DAC.

Step 9: The control counter may be initialized such that the voltage produced by the control DAC, the XOR gate produces a logic 0. This causes the control counter to decrement, which causes the output voltage of the control DAC to drop, which increases the voltage difference between output of control DAC and dither DAC. The PZT therefore gets thinner, increasing the path length of the RLG which is the desired result. Provided that the PZT is connected with the correct polarity, the same feedback will occur even when control DAC produces a voltage greater than that produced by the dither DAC. A similar feedback occurs when the path length is too long.

The above algorithm for three different conditions has been implemented in Xilinx 13.2i and the simulation output has been displayed below. Also this algorithm has been dumped into Vertex 4 evaluation platform.

The output waveforms of dither counter and control counter under three different peak conditions are shown below Fig.1.8 to Fig.1.10

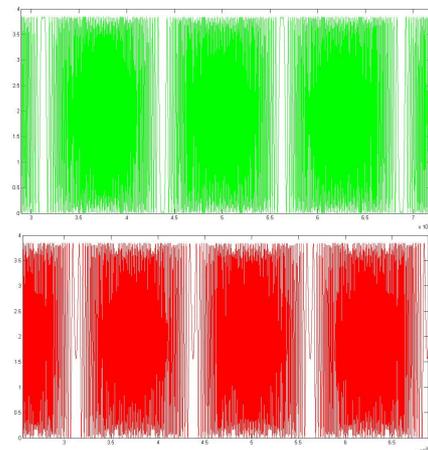


Fig.1.4 RLG output signals: Sin/Cos Signals

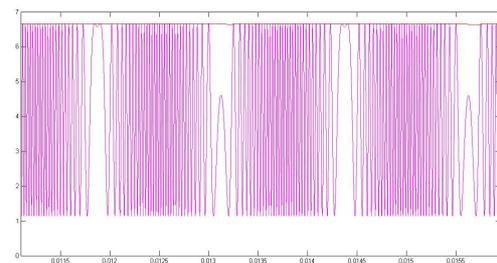


Fig.1.5 Peak Detection

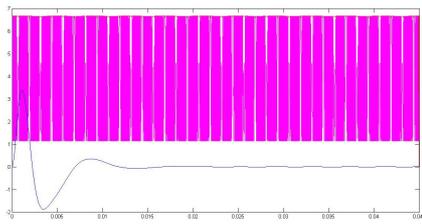


Fig.1.6 Band-pass Filtered output

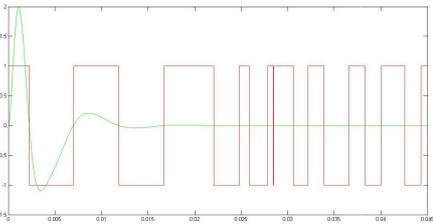


Fig.1.7 Converting to Square wave

VI. XILINX RESULTS

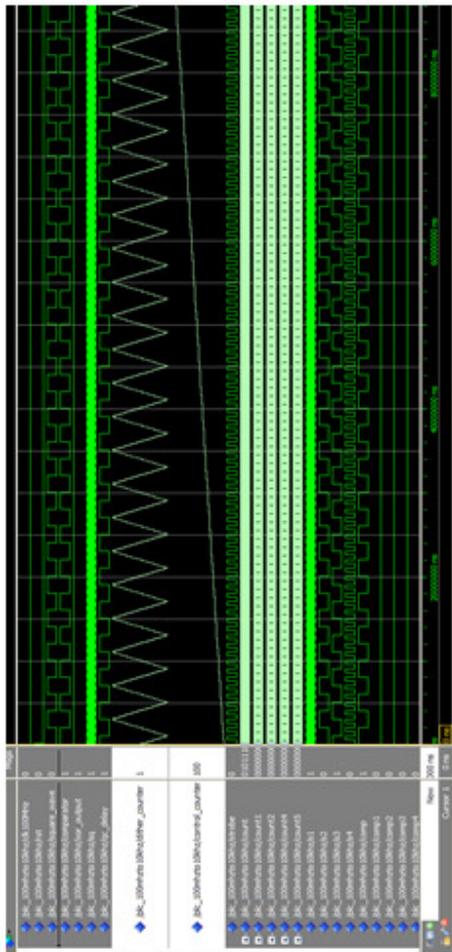


Fig 1.8 Above peak condition

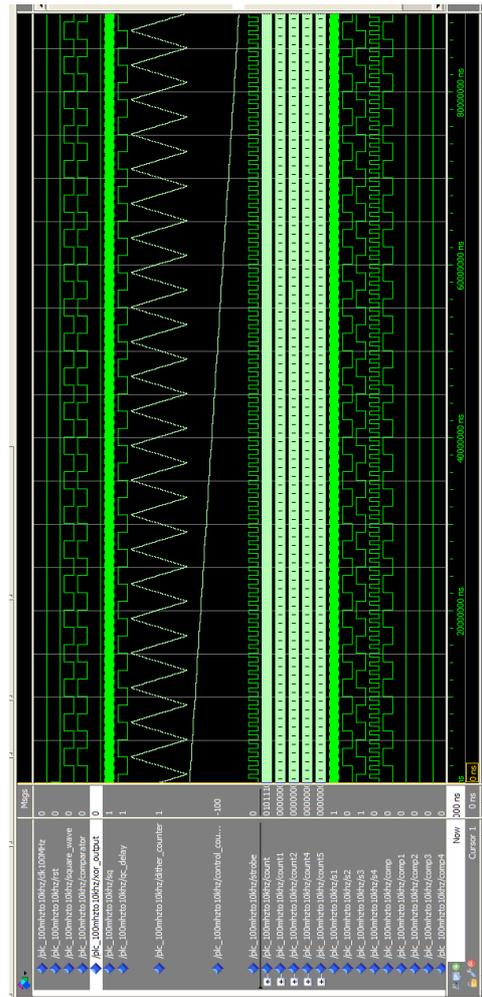


Fig.1.9 Below peak condition

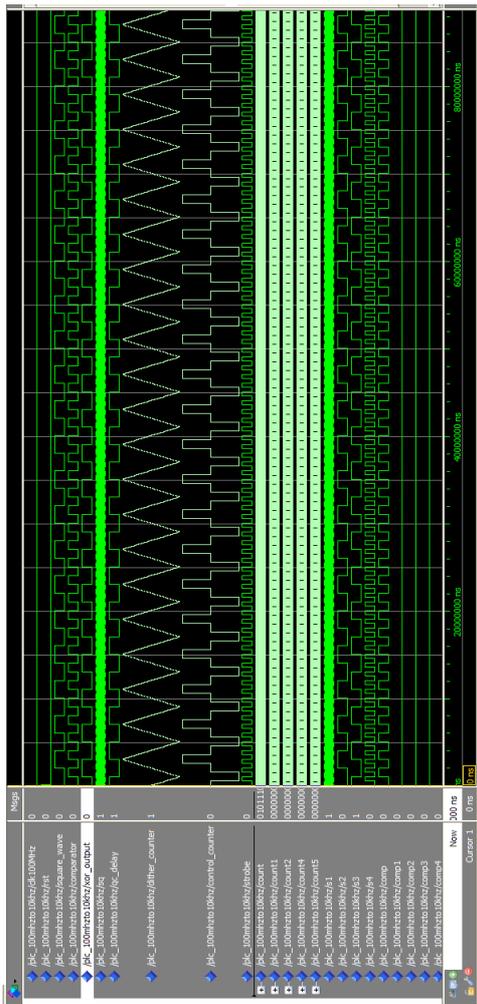


Fig.1.10 At peak condition

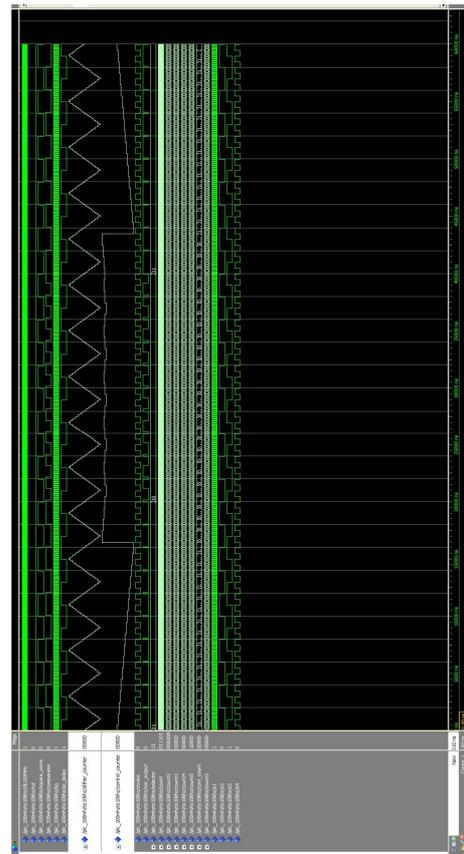


Fig.1.11 All three conditions

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Tribological Behaviour of Al-6061 / SiC Metal Matrix Composite by Taguchi's Techniques

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Abstract- Tribological behaviour of aluminium alloy Al-6061 reinforced with silicon carbide particles (10% & 15% weight percentage of SiCp) fabricated by stir casting process was investigated. The wear and frictional properties of the metal matrix composites was studied by performing dry sliding wear test using a pin-on-disc wear tester. Experiments were conducted based on the plan of experiments generated through Taguchi's technique. A L9 Orthogonal array was selected for analysis of the data. Investigation to find the influence of applied load, sliding speed and sliding distance on wear rate, as well as the coefficient of friction during wearing process was carried out using ANOVA and regression equation for each response were developed for both 10% & 15% SiC reinforced Al-6061 MMCs. Objective of the model was chosen as 'smaller the better' characteristics to analyse the dry sliding wear resistance. Results show that sliding distance has the highest influence followed by load and sliding speed. Finally, confirmation tests were carried out to verify the experimental results & Scanning Electron Microscope were done on wear surfaces.

Index Terms- Metal Matrix Composites, Stir casting, Taguchi's techniques, Orthogonal array, Analysis of variance, wear behaviour

I. INTRODUCTION

In the last two decades, research has shifted from monolithic materials to composite materials to meet the global demand for light weight, high performance, environmental friendly, wear and corrosion resistant materials. Metal Matrix Composites (MMCs) are suitable for applications requiring combined strength, thermal conductivity, damping properties and low coefficient of thermal expansion with lower density. These properties of MMCs enhance their usage in automotive and tribological applications [5]. In the field of automobile, MMCs are used for pistons, brake drum and cylinder block because of better corrosion resistance and wear resistance [7,8].

Fabrication of MMCs has several challenges like porosity formation, poor wettability and improper distribution of reinforcement. Achieving uniform distribution of reinforcement is the foremost important work. A new technique of fabricating cast Aluminium matrix composite has been proposed to improve the wettability between alloy and reinforcement. In this, all the materials are placed in graphite crucible and heated in an inert atmosphere until the matrix alloy is melted and followed by two step stirring action to obtain uniform distribution of reinforcement [2]. The fabrication techniques of MMCs play a

major role in the improvement of mechanical and tribological properties. The performance characteristics of Al alloy reinforced with 5% volume fraction of SiC fabricated through stir casting and found that the stir casting specimen have higher strength compared to powder metallurgy specimen. The size and type of reinforcement also has a significant role in determining the mechanical and tribological properties of the composites. The effect of type of reinforcements such as SiC whisker, alumina fiber and SiC particle fabricated by Powder Metallurgy on the properties of MMCs has been investigated. It was found that there existed a strong dependence on the kind of reinforcement and its volume fraction. The results revealed that particulate reinforcement is most beneficial for improving the wear resistance of MMCs.

There is a growing interest worldwide in manufacturing hybrid metal matrix composites [HMMCs] which possesses combined properties of its reinforcements and exhibit improved physical, mechanical and tribological properties. Aluminium matrix composites reinforced silicon carbide was developed using conventional foundry techniques. The reinforcements were varied by 10% and 15% by weight. The composite was tested for density, mechanical properties, and dry sliding wear. The results show an increasing trend in all the properties with increase in SiC content, except density which decreased with increase in reinforcements. The tribological properties of MMCs are also increased by increasing reinforcements at all applied conditions [13].

II. DESIGN OF EXPERIMENTS (DOE)

Design of Experiment is one of the important and powerful statistical techniques to study the effect of multiple variables simultaneously and involves a series of steps which must follow a certain sequence for the experiment to yield an improved understanding of process performance [19]. All designed experiments require a certain number of combinations of factors and levels be tested in order to observe the results of those test conditions. Taguchi approach relies on the assignment of factors in specific orthogonal arrays to determine those test combinations. The DOE process is made up of three main phases: the planning phase, the conducting phase, and the analysis phase. A major step in the DOE process is the determination of the combination of factors and levels which will provide the desired information [21].

Analysis of the experimental results uses a signal to noise ratio to aid in the determination of the best process designs. This technique has been successfully used by researchers in the study

of dry sliding wear behaviour of composites. These methods focus on improving the design of manufacturing processes. In the present work, a plan order for performing the experiments was generated by Taguchi method using orthogonal arrays [20]. This method yields the rank of various parameters with the level of significance of influence of a factor or the interaction of factors on a particular output response.

III. MATERIAL SELECTION

In the present investigation, Al-SiC alloy was chosen as the base matrix since its properties can be tailored through heat treatment process. The reinforcement was sic, average size of 150 to 160 microns, and there are sufficient literatures elucidating the improvement in wear properties through the addition of SiC. Due to the property of high hardness and high thermal conductivity, SiC after accommodation in soft ductile aluminium base matrix, enhance the wear resisting behaviour of the Al – SiC metal matrix composite.

Table 1 Chemical composition of matrix alloy Al - 6061

Chemical composition	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Al
%	0.4-0.8	0.7	0.15-0.40	0.15	0.8-1.2	0.04-0.35	0.25	0.2	Balance

3.1 Composite Preparation

In order to achieve high level of mechanical properties in the composite, a good interfacial bonding (wetting) between the dispersed phase and the liquid matrix has to be obtained. Stir-casting technique is one such simplest and cost effective method to fabricate metal matrix composites which has been adopted by many researchers. This method is most economical to fabricate composites with discontinuous fibres and particulates and was used in this work to obtain the as cast specimens. Care was taken to maintain an optimum casting parameter of pouring temperature (650°C) and stirring time (15 min). The reinforcements were preheated prior to their addition in the aluminium alloy melt. Degassing agent (hexachloro ethane) was used to reduce gas porosities. The molten metal was then poured into a permanent cast iron mould of diameter 26mm and length 300mm. The die was released after 6 hours and the cast specimens were taken out.

3.2 Wear Behaviour

The aim of the experimental plan is to find the important factors and combination of factors influencing the wear process to achieve the minimum wear rate and coefficient of friction. The experiments were developed based on an orthogonal array, with the aim of relating the influence of sliding speed, applied load and sliding distance. These design parameters are distinct and intrinsic feature of the process that influence and determine the composite performance [17]. Taguchi recommends analysing the S/N ratio using conceptual approach that involves graphing the effects and visually identifying the significant factors.

The above mentioned pin on disc test apparatus was used to determine the sliding wear characteristics of the composite.

Specimens of size 10 mm diameter and 25 mm length were cut from the cast samples, and then machined. The contact surface of the cast sample (pin) was made flat so that it should be in contact with the rotating disk. During the test, the pin was held pressed against a rotating EN31 carbon steel disc (hardness of 65HRC) by applying load that acts as counterweight and balances the pin. The track diameter was varied for each batch of experiments in the range of 50 mm to 100 mm and the parameters such as the load, sliding speed and sliding distance were varied in the range given in Table 2. A LVDT (load cell) on the lever arm helps determine the wear at any point of time by monitoring the movement of the arm. Once the surface in contact wears out, the load pushes the arm to remain in contact with the disc. This movement of the arm generates a signal which is used to determine the maximum wear and the coefficient of friction is monitored continuously as wear occurs and graphs between coefficient of friction and time was monitored for both of the specimens i.e., 10 % and 15% SiC/ Al-6061 MMCs.

Further, weight loss of each specimen was obtained by weighing the specimen before and after the experiment by a single pan electronic weighing machine with an accuracy of 0.0001g after thorough cleaning with acetone solution.

The results for various combinations of parameters were obtained by conducting the experiment as per the Orthogonal array and show the Table 3. The measured results were analysed using the commercial software MINITAB 15 specifically used for design of experiment applications. Table 4 & Table 5 shows the experimental results average of two repetitions for wear rate and coefficient of friction.

Table 2 Process parameters and levels

Level	Load (N)	Sliding speed, S (m/s)	Sliding distance, D (m)
1	10	2	1000
2	20	3	1750
3	30	4	2500

IV. PLAN OF EXPERIMENTS

Dry sliding wear test was performed with three parameters: applied load, sliding speed, and sliding distance and varying them for three levels. According to the rule that degree of freedom for an orthogonal array should be greater than or equal to sum of those wear parameters, a L₉ Orthogonal array which has 9 rows and 3 columns was selected as shown below:

Table 3 Orthogonal array L₉ of Taguchi

Experiment No.	Column 1	Column 2	Column 3
1	1	1	1
2	1	2	2
3	1	3	3
4	2	1	2
5	2	2	3
6	2	3	1
7	3	1	3
8	3	2	1
9	3	3	2

The selection of Orthogonal array depends on three items in order of priority, viz., the number of factors and their interactions, number of levels for the factors and the desired experimental resolution or cost limitations. A total of 9 experiments were performed based on the run order generated by the Taguchi model. The response for the model is wear rate and coefficient of friction. In Orthogonal array, first column is assigned to applied load, second column is assigned to sliding speed and third column is assigned to sliding distance and the remaining columns are assigned to their interactions. The objective of model is to minimize wear rate and coefficient of friction. The Signal to Noise (S/N) ratio, which condenses the multiple data points within a trial, depends on the type of characteristic being evaluated. The S/N ratio characteristics can be divided into three categories, viz. ‘nominal is the best’, ‘larger the better’ and ‘smaller the better’ characteristics. In this study, ‘smaller the better’ characteristics was chosen to analyse the dry sliding wear resistance. The S/N ratio for wear rate and coefficient of friction using ‘smaller the better’ characteristic given by Taguchi, is as follows:

$$S/N = -10 \log \frac{1}{n} \sum_{i=1}^n y_i^2$$

Where $y_1, y_2...y_n$ are the response of friction and sliding wear and n is the number of observations. The response table for signal to noise ratios show the average of selected characteristics for each level of the factor. This table includes the ranks based on the delta statistics, which compares the relative value of the effects. S/N ratio is a response which consolidates repetitions and the effect of noise levels into one data point. Analysis of variance of the S/N ratio is performed to identify the statistically significant parameters.

V. RESULTS AND DISCUSSIONS

The aim of the experimental plan is to find the important factors and combination of factors Influencing the wear process to achieve the minimum wear rate and coefficient of friction. The experiments were developed based on an orthogonal array, with the aim of relating the influence of sliding speed, applied load and sliding distance. These design parameters are distinct and intrinsic feature of the process that influence and determine the composite performance. Taguchi recommends analysing the S/N

ratio using conceptual approach that involves graphing the effects and visually identifying the significant factors.

5.1 Results of Statistical Analysis of Experiments

The results for various combinations of parameters were obtained by conducting the experiment as per the Orthogonal array. The measured results were analysed using the commercial software MINITAB 15 specifically used for design of experiment applications [23]. Table 4 & Table 5 shows the experimental results average of two repetitions for wear rate and coefficient of friction. To measure the quality characteristics, the experimental values are transformed into signal to noise ratio. The influence of control parameters such as load, sliding speed, and sliding distance on wear rate and coefficient of friction has been analysed using signal to noise response table. The ranking of process parameters using signal to noise ratios obtained for different parameter levels for wear rate and coefficient of friction are given in Table (4.1-4.2) and Table (5.1-5.2) respectively for 10% &15% reinforced SiC MMCs. The control factors are statistically significant in the signal to noise ratio and it could be observed that the sliding distance is a dominant parameter on the wear rate and coefficient of friction followed by applied load and sliding speed. Figure (4.1 - 4.4) shows for 10% influence of process parameters on wear rate and coefficient of friction graphically and Figure (5.1 - 5.4) shows for 15% influence of process parameters on wear rate and coefficient of friction graphically. The analysis of these experimental results using S/Nratios gives the optimum conditions resulting in minimum wear rate and coefficient of friction. The optimum condition for wear rate and coefficient of friction as shown in Table 10.

5.2 Analysis of Variance Results for Wear Test

The experimental results were analysed with Analysis of Variance (ANOVA) which is used to investigate the influence of the considered wear parameters namely, applied load, sliding speed, and sliding distance that significantly affect the performance measures. By performing analysis of variance, it can be decided which independent factor dominates over the other and the percentage contribution of that particular independent variable. Table (6&7) and Table (8&9) shows 10% &15% SiC MMCs of the ANOVA results for wear rate and coefficient of friction for three factors varied at three levels and interactions of those factors. This analysis is carried out for a significance level of $\alpha=0.05$, i.e. for a confidence level of 95%. Sources with a P-value less than 0.05 were considered to have a statistically significant contribution to the performance measures.

Table 4 Results of L₉ Orthogonal array for Al – 6061 / 10% SiC MMC

S. No.	L (N)	S (m/s)	D (m)	Coefficient of friction	Wear rate (mm ³ /m)	S/N ratio c.o.f	S/N ratio wear rate
1	10	2	1000	0.311	0.00481	10.1448	46.3571
2	10	3	1750	0.291	0.0036	10.7221	48.87395
3	10	4	2500	0.277	0.00178	11.1504	54.9916
4	20	2	1750	0.35	0.00422	9.1186	47.49375
5	20	3	2500	0.343	0.00222	9.2941	53.07294
6	20	4	1000	0.372	0.0037	8.5891	48.63597
7	30	2	2500	0.36	0.00296	8.8739	50.57417
8	30	3	1000	0.41	0.0037	7.7443	48.63597
9	30	4	1750	0.39	0.00254	8.1787	51.90333

Table 4.1 Responses table for S/N ratio for wear (10% SiC)

Level	Load	Sliding velocity	Sliding distance
1	50.07	48.14	47.88
2	49.73	50.19	49.42
3	50.37	51.84	52.88
Delta(Δ)	0.64	3.70	5.00
Rank	3	2	1

Table 4.2: Responses table for S/N ratio of coefficient of friction (10% SiC)

Level	load(A)	Sliding velocity(B)	Sliding distance(C)
1	10.672	9.379	8.826
2	9.001	9.254	9.340
3	8.266	9.306	9.773
Delta(Δ)	2.407	0.126	0.947
Rank	1	3	2

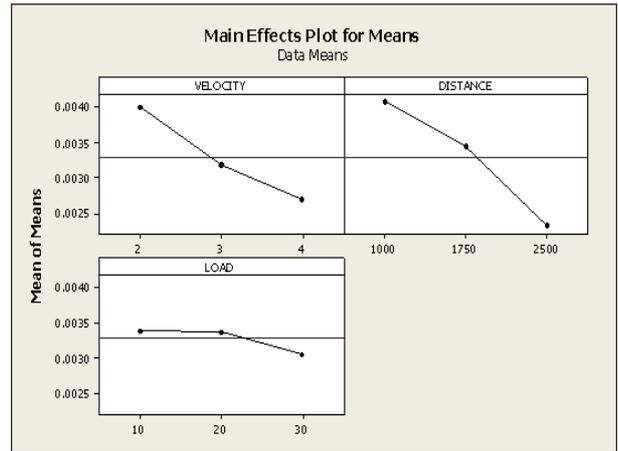


Fig.4.3 Main effects for plot for Means –Wear Rate

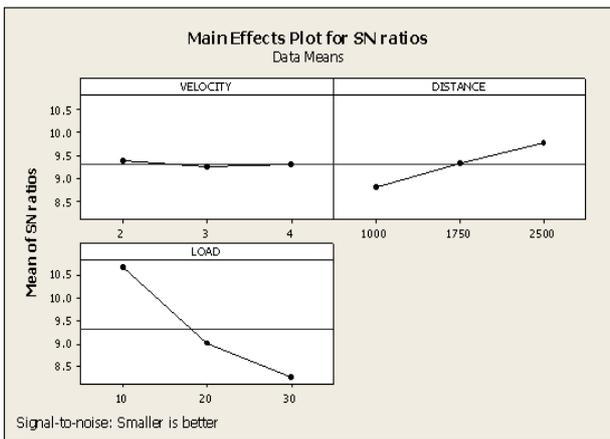


Fig.4.1 Main effects for plot for S/N Ratios –Coefficient of Friction

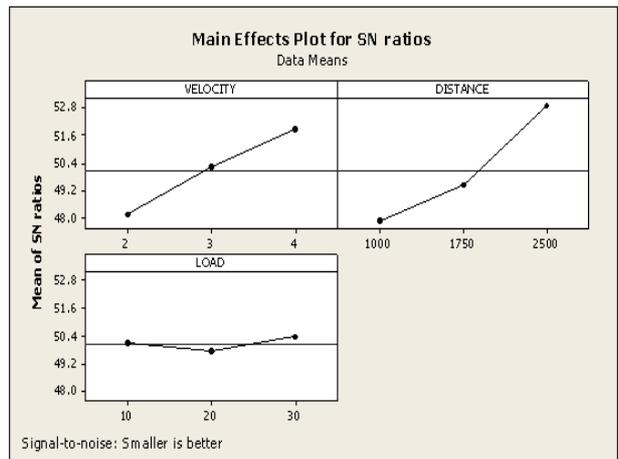


Fig.4.4 Main effects for plot for S/N Ratio –Wear Rate

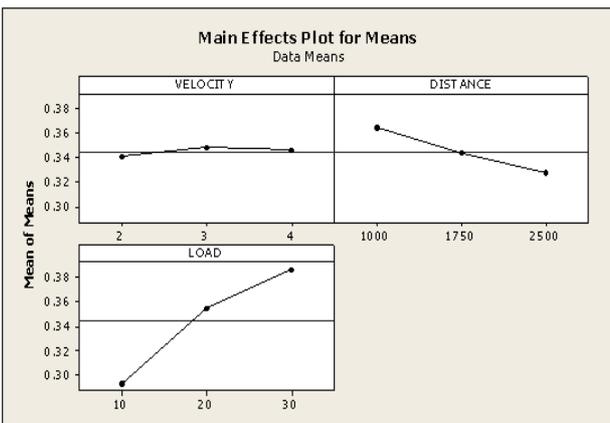


Fig.4.2 Main effects for plot for Means –Coefficient of Friction

Table 5: Results of L9 Orthogonal array for Al – 6061 / 15% SiC MMC

S. No.	Load (N)	sliding velocity (m/s)	sliding distance(m)	Wear (mm ³ /m)	Coefficient of friction	S/N Ratio (wear)(db)	S/N Ratio (coef) (db)
1	10	2	1000	0.0037	0.356	48.6360	8.9710
2	10	3	1750	0.00317	0.33	49.9788	9.6297
3	10	4	2500	0.00593	0.29	44.5389	10.7520
4	20	2	1750	0.00402	0.426	47.9155	7.4118
5	20	3	2500	0.00252	0.404	51.9720	7.8724
6	20	4	1000	0.00259	0.455	51.7340	6.8398
7	30	2	2500	0.00207	0.37	53.6806	8.6360
8	30	3	1000	0.002185	0.41	53.1211	7.7443
9	30	4	1750	0.00169	0.39	55.4423	8.1787

Table 5.1: Response Table for Signal to Noise Ratios (Coefficient of friction) Smaller is better

Level	Load	Speed	Distance
1	9.784	7.410	6.430
2	7.375	6.994	6.995
3	4.424	7.179	8.158
Delta	5.360	0.417	1.728
Rank	1	3	2

Table 5.2: Response Table for Signal to Noise Ratios Smaller is better (Wear Rate)

Level	Load	Speed	Distance
1	47.72	50.08	51.19
2	50.54	51.72	51.11
3	54.11	50.57	50.06
Delta	6.39	1.64	1.13
Rank	1	2	3

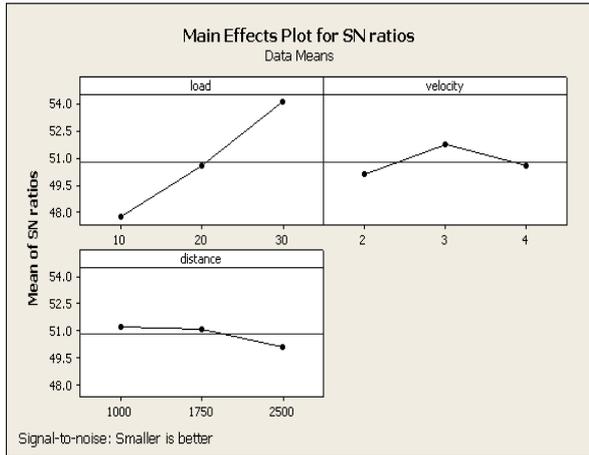


Fig 5.1: Main effects plot for S/N ratios – Wear Rate

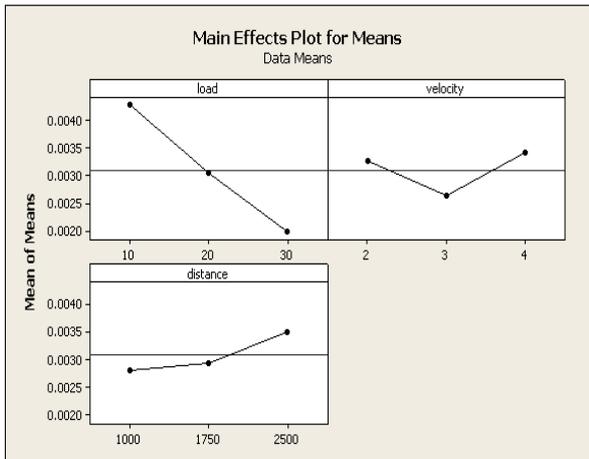


Fig 5.2: Main effects plot for Means – Wear Rate

Fig 5.3: Main effects plot for S/N ratio – Coefficient of Friction

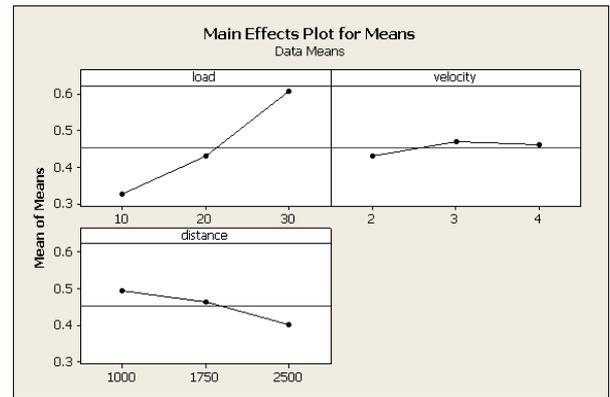
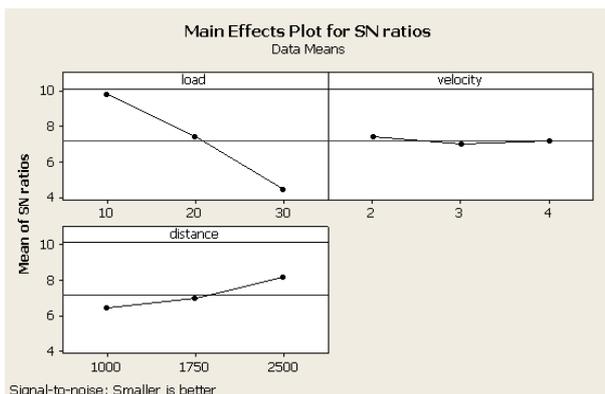


Fig 5.4: Main effects plot for Means – Coefficient of Friction

Table 6: Analysis of Variance for Means (Wear Rate) (10% SiC)

Source	DF	Seq SS	Adj SS	Adj MS	F	P	Pr (%)
Load	2	0.0000001	0.000000	0.000000	2.31	0.302	1.25
Speed	2	0.0000003	0.0000003	0.000001	29.89	0.032	37.5
Distance	2	0.0000005	0.0000005	0.000002	52.75	0.019	62.5
Error	2	0.0000000	0.0000000	0.0000000			1.25
Total	8	0.0000008					100.0

Table 7: Analysis of Variance for Means (Coefficient of Friction) (10% SiC)

Source	DF	Seq SS	Adj SS	Adj MS	F	P	Pr (%)
Load	2	0.013620	0.013620	0.006810	178.69	0.006	85.5
Speed	2	0.000098	0.000098	0.000049	1.28	0.439	0.6
Distance	2	0.002135	0.002135	0.001067	28.01	0.034	13.4
Error	2	0.000076	0.000076	0.000038			0.5
Total	8	0.015929					100.0

Table 8: Analysis of Variance for Means (Coefficient of Friction) (15% SiC)

Source	DF	Seq SS	Adj SS	Adj MS	F	P	Pr (%)
Load	2	0.120034	0.0120034	0.0060017	58.83	0.017	87.2
Speed	2	0.002318	0.002318	0.001159	1.14	0.468	1.7
Distance	2	0.013311	0.013311	0.006655	6.54	0.133	9.7
Error	2	0.002040	0.002040	0.001020			1.4
Total	8	0.137703					100.0

Table 9: Analysis of Variance for Means (Wear Rate) (15% SiC)

Source	DF	Seq SS	Adj SS	Adj MS	F	P	Pr (%)
Load	2	0.000008	0.000008	0.000004	1.94	0.340	57.20
Speed	2	0.000001	0.000001	0.000001	0.26	0.797	7.10
Distance	2	0.000001	0.000001	0.0000005	0.19	0.838	7.10
Error	2	0.000004	0.000004	0.000002			28.60
Total	8	0.000014					100.0

It can be observed that for aluminium (10% & 15%) SiC Metal Matrix Composites, from the Table 6 & 9, that the sliding distance has the highest influence (Pr =62.5% & Pr=7.1%) on wear rate. Hence sliding distance is an important control factor to be taken into consideration during wear process followed by applied loads (P=1.25% & P=57.2%) & sliding speed (Pr=37.5% & Pr=7.1%) respectively. In the same way from the Table 7 & Table 8 for coefficient of friction, it can observe that the load has the highest contribution of about 85.5% & 87.2%, followed by sliding distance (13.4% & 9.7%) & sliding speed (0.6% & 1.7%) for Al-6061 with (10% & 15%) SiC metal matrix composites.

The interaction terms has little or no effect on coefficient of friction & the pooled errors accounts only 0.5% & 1.4%. From the analysis of variance & S/N ratio, it is inferred that the sliding distance has the highest contribution on wear rate & coefficient of friction followed by load & sliding speed.

VI. MULTIPLE LINEAR REGRESSION MODEL

A multiple linear regression model is developed using statistical software "MINITAB 15". This model gives the relationship between an independent / predicted variable & a response variable by fitting a linear equation to observe data. Regression equation thus generated establishes correlation between the significant terms obtained from ANOVA analysis namely applied load, sliding speed & sliding distance.

The regression equation developed for Al / (10%) SiC MMCs wear rate and coefficient of friction are as follows

$$W_r = 0.00764 - 0.000016 L - 0.000662 S - 0.000001 D \quad \text{Eq(1)}$$

$$C_f = 0.286 + 0.00468 L + 0.00300 S - 0.000025 D \quad \text{Eq(2)}$$

Similarly, regression equation for Al / (15%) SiC MMCs wear rate and coefficient of friction are as follows

$$W_r = 0.00438 - 0.000114L + 0.00007S + 0.0000001 D \quad \text{Eq (3)}$$

$$C_f = 0.237 + 0.014L + 0.0147S - 0.000062 D \quad \text{Eq (4)}$$

From Eq (1), it is observed that the load, sliding speed & sliding distance increases or decreases at any parametric value, it will be decrease the wear rate of the value of 0.00764mm³/m But in case of coefficient of friction Eq (2), sliding speed plays a major role as well as followed by applied load and sliding distance. Overall for the 10% reinforced SiC in Al-6061 MMCs regression equation gives the clear indication about coefficient of friction is highly influenced by sliding speed.

From Eq (3) & Eq (4), it is observed that the sliding speed plays a major role on wear rate as well as coefficient of friction. Eq (4) is highly influenced by load & sliding speed means that if load & sliding speed increases it also increase the coefficient of friction,sliding distance minutely affect the wear rate & coefficient of friction for 15% reinforcement of SiC in Al-6061 MMCs.

Table 10: Optimum level Process Parameters for Wear Rate and Coefficient of Friction

Sr. No.	MMCs	Load (N)	Sliding Speed (m/s)	Sliding Distance (m)	Wear Rate (mm ³ /m)	Coefficient of Friction (mm ³ /m)	S/N Ratio (db)
1	10% SiC	30	3	1000	0.0037		48.6360
2	15% SiC	10	3	1750	0.00317		49.9788
3	10% SiC	10	4	2500		0.277	11.1504
4	15% SiC	10	4	2500		0.290	10.7520

From Eq (1) & Eq (2),observed that the negative value of coefficient of speed reveals that increase in sliding speed decreases the wear rate & coefficient of friction of 10% reinforced SiC MMCs. this can be attributed to the oxidation of aluminium alloy Al – 6061 which forms an oxide layer at higher

interfacial temperature thus preventing the sliding, thereby decreases the wear rate & coefficient of friction and a similar behaviour has been observed [].

From Eq (3) & Eq (4), it is observed that the positive value of coefficient of speed reveals that increase in sliding speed increases the wear rate & coefficient of friction of 15% reinforced SiC metal matrix composites. This can be related to the reinforcement of weight percentage of silicon carbide in Al – 6061 MMCs from 10% to 15% , resulted the brittlement property of the material. Wear rate are largely governed by the interaction of two sliding surfaces.

To understand the wear mechanism of composites for 10% &15% SiC, the worn surfaces were examined by Scanning Electron Microscope. During sliding, the entire surface of the pin has contact with the surface of the steel disc & machine marks can also be observed. Fig: 6 & Fig: 7 shows the microstructure of the worn surfaces of composites (for 10% & 15% SiC) at an applied load 30 N, sliding distance of 2500 m for sliding speed of 2 m/s, 3 m/s and 4 m/s respectively. Grooves were mainly formed by the reinforcing particles of SiC. In fig: 6 & 7 shows that more grooves in 15% SiC MMCs. As the sliding speed increases, the number of grooves also increases & the reinforcements are projecting out from the surface due to ploughing action counterface & pin and formation of wear debris was also observed in 15% SiC reinforced Al-6061 MMCs.

The negative value of distance is indicative that increase in sliding distance decreases the wear rate as well as coefficient of friction for both MMCs, the presence of hard SiC particle which provides abrasion resistance, resulting in enhanced dry sliding wear performance.

From the observation of Eq(1), Eq(2), Eq(3) & Eq(4), we are taking a case of unit value of load, sliding speed & sliding distance, after that we get the value of wear rate and coefficient of friction as follows: For 10% SiC reinforced MMCs $W_r = 0.006961 \text{ mm}^3/\text{m}$, $C_f = 0.2937$ For 15% reinforced MMCs $W_r = 0.0043361 \text{ mm}^3/\text{m}$, $C_f = 0.26564$ due to increase in weight percentage (10% to 15%) of SiC reinforced in Al-6061 metal matrix composites, it increase the hardness of the MMCs that reveal it reduces the wear rate & coefficient of friction.

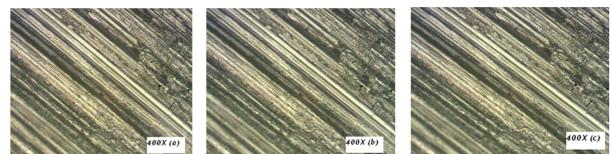


Fig 6: (a) 30 N, 2 m/s, 2500 m

Fig 6: (b) 30 N, 3 m/s, 2500 m

Fig 6: (c) 30 N, 4 m/s, 2500 m

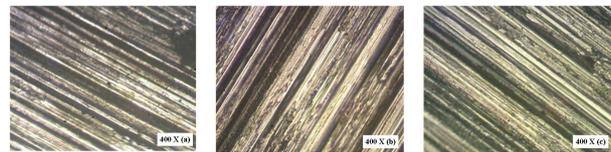


Fig 7: (a) 30 N, 2 m/s, 2500 m

Fig 7: (b) 30 N, 3 m/s, 2500 m

Fig 7: (c) 30 N, 4 m/s, 2500 m

VII. CONFIRMATION TEST

A confirmation experiment is the final step in the Design process. A dry sliding wear test was conducted using a specific

combination of the parameters & levels to validate the statistical analysis.

After the optimal level of testing parameters have been found, it is necessary that verification tests are carried out in order to evaluate the accuracy of the analysis & to validate the experimental results.

Table 11: Confirmation Experiment for Wear Rate and Coefficient of Friction

MMCs	Exp. No.	Load(N)	Sliding Speed (m/s)	Sliding Distance(m)
Al-6061+ 10% SiC	1	13	2.4	1200
	2	19	2.8	1800
	3	28	3.5	2200
Al-6061+ 15% SiC	1	13	2.4	1200
	2	19	2.8	1800
	3	28	3.5	2200

Table 12: Result of Confirmation Experiment and their comparison with Regression

MMCs	Exp. Wear Rate(mm ³ /m)	Reg. Model Eq(1), Wear Rate(mm ³ /m)	% Error	Exp. Coefficient of Friction	Reg. Model Eq(2), Wear Rate(mm ³ /m)	% Error
Al-6061+10% SiC	0.005	0.00464	7.89	0.3106	0.324	4.11
	0.00389	0.00368	5.7	0.3131	0.338	7.366
	0.00308	0.00277	11.23	0.3602	0.372	3.17
MMCs	Exp. Wear Rate(mm ³ /m)	Reg. Model Eq(3), Wear Rate(mm ³ /m)	% Error	Exp. Coefficient of Friction	Reg. Model Eq(4), Wear Rate(mm ³ /m)	% Error
Al-6061+15% SiC	0.00348	0.00318	9.36	0.367	0.379	3.27
	0.00271	0.00259	4.69	0.399	0.432	7.415
	0.00178	0.00165	7.87	0.493	0.544	9.256

The experimental value of wear rate is found to be varying from wear rate calculated in regression equation by error percentage between 5.7% to 11.23%, while for coefficient of friction it is between 3.17% to 7.366% for 10% weight percentage of SiC reinforced with Al-6061 MMCs. But in case of 15% weight percentage of SiC reinforced with Al-6061 MMCs gives the experimental value of wear rate is found to be varying from wear rate calculated in regression equation by error percentage between 4.69% to 9.36%, while for coefficient of friction it is between 3.27% to 9.256%.

VIII. CONCLUSIONS

Following are the conclusions drawn from the study on dry sliding wear test using Taguchi's technique.

- Sliding distance (62.5%) has the highest influence on wear rate followed by sliding speed(37.5%) and applied load (1.25%) and for coefficient of friction, the contribution of applied load is 85.5%, sliding distance is 13.4% for **Al – 6061/ 10% SiC** metal matrix composites.
- Applied load (57.2%) has the highest influence on wear rate followed by sliding distance (7.1%) and sliding speed (7.1%) and for coefficient of friction, the contribution of applied load is 87.2%, sliding distance is 9.7% for **Al – 6061/ 15% SiC** metal matrix composites.
- Increasing incorporation of SiC (10% & 15%) increases the wear resistance of composites by forming a protective layer between pin & counterface.

- From the above conclusion we predict that sliding distance & applied load have the highest influence on wear rate in both composites.
- Similarly applied load is only parameter which is largely influence the coefficient of friction in both composites.
- Regression equation generated for the (10% & 15% SiC MMCs) present model was used to predict the wear rate & coefficient of friction of Al – 6061/(10% & 15%) SiC MMCs for intermediate conditions with reasonable accuracy.
- Confirmation experiment was carried out & made a comparison between experimental values showing an error associated with dry sliding wear & coefficient of friction in both composites varying from 4.69% to 11.23% and 3.17% to 9.256% respectively. Thus design of experiments by Taguchi method was successfully used to predict the tribological behavior of composites.

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Evaluation of Grain Quality of Kalanamak varieties/lines cultivated in Uttar Pradesh

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Abstract- India possesses an immense wealth of Basmati and non Basmati aromatic rice varieties and land races exhibiting a wide variability in their grain quality and cooking characteristics. Among non basmati aromatic rices, Kalanamak is an important and popular scented rice variety grown in Eastern Uttar Pradesh. This variety is famous for its taste and aroma. In eastern India it is cooked in honour of guest or given as gift. Although Kalanamak is fast going out of cultivation, it is one indigenous aromatic rice variety if it is promoted properly, offers a great promise not only in domestic market but also as an export commodity. It can be boon for farmers of Eastern Uttar Pradesh and Tarai area of Bihar. In present study 40 lines/varieties of Kalanamak, collected from different parts of Eastern Uttar Pradesh were evaluated on the basis of grain quality for pure line selections and further improvement to attract more and more farmers for its cultivation again.

In our study aroma ranged from very low to strong. Three variety/lines showed very low aroma, while low aroma was shown by 11 variety/lines, Moderate aroma was reported for 12 variety/lines & the remaining 14 variety/lines showed strong aroma. The gelatinizing temperature of most of varieties/ lines under study was low (33), remaining were grouped in intermediate (06) and High (01) gelatinizing temperature Category. This was decided by Alkali Digestion Score which ranged from 2.0 (Kalanamak 3120 SN) to 7.0 (Kalanamak 3259 SN, 3131 CH, 3219 SN, 3214 CH, 3216 N, 3222 N, 3216-1 SN, 3125 CH, 3128 N, 3129 CH, 3121 N, 3329 N, 3256 CH, 3089 CH, 3129 CH, 3121-1 SN, 3122 CH, 3278 SN & 3131-1 SN). Cooked kernel length was recorded from 8.3 (3257 CH) to 10.90 mm (3214 CH), while cooked kernel breadth ranged between 2.4 mm (3219 N, 3214 CH, 3216 N, 3222 N, 3216-1 SN, 3128 N, 3256 CH, 3119-2 SN & 3114-1 N) to 3.0 mm (3278 SN). Elongation ratio was recorded from 1.60 (Kalanamak 3257 CH) to 2.33 (Kalanamak 3319-2 SN). Most of the parameters of these varieties/lines were compared to premium Dehradun basmati 3020. Based on this study it was revealed that besides Basmati rice other non Basmati aromatic rice varieties like Kalanamak should also promoted by scientists and adopted by more and more farmers & traders so the consumers can get better aromatic rice at lower cost and simultaneously we can maintain our traditional non basmati aromatic rice germ plasm.

Index Terms- Kalanamak, Grain quality, Non Basmati rice, Amylose content, Gelatinizing temperature, Aroma

I. INTRODUCTION

More than 90% of the world's rice is grown and consumed in Asia, where 60% of the calories are consumed by 3 billion Asians (Khush, 1997). India is one of the world's largest producers of white rice, accounting for 20 % of all world rice production. India stands first in area, second in production, followed and preceded by China on these two aspects. The other major rice growing countries are Indonesia, Vietnam, Bangladesh, Thailand, Myanmar and Philippines among Asian countries. Now these days rice is excessively produced in whole of the world. Rice grain quality is a major factor from consumer as well as marketing point of view. Aromatic rice, which has stronger aroma and kernel elongation than ordinary rice, has more in demand in different countries of the world. India is one of the largest exporter of basmati rice in world (Husaini et al, 2009) The consumer demand has increased markedly to pay a premium price for fragrance (Louis et al, 2005)

Scented rices grow best and produce finest quality grains under cool, humid conditions, which are common in Himalayan Tarai of U.P and Uttarakhand and foot hills of Vindhya Hills. Hence Himalayan Tarai of Uttar Pradesh (U.P) and Uttarakhand is probably the place of origin of aromatic rices (Khush, 2000). Among non basmati aromatic rices, Kalanamak is the most popular scented rice variety grown in Uttar Pradesh. It is among one of the most important scented rice varieties of India. This variety is famous for its taste and aroma. It is cooking at marriages is considered auspicious and it's smoke is believed to be purifying the atmosphere. It derives its name from its black husk. It is grown widely in Tarai area of Uttar Pradesh adjoining Nepal particularly in the districts of Siddharthnagar, Santkabirnagar and Basti and in small pockets in districts Gorakhpur, Mahrajganj, Balrampur, Gonda, Bahraich, Shravasti, Deoria and Padrauna (North Eastern Plain Zone of eastern UP). According to H.N. Singh et. al., (2006) there is no official record, but extensive discussion with farmers of its native area of cultivation revealed that Kalanamak used to be the most popular variety in this area until the 1970s. Even during the 1990s, statistics show that Kalanamak was grown on more than 8 % of the rice area in Siddhartha Nagar alone.

Grain quality has always been an important consideration in rice variety selection and development. Based on the survey of 11 major rice growing countries Juliano & Duff (1991) concluded that grain quality is second only to yield as the major breeding objective. In the future grain quality will be even more important as once the very poor, many of whom depend largely on rice for their staple food become better off and begin to

demand higher quality rice (**Juliano & Villarreal , 1993**). Grain quality in rice is very difficult to define with precision as preferences for quality vary from country to country. The cooking quality preferences vary in different countries (**Azeez and Shafi, 1966**). The concept of quality varies according to the preparations for which grains are to be used. Rice is one cereal that is consumed mainly as whole milled and as boiled grain. The desired properties may vary from one ethnic group or geographical region to another and may vary from country to country (**Juliano et al, 1964**). Grain quality characters are reported to play important role in genetic divergence too (**Singh, et. al, 2008**). Besides grain quality characters , agro-morphological character like plant height ,weight of panicle , 1000 grain weight, panicle length also contribute towards genetic divergence (**Singh and Singh , 2008**). Further both grain quality and agro-morphological characters followed by molecular marker study may be utilized to explore the variability and relatedness among different Basmati and non basmati scented rice lines not only at morpho-physiological and grain quality level but also at molecular level, which can be a positive step towards documentation of our scattered knowledge about germ plasm available in India. (**Singh, Yogendra 2006**).

Basmati rice costs 2-3 times more to pocket of consumers than non Basmati rice. It is not possible for each and every person to expend more money for procurement of Basmati rice for their kitchen. On other hand it is not possible to farmers / traders to provide Basmati for each person as production of most of Basmati rice in India is limited to specific area i.e. The Himalayan Tarai region. Hence there is need to explore potential of other non Basmati aromatic rices particularly Kalanamak as substitute of Basmati rice. Keeping in mind these facts present study was done to generate comparative data of various grain quality characteristics of Kalanamak varieties/lines for further improvement to attract more and more farmers for its cultivation again.

II. MATERIAL AND METHOD

Total 40 varieties/ lines of Kalanamak collected from Uttar Pradesh were taken for present study. All the lines were grown at seed Production Center (SPC), Pantnagar under G.B. Pant University of Ag. & Tech, Pantnagar under organic field conditions during period of 2005-06 to 2007-08. Most of the parameters of these varieties/lines were compared to premium Dehradun basmati 3020. Some field observations like plant height and panicle size (**Fig 01**) were also taken. Grain samples of all lines were analyzed for different quality characteristics viz. hulling per cent, milling per cent and head rice recovery as described by **Ghosh et. al., (1971)**, alkali value following the method of **Little et. al. (1958)**, amylose content (**Juliano, 1972**) aroma, gel consistency and kernel elongation ratio by method adopted by **Azeez and Shafi, 1966** were followed.

III. RESULTS AND DISCUSSION

The mean values of grain quality characters of different aromatic rice varieties/ lines in present study are summarized in **Table no. 01**. Among all quality characteristics aroma is

considered as most important quality parameter of high quality rice. Aroma development is influenced by both genetic factors and environment. The major aromatic compound responsible for aroma is considered is 2-acetyl-1- pyrroline (**Buttery et .al, 1983, 1986**). In our study aroma ranged from very low to strong. Three variety/lines i.e 3229 N, 3117 CH, & 3120 SN showed very low aroma , while low aroma was shown by 11 variety/lines i.e Kalanamak 3215 CH, 3259 SN, 3131 CH, 3125 CH, 3126 CH, 3229 SN, 3256 CH, 3278 SN, 3124 CH, 3120-1 SN, & 3114-1 SN. Moderate aroma was reported for 12 variety/lines i.e 3219 N, 3222 N, 3319 CH, 3215 CH, 3121 N, 3213 CH, 3257 CH, 3089 CH, 3121-1 SN, 3131-1 SN, 3120-2 SN & 3114-2 SN. The remaining 14 variety/lines showed strong aroma. According to **Lefebvre et. al., 2010**, the training and recruiting the sensory expert panel are important in the process of sensory analysis and organoleptic tests

Many cooking and eating characteristics of milled rice are influenced by the ratio of two kinds of starches i.e amylose and amylopectin, in rice grain. (**Sanjiva Rao et.al.,1952**). Amylose content correlates negatively with taste panel scores for cohesiveness, tenderness, colour and gloss of boiled rice. Among all varieties the amylose concentration ranged from High (02), High-Intermediate (15) to Intermediate (23) category and it ranged from 20.80 % (Kalanamak 3131 N) to 30.80 % (Kalanamak 3229 SN & 3131-2 SN). Consumers generally prefer intermediate amylose conc. (20-25 %). The rice varieties are grouped on the basis of their amylose content in to waxy (0-2 %) very low (3-9 %), low (10-19 %), intermediate (20-25 %) and high (>25 %) (**Dela Cruz and Khush, 2000**). Gel consistency (**Fig.04**) generally correlates negatively with amylose conc. Gel consistency decides the either rice is soft (gel consistency > 60 mm gel length), flaky (gel consistency 41-60 mm gel length) or hard (gel consistency ≤ 40 mm gel length). Amylose and amyl pectin in kernel determines the texture of cooked rice and consumers prefer rice with intermediate Amylose content. Amylose content, starch, gel consistency and non reducing sugars content decreases with elevated temperature (**Pandey et al. 2007**). In our study it ranged from 30.0 mm (Kalanamak 3256 CH) to 90.0 mm (3222 N, 3119 CH, 3213 CH,3117 CH, 3089 CH, 3129 CH, 3256-1 SN, 3131-1 SN, 3119-2 SN 3120 SN, 3114-2 SN & 3131-2 SN). All varieties were grouped in three category i.e soft (29), medium (06) and hard (05) .The gelatinizing temperature of most of varieties/ lines under study was low (33), remaining were grouped in intermediate (06) and High (01) gelatinizing temperature Category. This was decided by Alkali Digestion Score (**Fig. 03**) which ranged from 2.0 (Kalanamak 3120 SN) to 7.0 (Kalanamak 3259 SN, 3131 CH, 3219 SN,3214 CH,3216 N,3222 N,3216-1 SN, 3125 CH, 3128 N,3129 CH, 3121 N, 3329 N, 3256 CH,3089 CH, 3129 CH,3121-1 SN, 3122 CH, 3278 SN &3131-1 SN). Grain quality evaluation of aromatic rice has been reported by **S.J. Bhonsle, (2010)**

The length wise elongation (**Fig.02**) upon cooking increase in girth is considered most desirable in high quality rice. During cooking rice grains absorb water and increase in length, breadth and volume (**Sood, 1978**). In present study the kernel length ranged from 4.20 mm (3124 CH) to 5.60 mm (3120 SN) and kernel breadth ranged from 1.80 mm (3216 N, 3125 CH, 3319 CH, 3121 N, 3213 CH, 3126 CH, 3229 SN, 3256 CH, 3089

CH,3121-1 SN, 3122 CH, 3278 SN, &3124 CH) to 2.10 mm (3121 CH &3120 SN). The L/B ratio of kernel ranged from 2.20 (3215 CH) to 2.88 (3126 CH, 3089 CH, 3121-1 SN & 3278 SN). According to **Dela Cruz and Khus (2000)**. The L/B ratio decides the shape and category size of rice grain i.e. L/B ratio > 3.0 is for Slender shape, 2.1 to 3.0 is for Medium shape while \leq 2.0 is called as Bold grain. Cooked kernel length was recorded from 8.3 (3257 CH) to 10.90 mm (3214 CH), while cooked kernel breadth ranged between 2.4 mm (3219 N, 3214 CH, 3216 N, 3222 N, 3216-1 SN, 3128 N, 3256 CH,3119-2 SN & 3114-1 N) to 3.0 mm (3278 SN). Elongation ratio was recorded from 1.60 (Kalanamak 3257 CH) to 2.33 (Kalanamak 3319-2 SN). The quality characterization of newly developed basmati and non basmati rice cultivars from cereal chemistry approach and to find correlation between important properties has been recently reported from different parts of India by **Bhonsle and Sellappan (2010)** , **S.J. Bhonsle, (2010)** , and **Kaur et. al., (2011)**

Cultivation and selection by farmers for centuries under varied growing conditions has resulted in a myriad of rice varieties. Rice varieties differ from each other in growth duration, photoperiod sensitivity, grain size, shape and colour, and endosperm properties. The small and medium grain aromatic rices are regarded as separate class **non Basmati aromatic rices**. The non-basmati aromatic rices also share one or more of the basmati characteristics, but not all of them. Generally they have small to medium kernel length but may have similar L/B ratio and kernel elongation rate as that of Basmati types. Many non basmati aromatic rices may surpass basmati types in all other quality characteristics except kernel length. Uttar Pradesh has been the home of some of the finest quality scented rices. While the long-grained Basmati rice is grown in Western U.P. and Uttaranchal, the small and medium grained scented rices are distributed all over U.P. Due to the quest for high yielding varieties, beginning in the mid-sixties, a large number of small and medium grained scented rice varieties, slowly vanished from the farmers' fields. For example, only a few years back, U .P. had as many as 40 well-known scented rice varieties, but today, one finds not more than 3 or 4. In the absence of any systematic breeding work and seed production program, most varieties found on the farmers' fields show a high degree of admixture, so much so that the varieties are on the verge of losing their identity (**Singh et. al. 2003**). Among non basmati aromatic rices, Kalanamak is the most popular scented rice variety grown in U.P. it is one of the most important scented varieties of India. It derives its name from its black husk. It is grown widely in Tarai area adjoining Nepal. This variety is famous for its taste and aroma. In eastern India it is cooked in honour of guest or given as gift. It is cooking at marriages is considered auspicious and it's smoke is believed to be purifying the atmosphere. Although Kalanamak is fast going out of cultivation, it is one indigenous aromatic rice variety if it is promoted properly, offers a great promise not only in domestic market but also as an export commodity. It can be boon for farmers of Eastern Uttar Pradesh and Tarai area of Bihar. However there is need to offer strong research policy and marketing support to promote this cultivar.

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Table No.01: Physicochemical properties of different Kalanamak varieties/Lines

S. No.	Kalanamak Variety/Line	KL (mm)	KB (mm)	L/B	CKL (mm)	CKB (mm)	ER	Aroma	GC		A C.		GT	
									Gel Length (mm)	Cat	%	Cat	AS	Cat
1	3215CH	4.4	2.0	2.20	10.1	2.6	2.29	Low	65	S	26.5	H-I	6.5	L
7	3259SN	4.6	2.0	2.3.	10.0	2.8	2.17	Low	65	S	23.6	I	7.0	L
2	3131CH	5.0	2.1	2.38	10.6	2.6	2.12	Low	40	H	29.7	H-I	7.0	L
3	3219N	5.0	2.0	2.50	9.3	2.4	1.86	Moderate	60	M	23.3	I	7.0	L
4	3214CH	5.4	2.0	2.70	10.9	2.4	2.01	Strong	60	M	23.6	I	7.0	L
5	3216N	4.8	1.8	2.66	10.6	2.4	2.20	Strong	65	S	24.8	I	7.0	L
6	3222N	5.4	1.9	2.84	8.8	2.4	1.63	Moderate	90	S	22.7	I	7.0	L
8	3216-1SN	5.0	2.0	2.50	10.6	2.4	2.12	Strong	35	H	24.2	I	7.0	L
9	3125CH	4.6	1.8	2.55	9.8	2.6	2.13	Low	40	H	25.5	H-I	7.0	L
10	3128N	5.4	2.0	2.70	11.2	2.4	2.07	Strong	70	S	22.5	I	7.0	L
11	3319CH	4.8	1.8	2.66	8.4	2.7	1.75	Moderate	90	S	28.3	H-I	7.0	L
12	3215CH	5.4	2.0	2.70	11.0	2.6	2.04	Moderate	60	M	26.5	H-I	6.5	L
13	3121N	5.0	1.8	2.77	8.2	2.5	1.64	Moderate	70	S	20.8	I	7.0	L
14	3213CH	5.0	1.8	2.77	9.4	2.6	1.88	Moderate	90	S	22.6	I	6.5	L
15	3126CH	5.2	1.8	2.88	11.2	2.6	2.15	Low	60	S	29.4	H-I	6.5	L
16	3329N	5.0	1.9	2.63	9.2	2.6	1.84	Very Low	65	S	25.9	H-I	7.0	L
17	3257CH	5.2	1.9	2.73	8.3	2.6	1.60	Moderate	45	M	25.7	H-I	6.5	L
18	3229SN	4.8	1.8	2.66	9.2	2.5	1.92	Low	40	H	30.8	H	6.0	L
19	3266SN	5.4	1.9	2.84	8.9	2.6	1.65	Strong	70	S	23.3	I	6.5	L
20	3117CH	4.8	1.9	2.52	10.2	2.5	2.13	Very Low	90	S	23.2	I	6.0	L
21	3256CH	5.0	1.8	2.77	9.8	2.4	1.96	Low	30	H	24.5	I	7.0	L
22	3089CH	5.2	1.8	2.88	10.2	2.6	1.96	Moderate	90	S	21.9	I	7.0	L
23	3327SN	4.8	2.0	2.4	9.4	2.7	1.96	Strong	85	S	25.5	H-I	6.9	L
24	3129CH	5.0	1.9	2.63	9.7	2.8	1.94	Strong	90	S	23.3	I	7.0	L
25	3121-1SN	5.2	1.8	2.88	10.5	2.6	2.02	Moderate	60	M	22.3	I	7.0	L
26	3122CH	5.1	1.8	2.83	9.9	2.7	1.94	Strong	60	M	23.1	I	7.0	L
27	3278SN	5.2	1.8	2.88	10.3	3	1.98	Low	75	S	21.9	I	7.0	L
28	3256-1SN	5.4	2.0	2.7	8.9	2.6	1.65	Strong	90	S	24.1	I	5.2	L
29	3124CH	4.2	1.8	2.33	10.1	2.6	2.4	Low	65	S	21.8	I	6.5	L
30	3212CH	5.3	2.0	2.65	10.0	2.7	1.89	Strong	70	S	21.2	I	5.5	I
31	3131-1SN	4.8	2.0	2.40	9.4	2.6	1.96	Moderate	80	S	23.5	I	7.0	L
32	3119-2SN	4.9	1.9	2.57	11.4	2.4	2.33	Strong	90	S	26.0	H-I	5.0	I
33	3120SN	5.6	2.1	2.66	10.8	2.6	1.93	Very Low	90	S	26.8	H-I	2.0	H
34	3120-1SN	5.4	1.9	2.84	10.9	2.5	2.02	Low	85	S	26.5	H-I	6.0	L
35	3120-2SN	5.3	1.9	2.78	11.0	2.5	2.08	Moderate	70	S	25.9	H-I	6.5	L
36	3114-1N	4.9	1.9	2.57	10.6	2.4	2.16	Low	85	S	21.7	I	4.5	I
37	3114-2SN	4.8	1.9	2.52	10.2	2.5	2.13	Moderate	90	S	23.1	I	4.5	I

38	3131-2SN	5.0	2.0	2.50	9.4	2.7	1.88	Strong	90	S	30.8	H	5.0	I
39	3119N	4.8	1.9	2.52	9.7	2.6	2.02	Strong	85	S	25.4	H-I	6.0	L
40	3119-1SN	4.8	2.0	2.40	9.8	2.6	2.04	Strong	80	S	27.5	H-I	4.5	I
41	Dehradun Basmati 3020	7.0	1.8	3.9	13.1	2.2	1.9	Strong	80	S	25.5	H-I	2.3	H

PL=paddy length, PB=paddy breadth, HR=hulling recovery, MR=milling recovery, KL=kernel length, KB=kernel breadth,
 L/B= kernel length/kernel breadth, CKL=cooked kernel length, CKB=cooked kernel breadth, ER=elongation ratio (after cooking),
 AS=alkali score,
 GT=gelatinization temperature, GC=gel consistency, GL=gel length, AC= Amylose content, cat. =category; L=low; I=intermediate;
 H-I=high-intermediate;
 H=high , Amylose content codes: I=intermediate (20-25%), H-I=High-Intermediate (25-30%), H=High (>30%)

Aroma codes: Strong (S), Moderate (M), Low (L), Very Low (VL)

Alkali score codes:

- 1
- 2
- 3
- 4
- 5
- 6
- 7

Gelatinizing temperature

- H=High
- H=High
- H-I=High-Intermediate
- I=Intermediate
- I=Intermediate
- L=Low
- L=Low

Gel consistency:

Gel length (mm)

- 0-40
- 41-60
- 61-100

Category

- H=hard
- M=Medium
- S=Soft



Fig.01: Panicle size

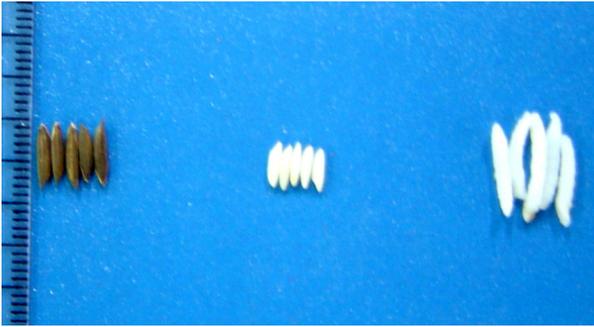


Fig.02: Cooked Kernel Elongation

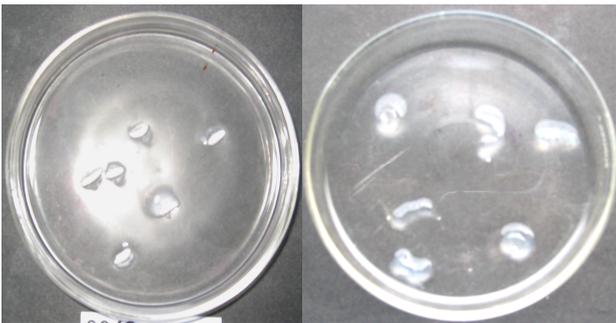


Fig.03: Alkali digestion Score Analysis

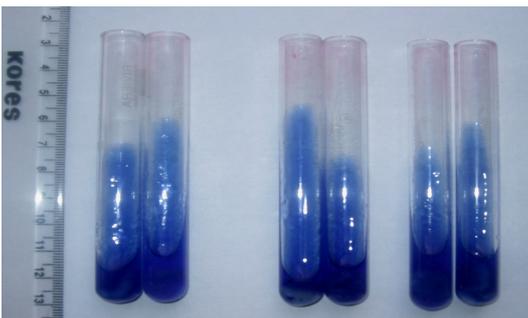


Fig.04: Gel Consistency

Experimental Investigation of an Alternate Refrigerant for R22 in Window Air Conditioning System

M.Ashok Chakravarthy, M.L.S.Deva Kumar

Abstract- This paper is concerned with the future phase-out of Hydro Chloro Fluoro Carbons (HCFCs) used in the air conditioning systems. The air conditioning industry is currently evaluating alternative refrigerants for R-22. A window-type air conditioning system is selected for the tests conducted with three different types of refrigerants. These air conditioning units are spread widely in their applications and are circulating R-22 as a refrigerant. Finding an alternative refrigerant for replacing R-22 is becoming a practical problem because general use of hydro chlorofluorocarbons (HCFCs) including R-22 is promised to be banned by 2020 as per the Montreal Protocol.

It is intended to replace R-22 refrigerant by other refrigerants which are considered to be environmental friendly. In this project, two zeotrope blend refrigerants were selected to be tested as alternative refrigerants for R-22 in the window type air conditioner system viz., R-407C (mixture of R-32/125/134a), R-407A (mixture of R-32/125/134a) to their better thermal properties and acceptable pressure and temperature ranges. The alternate refrigerants to be used in the project have very less ozone depletion potential (ODP) and global warming potential (GWP). The performance of each refrigerant has been found individually and the results were used to evaluate and compare the following performance criteria: cooling capacity, Energy Efficiency Ratio and the coefficient of performance (COP).

Index Terms- Alternative Refrigerant, HCFCs, Zeotrope blend ODP, GWP.

I. INTRODUCTION

A great breakthrough occurred in the field of air-conditioning with the development of Freons by E.I.dupont.

Freons are a series of fluorinated hydrocarbons, popularly known as fluorocarbons, derived from methane, ethane etc as bases. Since their development in 1931, chloro fluoro carbons (CFCs) were thought to be ideal Refrigerants. In 1974, CFCs were tentatively identified as destructive to the ozone layer.

A. Montreal Protocol

The scientific confirmation of the depletion of the ozone layer prompted the international Community to establish a mechanism for cooperation to take action to protect the ozone layer. This was formalized by a treaty called the Vienna Convention for the Protection of the Ozone Layer, which was adopted and signed by 28 countries on 22nd march 1985 in Vienna. This led to the drafting of the Montreal Protocol on Substances that Deplete the Ozone Layer. The Protocol was signed by 24 countries and by the European Economic Community and entered into force on 1st January 1989. The treaty states that the Parties to the Montreal Protocol recognize that worldwide emissions of ozone-depleting substances (ODSs) significantly deplete and otherwise modify the ozone layer in a manner that is likely to result in

adverse effects on human health and the environment. At Montreal, a 50 per cent cut by 2000 was decided on. However, this was adjusted only three years later, when full scientific evidence was available. The First Meeting of the Parties to the Protocol was held in Helsinki in May 1989, and the Parties have met every year since to review progress and discuss amendments resulting from continued research and technical developments. The provisions of the Protocol include the requirement that the Parties to the Protocol base their future decisions on the current scientific, environmental, technical and economic information assessed by panels drawn from the worldwide expert communities. The most recent scientific assessment of the current status of the ozone layer is set out in a report published by the World Meteorological Organization (WMO) entitled Scientific Assessment of Ozone Depletion 2006.

B. Refrigerant Solutions For Today's Environmental Challenges

The HVACR industry is facing two major environmental challenges today: stratospheric ozone depletion and global climate change. Stratosphere Ozone Depletion is believed to be caused by the release of certain manmade ozone depleting chemicals into the atmosphere. Arora C. P., B.K.Bhalla and Addai Gassab studied the performance of window type air conditioners using R-22 (1979). They found thirteen (13) compounds that satisfied this criterion. These are: R-115; 500, 502, 505, 506, which are already banned R-161 which is highly toxic; R-143a, 152a which are slightly flammable and R-22, 124, 125, 134 and 134a which are nonflammable. There are many other works published on the alternatives to R-22 and other ozone depletion refrigerants some of these are Kuehl S.J., Goldschmidt V.W. Steady flows of R-22 through capillary tubes (1990). Boumaza, M. M., (2007). Investigation and Comparison of Chlorine Compounds Refrigerants and their Potential Substitutes Operating at high Ambient Temperature for the Replacement of R22.Hoffman also studied the replacements for HCFCs.

C. Window Air Conditioner

A window air conditioner is a system that cools space to a temperature lower than the surroundings. To accomplish this, heat must be removed from the enclosed space and dissipated into the surroundings. However, heat tends to flow from an area of high temperature to that of a lower temperature. During the cycle, a substance called the refrigerant circulates continuously through four stages. The first stage is called Evaporation and it is here that the refrigerant cools the enclosed space by absorbing heat. Next, during the Compression stage, the pressure of the refrigerant is increased, which raises the temperature above that of the surroundings. As this hot refrigerant moves through the next stage, Condensation, the natural direction of heat flow allows the release of energy into the surrounding air. Finally, during the Expansion phase, the refrigerant temperature is

lowered by refrigeration effect. This cold refrigerant then begins the Evaporation stage again, removing more heat from the enclosed space.

A typical diagram of a window air conditioner which works according to the process explained above is shown in the figure.

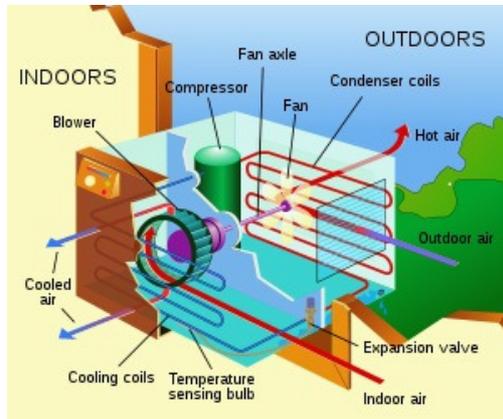


Fig. 1. Construction of a window air conditioner

D. Refrigerant in Vapour Compression Refrigeration system

Window air conditioner works on the principle of vapour compression refrigeration system. The refrigerant is a heat carrying medium which during the cycle (that is compression, condensation, expansion and evaporation) in the refrigeration system absorb heat from a low temperature source and discard the heat so absorbed to a higher temperature sink.

The suitability of a refrigerant for a certain application is determined by its physical, thermodynamic, chemical properties and by various practical factors. There is no one refrigerant which can be used for all types of applications. If one refrigerant has certain good advantages, it will have some disadvantages also for a particular application. Hence, a refrigerant is chosen which has greater advantages and less disadvantages.

II. EXPERIMENTAL WORK

A. Description of the Test Apparatus

A GODREJ company window air conditioner of 1 ton refrigeration capacity was selected to be as a test rig. The overall physical dimensions of the window air conditioning system are (60 X 56 X 38) cm and 42 kg weight. Figure 2. shows the schematic diagram of the window air conditioner used in the experiment.

The unit is having single electricity phase rotary compressor. The condenser and evaporator coils are made of copper with smooth inner tube surface. The evaporator fins are hydrophilic and Condenser fins are Hydrophobic. The interrupted type of fin used in the experiment is very widely accepted method of increasing the heat transfer coefficient and creating more turbulent mixing on the air side of heat exchangers. Both compressor and condenser fins were made of aluminium.

The window air conditioner utilizes refrigerant R-22 and mineral lubricating oil. In order to provide superior lubrication with chlorine refrigerants poly ester lubricants were used. The air

conditioner accommodates a three speed motor to run the condenser and evaporator fans.

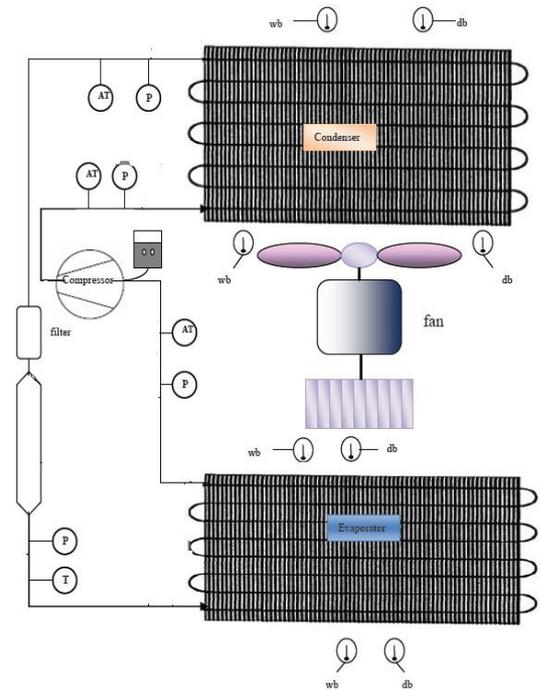


Fig. 2. Schematic diagram of the window air conditioner

B. Selection of the Refrigerant

The new trend is to use zeotropic blend refrigerants in the air conditioning system. In the present experiment, two zeotropic blend refrigerants were selected to be tested as alternate refrigerants for R-22 in the window air conditioner test rig. These refrigerants were R-407C comprising of (R32/R125/R134a) in a mass fraction composition percentage as (23/25/52) and R-407A comprising of (R32/R125/R134a) in a mass fraction composition percentage as (20/40/40).

These are commercially available have been assigned an identifying number in the 400series. Zeotropic blends shift in composition during condensing process. As the blend changes phases, more of one component will transfer to the other phase faster than the rest. This property is called fractionation. The changing composition of the liquid from one side of the heat exchanger to the other is called the temperature glide. The temperature glide will cause different values for temperature at a given pressure, depending on how much refrigerant is liquid and how much is vapour. The alternate refrigerants used in the present work have very less ODP and GWP as compared to R-22.

C. Refrigerant Charging

The refrigerant may be charged in a liquid or vapour modes. This is limited by operating factors, such as the amount of refrigerant and time of charging. Charging a refrigeration system, especially the one built-up with capillary tube control, is the most critical task. Amount of refrigerant to be charged is so selected that it maintains desired suction & discharge pressures. It is customary to charge the system with a charging cylinder on

volume basis but the short-coming of this method is that since the density of refrigerant varies appreciably with temperature, one can come across erroneous quantity as the charging cylinder does not have different scales for different ambient temperatures. A better alternative method is to charge the refrigerant by weight. Charging without the aid of any equipment requires a high level of skill and human judgment. Sometimes charging is done without the aid of any equipments, this system uses suction pressure and discharge pressure as indicative of the charge quantity. However, this needs a high level of skill and human judgment.

III. TEST PROCEDURE

At the incipience of the test, the system was kept running at least 10 minutes to reach the steady state conditions. This was done by monitoring the temperature and pressure gauge for the circulated refrigerant. After that achievement, the refrigerant side measurements, temperature and pressure, and air side measurements, dry and wet bulb temperature, were recorded. These readings were taken at ambient temperature i.e., 27.3 °C DBT and 19.2 WBT to detect the performance of the window air conditioner test rig .

This procedure was repeated for the refrigerants R-407C and R407A. The tests were usually commenced at highest fan speed where the volumetric air flow rate fixed at (9.33) m³/min. as specified by the unit manufacturer company.

IV. ANALYSIS OF THE EXPERIMENTAL DATA

The data analysis involved a number of assumptions that are important to be addressed, as described below:

1. The mass flow rate of refrigerant is constant at all parts of the experimental test rig.
2. The air temperature at the entrance and exit of heat exchangers are constant and homogenous at all tubes in the front and lee sides.

The data reduction procedure includes the refrigerating effect, power consumed by compressor, heat rejected in the condenser, energy efficiency ratio calculated for both R-22 and its alternatives. In addition, (COP) was calculated from the above mentioned parameters. The properties of R-22 and other refrigerants were obtained from the published data by ASHRAE Hand Book.

V. PERFORMANCE CALCULATIONS

A. Refrigerant R-22

1. Condenser temperature, $T_c = 65.4$ °C
2. Condenser Pressure, $P_c = 18.12$ bar
3. Evaporator Temperature, $T_e = 7.9$ °C
4. Evaporator Pressure, $P_e = 3.78$ bar

Calculations for Cooling Capacity:

Readings taken from the test rig:

Mass Flow rate of Air = 0.1688 kg/sec

Input Power (Watts) = 970

Entering Air Enthalpy, $h_{ae} = 55.8$ kJ/kg

(Taken from psychrometric chart at Indoor air temperature i.e. 27.3 °C DBT, 19.2 °C WBT)

Leaving Air Enthalpy, $h_{al} = 35.9$ kJ/kg

(Taken from psychrometric chart at Leaving air temperature i.e. 18.59 °C DBT, 12.34 °C WBT)

Enthalpy Difference = Entering Air Enthalpy (h_{ae}) – Leaving Air Enthalpy (h_{al}) = 55.8 – 35.9

$$= 19.9 \text{ kJ/kg}$$

Cooling Capacity = Mass flow rate of air * Enthalpy difference = 0.1688 * 19.9

$$= 3.359 \text{ kW}$$

Cooling Capacity = Cooling capacity in kW * 3412.14

$$= 3.359 * 3412.14$$

$$= 11461.37 \text{ Btu/hr}$$

Energy Efficiency Ratio = (Cooling capacity in Btu/hr) / (Input Power in Watts)

$$= 11461.37 / 970$$

$$= 11.81$$

COP of system = Energy Efficiency Ratio / 3.412

$$= 11.81 / 3.412$$

$$= 3.46$$

From Pressure –Enthalpy Diagram (at corresponding pressure and temperatures)

Enthalpy at the beginning of compression,

$$h_1 = 403 \text{ kJ/kg}$$

Enthalpy at the end of compression

$$h_2 = 441 \text{ kJ/kg}$$

Enthalpy at the beginning of the expansion

$$h_3 = 259 \text{ kJ/kg}$$

Enthalpy at the end of expansion

$$h_4 = 259 \text{ kJ/kg}$$

Capacity of the system = $1 \text{ TR} = 1 * 3.5 \text{ kW}$

$$= 3.5 \text{ kW}$$

Mass Flow rate, $m_r = \text{Capacity in kW} / (h_1 - h_4)$

$$= 3.5 / (403 - 259)$$

$$= 0.0243 \text{ kg/sec}$$

Refrigeration Effect (Re) = $(h_1 - h_4)$

$$= (403 - 259)$$

$$= 144 \text{ kJ/kg}$$

Compressor work (W) = $m_r * (h_2 - h_1)$

$$= 0.0243 * (441 - 403)$$

$$= 0.923 \text{ kW}$$

Heat rejected in the Condenser, = $m_r * (h_2 - h_3)$

$$= 0.0243 * (441 - 259)$$

$$= 4.422 \text{ kW}$$

Co- efficient of Performance,

$$(\text{C.O.P.}) = (h_1 - h_4) / (h_2 - h_1)$$

$$= (403 - 259) / (441 - 403)$$

$$= 3.69$$

B. Refrigerant R-407c

1. Condenser temperature, $T_c = 74.$ °C

2. Condenser Pressure, $P_c = 19.45$ bar

3. Evaporator Temperature, $T_e = 10.5$ °C

4. Evaporator Pressure, $P_e = 3.9$ bar

Calculations for Cooling Capacity:

Readings taken from the test rig:

Mass Flow rate of Air = 0.1688 kg/sec
 Input Power (Watts) = 970
 Entering Air Enthalpy, $h_{ac} = 55.7$ kJ/kg
 (Taken from psychrometric chart at Indoor air temperature i.e. 27.3 °C DBT, 19.2 °C WBT)
 Leaving Air Enthalpy, $h_{al} = 34.9$ kJ/kg
 (Taken from psychrometric chart at Leaving air temperature i.e. 17.8 °C DBT, 12°C WBT)
 Enthalpy Difference = Entering Air Enthalpy (h_{ac}) – Leaving Air Enthalpy (h_{al}) = 55.8 – 35.9
 = 20.8 kJ/kg
 Cooling Capacity = Mass flow rate of air * Enthalpy difference
 = 0.1688 * 20.8
 = 3.511 kW
 Cooling Capacity = Cooling capacity in kW * 3412.14
 = 3.511 * 3412.14
 = 11980.02 Btu/hr
 Energy Efficiency Ratio = (Cooling capacity in Btu/hr)/ (Input Power in Watts)
 = 11980.02 / 970
 = 12.26
 COP of system = Energy Efficiency Ratio / 3.412
 = 12.26/3.412
 = 3.59
 From Pressure –Enthalpy Diagram (at corresponding pressure and temperatures)
 Enthalpy at the beginning of compression,
 $h_1 = 411$ kJ/kg
 Enthalpy at the end of compression
 $h_2 = 455$ kJ/kg
 Enthalpy at the beginning of the expansion
 $h_3 = 260$ kJ/kg
 Enthalpy at the end of expansion
 $h_4 = 260$ kJ/kg
 Capacity of the system = 1TR = 1 * 3.5 KW
 = 3.5kW
 Mass Flow rate, $m_r =$ Capacity in kW/ (h1-h4)
 = 3.5 / (411-260)
 = 0.0231 kg/sec
 Refrigeration Effect (Re) = (h1 - h4)
 = (411 – 260)
 = 151 kJ/kg
 Compressor work (W) = $m_r \times (h_2 - h_1)$
 = 0.0231 x (455 –411)
 = 1.016 kW
 Heat rejected in the Condenser = $m_r \times (h_2 - h_3)$
 = 0.0231 x (455-260)
 = 4.504 kW
 Co- efficient of Performance,
 (C.O.P.) = $(h_1 - h_4) / (h_2 - h_1)$
 = (411 – 260) / (455 – 411)
 = 3.431

C. Refrigerant R-407a

1. Condenser temperature, $T_c = 76$ °C
2. Condenser Pressure, $P_c = 22.4$ bar
3. Evaporator Temperature, $T_e = 10.9$ °C

4. Evaporator Pressure, $P_e = 4.59$ bar

Calculations for Cooling Capacity:

Readings taken from the test rig:

Mass Flow rate of Air = 0.1711 kg/sec
 Power (Watts) = 970
 Entering Air Enthalpy, $h_{ac} = 54.8$ kJ/kg
 (Taken from psychrometric chart at Indoor air temperature i.e. 27.2 °C DBT, 19.1 °C WBT)
 Leaving Air Enthalpy, $h_{al} = 32.9$ kJ/kg
 (Taken from psychrometric chart at Leaving air temperature i.e. 15 °C DBT, 10.9 °C WBT)
 Enthalpy Difference = Entering Air Enthalpy (h_{ac}) – Leaving Air Enthalpy (h_{al}) = 54.8 – 32.9
 = 21.1 kJ/kg
 Cooling Capacity = Mass flow rate of air * Enthalpy difference
 = 0.1711 * 21.1
 = 3.610 kW
 Cooling Capacity = Cooling capacity in kW * 3412.14
 = 3.610 * 3412.14
 = 12317.82 Btu/hr
 Energy Efficiency Ratio = (Cooling capacity in Btu/hr)/ (Input Power in Watts)
 = 12317.82 / 970
 = 12.698
 COP of system = Energy Efficiency Ratio / 3.412
 = 12.698/3.412
 = 3.721
 From Pressure –Enthalpy Diagram (at corresponding pressure and temperatures)
 Enthalpy at the beginning of compression,
 $h_1 = 311$ kJ/kg
 Enthalpy at the end of compression
 $h_2 = 346$ kJ/kg
 Enthalpy at the beginning of the expansion
 $h_3 = 176$ kJ/kg
 Enthalpy at the end of expansion
 $h_4 = 176$ kJ/kg
 Capacity of the system = 1TR = 1 * 3.5 KW
 = 3.5kW
 Mass Flow rate, $m_r =$ Capacity in kW/ (h1-h4)
 = 3.5 / (311-176)
 = 0.0259 kg/sec
 Refrigeration Effect (Re) = (h1 - h4)
 = (311 – 176)
 = 135 kJ/kg
 Compressor work (W) = $m_r \times (h_2 - h_1)$
 = 0.0259 x (346 –311)
 = 0.906 kW
 Heat rejected in the Condenser = $m_r \times (h_2 - h_3)$
 = 0.0259 x (346-176)
 = 4.403KW
 Co- efficient of Performance,
 (C.O.P.) = $(h_1 - h_4) / (h_2 - h_1)$
 = (311 – 176) / (346 – 311)
 = 3.857

Table.1. Comparison of performance parameters

Performance Parameters	R-22	R407C	R407A
Refrigerant mass flow rate (kg/sec)	0.0243	0.0231	0.0259
Cooling Capacity(kW)	3.359	3.511	3.611
Heat rejected in the Condenser (kW)	4.422	4.505	4.403
Compressor work (Watts)	923	1016	906
Energy Efficiency Ratio	11.81	12.26	12.698
COP	3.46	3.59	3.71

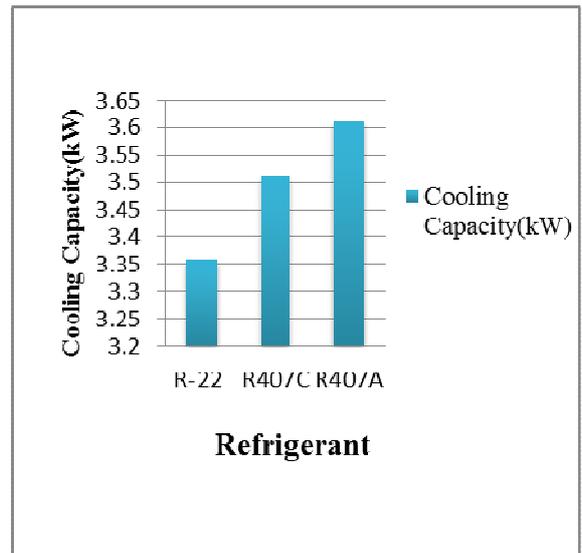


Fig.4. Cooling capacity comparison of the refrigerants

Graphs

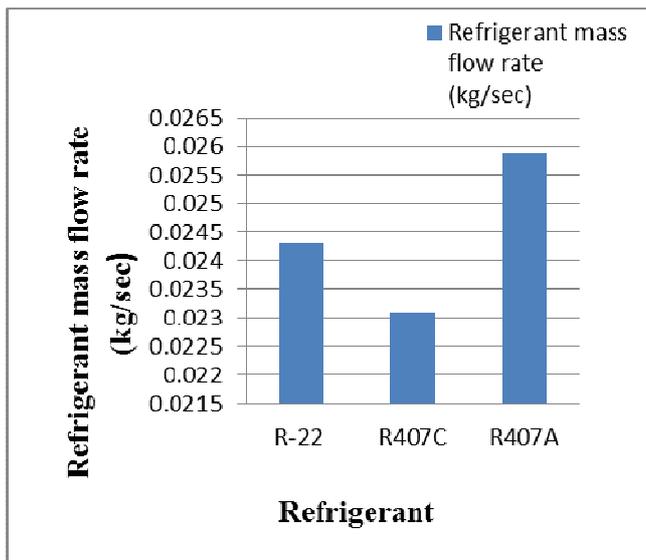


Fig.3. Refrigerant mass flow rate Comparison of the refrigerants

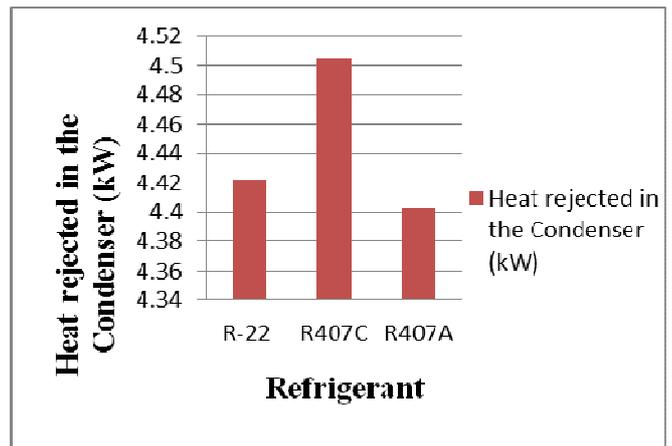


Fig.5. Comparison of heat rejected in the condenser

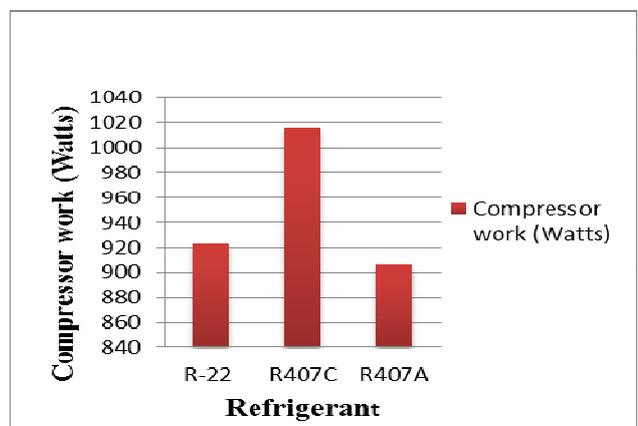


Fig.6. Compressor work Comparison of the refrigerants

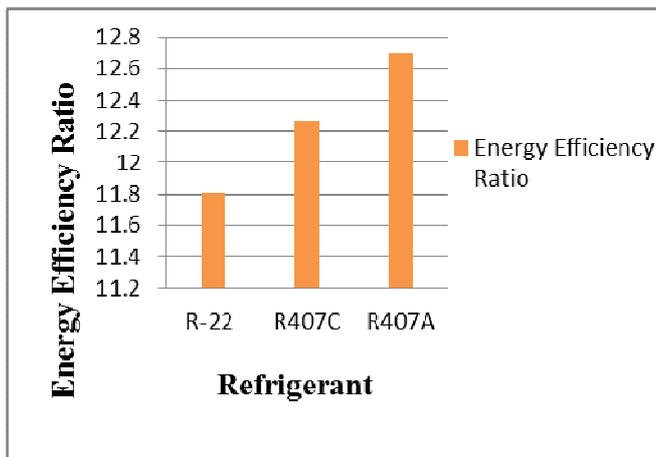


Fig.7. Energy Efficiency Ratio comparison of the refrigerants

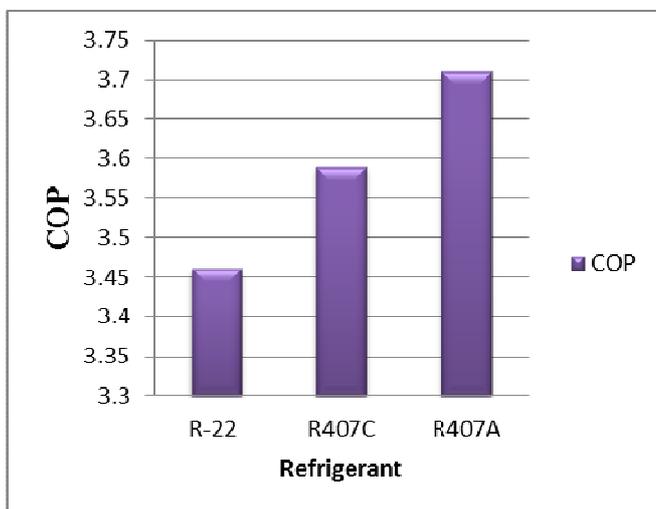


Fig.8. COP comparison of the refrigerants

VI. CONCLUSION

The present experimental work showed the following findings:

- The drop in technique of R-22 by R-407C and R-407A improved cooling capacity up to (4.5%) and (7.5%) respectively. This emphasizes a very important point that the existing evaporator circuit is very suitable for the present alternative refrigerants.
- R-407A exhibited lower power consumption than that experienced with R-22 tests by (2%). On the contrary, R-407C showed a higher consumed power than that of R-22 by (9%).
- R-407C and R-407A showed a significant increase in Energy Efficiency Rate by (4%) and (7.5%) respectively for the operating conditions presented here.
- R-407C exhibited decrease in mass flow rate than that experienced with R-22 tests by (5%). On the contrary, R-407A showed an increase in mass flow rate than that of R-22 by (6.5%).

- R-407C and R-407A showed a significant increase in COP by (3.75%) and (7.2%) respectively for the operating conditions presented here.
- The results confirmed that R-407C and R-407A are promising alternatives as a direct replacement; drop in of R-22 in RAC. Noting that the drop in technique is a feature of the refrigeration unit. Therefore, the performance of a specific alternative varies from one application to another.

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NOMENCLATURE

- COP: Coefficient of Performance
 h: Enthalpy, (kJ/kg)
 DBT: Dry bulb temperature, (°C)
 WBT: Wet bulb temperature, (°C)

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INDO – US Nuclear Deal and 123 Agreements

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Abstract- The process of Indo-US nuclear deal could be said to have started on July 18, 2005 with the issue of joint statement by the India Prime Minister and the United States (US) President. Subsequently, much of debate took place both in India and the US on issues related to granting special nuclear status to India and India joining a pro US camp. This deal has been viewed as a beginning of special relationship between India and the US. However, it took five years for the official start of first Indo-US strategic dialogue which took place at Washington during June 2010. Unfortunately, for all these years the other dimensions of this strategic relationship which were clearly articulated during July 2005 did not get much of publicity. This paper attempts to analyze various non nuclear dimensions of Indo-US strategic cooperation which include Economic Growth and Trade Promotion, Energy and the Environment, Democracy and Development, Non-Proliferation and Security and High Technology and Space.

Index Terms- India, United States, Nuclear, Strategic, High Technology, Energy and the Environment

I. INTRODUCTION

The civilian nuclear cooperation deal with the United States is only one part of the wide-ranging alliance that the UPA government sought to forge with the United States. The strategic alliance with the United States as stated in the joint statement of July 2005 by the Indian Prime Minister and the US President has four aspects. The political, which involves India joining the US bandwagon of “spreading democracy” around the world; the economic, involving a strategic partnership based on a blueprint for US capital; the military, expressed through the Defense Framework Agreement; and fourthly the Nuclear Cooperation Agreement. Prior to the joint statement of July 2005, the UPA government signed a ten-year Defense Framework Agreement with the United States. It is evident that without the defense agreement, the Americans would not have agreed for the nuclear cooperation. This seems to be part of a quid.

II. HISTORY OF INDIAN NUCLEAR PROGRAM

In the 1950s, the United States helped India develop nuclear energy under the Atoms for Peace program. The United States built a nuclear reactor for India, provided nuclear fuel for a time, and allowed Indian scientists study at U.S. nuclear laboratories. In 1968, India refused to sign the NPT, claiming it was biased. In 1974, India tested its first nuclear bomb, showing it could develop nuclear weapons with technology transferred for peaceful purposes. As a result, the United States isolated India for twenty-five years, refusing nuclear cooperation and trying to convince other countries to do the same. But since 2000, the United States has moved to build a "strategic partnership" with

India, increasing cooperation in fields including spaceflight, satellite technology, and missile defense.

III. STRATEGIC ALLIANCE WITH UNITED STATES OF AMERICA

The Manmohan Singh government has followed on the footsteps of the BJP-led government in accepting the US rhetoric on democracy. All the India-US joint statements accord primacy to “democracy” and “freedom.” This implicitly conveys the message that India is politically and ideologically with the US in its crusade to project democracy and freedom as weapons to enforce regime change, prise open economies and establish US hegemony in countries and regions. If the BJP-led government enthusiastically joined the democracy bandwagon by co-sponsoring the Community of Democracies the UPA government embraced the Global Democracy Initiative announced in the July 2005 joint statement. The UPA government has forced out \$10 million for the UN Democracy Fund, which has been set up under US urging.

Two significant steps in the economic sphere were announced in the Bush Manmohan Singh joint statement issued during the Bush visit to India in March 2006. A report of the US-India CEO Forum titled “US-India Strategic Economic Partnership,” which was released during the Bush visit, was welcomed in the joint statement “agreeing to consider its recommendations.” Secondly, a US-India Agricultural Knowledge Initiative, which was announced during Manmohan Singh’s US visit, was formally launched. The unequal nature of the strategic economic partnership between the American and Indian corporate can be gauged from the fact that 21 out of the 30 recommendations of the CEO Forum were exclusively meant for India, most of them in the form of demands for policy changes related to specific sectors of the Indian economy to the obvious benefits of the US corporate. This includes liberalization of norms for Infrastructure investments, market-driven reforms in the Power and Oil & Gas sector, further liberalization of the Telecom sector and ensuring a “level playing field” between the private and public sector telecom companies, raising the FDI cap in the Insurance sector, liberalization of norms for FDI in Banking, liberalization of FDI norms in Retail Trade, removal of FDI caps in sectors such as print media, broadcasting, cable and satellite systems and e-commerce, liberalizing restrictions on FDI in the Real Estate and initiating urban reforms like removal of urban land ceiling, reducing stamp duty etc., liberalization of Defense Procurement norms, liberalization of FDI in Higher Education and so on. The Deputy Chairman of the Planning Commission, who also co-chairs India US Economic Dialogue, had promptly announced the formation of 24 committees to take the recommendations of the CEO Forum forward. While such alacrity to serve the interests of the US corporate met with domestic opposition, the Report of the CEO Forum continues to be displayed in the

official website of the Planning Commission. The CEO Forum recommendations have since been earnestly pursued by the UPA government, often overriding the NCMP.

The vision of foreign and domestic agribusiness driven agriculture underlying the Agricultural Knowledge Initiative is inappropriate for a country like India dominated by peasant agriculture. The efforts by the UPA government to allow large scale procurement of food grain by corporate, promote contract farming and futures trading in food grain and open up retail trade to FDI are influenced by such a distorted vision, which is in conflict with the commitments made in the NCMP.

IV. DEFENCE AGREEMENT

The ten-year Defense Framework Agreement was signed in June 2005. It was a precursor to the joint statement issued in July, just three weeks later. Such a wide-ranging military collaboration agreement has not been signed by India with any country since independence. The agreement provides for joint operations by the two armed forces in military operations outside the auspices of the United Nations; the agreement aims “interoperability” of the armed forces; the two sides will work for missile defense cooperation; sale of US weapons to India and co-production is another feature. Under this pact, India has agreed to work out a Logistics Support Agreement (otherwise known as the Acquisition and Cross Servicing Agreement) with the United States and a Maritime Security Cooperation between the two navies. Regular joint exercises and military training of Indian officers in the United States are already underway. This Defense Framework Agreement alone is sufficient to change the entire security and strategic orientation of India.

Following the announcement of the bilateral nuclear cooperation agreement in July 2007, Nicholas Burns, the Under Secretary of State, who was responsible for negotiating the bilateral agreement, in the official briefing after the 123 agreement was reached, said: “And I think now that we have consummated the civil nuclear trade between us, if we look down the road in the future, we’re going to see far greater defense cooperation between the United State and India: training; exercises; we hope, defense sales of American military technology to the Indian armed forces.”

V. NUCLEAR DEAL AND ENERGY

The major argument advanced by the UPA government is that the nuclear agreement is vital for India to end its nuclear isolation, without which it will not be possible to meet the country’s energy requirements in the future. This ignores the very limited contribution that nuclear power makes to our overall energy generation which is less than 3 per cent. It cannot exceed 7 per cent even if the ambitious plans for expansion to 20,000 MW are implemented by 2020. While talking about energy security, the cost of nuclear power has to be factored in. We should continue to develop nuclear technology based on the three-phased program me. But the expansion of nuclear power cannot become the central focus for energy security. The cost of power per unit generated for imported nuclear reactor will be twice that of a coal-based plant. The capital required to set up a plant with an imported reactor will be thrice that of a coal-based plant. So, what does it mean in terms of investment to set a target

of 20,000 MW of nuclear power by 2020, or the more ambitious 40,000 MW target set out by the Prime Minister? The government has not conducted any techno-economic study on the feasibility and cost of nuclear power.

The implementation of the nuclear cooperation agreement will hamper the pursuit of a self-reliant nuclear technology policy for peaceful purposes based on the three-phase nuclear energy program me. There will be an unacceptable price to be paid. While negotiating for the nuclear deal, the United States simultaneously opposed India going ahead with the Iran pipeline project. The strategic alliance with the US will constrain India from accessing energy from Iran and working for an Asian energy security grid which will link Central Asia, West Asia and South Asia. After the Hyde Act was adopted in December 2006, the CPI(M) had stated that it contains provisions which are contrary to the assurances given by the Prime Minister to Parliament on August 17, 2006. The CPI (M) had repeatedly asked the government not to proceed with the bilateral negotiations for the 123 agreement, till this matter was cleared up. But the government did not heed this advice too. The ten-year Defense Framework Agreement was signed in June 2005. It was a precursor to the joint statement issued in July, just three weeks later. Such a wide-ranging military collaboration agreement has not been signed by India with any country since Independence. The agreement provides for joint operations by the two armed forces in military operations outside the auspices of the United Nations; the agreement aims “interoperability” of the armed forces; the two sides will work for missile defense cooperation; sale of US weapons to India and co-production is another feature. Under this pact, India has agreed to work out a Logistics Support Agreement (otherwise known as the Acquisition and Cross Servicing Agreement) with the United States and a Maritime Security Cooperation between the two navies. Regular joint exercises and military training of Indian officers in the United States are already underway. This Defense Framework Agreement alone is sufficient to change the entire security and strategic orientation of India. Following the announcement of the bilateral nuclear cooperation agreement in July 2007, Nicholas Burns, the Under Secretary of State, who was responsible for negotiating the bilateral agreement, in the official briefing after the 123 agreement was reached, said: “And I think now that we have consummated the civil nuclear trade between American us, if we look down the road in the future, we’re going to see far greater defense cooperation between the United State and India: training; exercises; we hope, defense sales of military technology to the Indian armed forces.”

VI. SECTION (123) AGREEMENT

Under existing law (Atomic Energy Act [AEA] of 1954, as amended; P.L. 95-242; 42 U.S.C. §2153 et seq.) all significant U.S. nuclear cooperation with other countries requires a peaceful nuclear cooperation agreement. Significant nuclear cooperation includes the transfer of U.S.-origin special nuclear material subject to licensing for commercial, medical, and industrial purposes. Such agreements, which are “congressional-executive agreements” requiring congressional approval, do not guarantee that cooperation will take place or that nuclear material will be transferred, but rather set the terms of reference and authorize cooperation. The AEA includes requirements for an agreement’s

content, conditions for the President to exempt an agreement from those requirements, presidential determinations and other supporting information to be submitted to Congress, conditions affecting the implementation of an agreement once it takes effect, and procedures for Congress to consider and approve the agreement. Section 123 of the AEA requires that any agreement for nuclear cooperation meet nine nonproliferation criteria and that the President submit any such agreement to the House Committee on Foreign Affairs and the Senate Committee on Foreign Relations. The Department of State is required to provide the President an unclassified Nuclear Proliferation Assessment Statement (NPAS), which the President is to submit, along with the agreement, to those two committees. The State Department is also required to provide a classified annex to the NPAS, prepared in consultation with the Director of National Intelligence. The NPAS is meant to explain how the agreement meets the AEA nonproliferation requirements. The President must also make a written determination "that the performance of the proposed agreement will promote and will not constitute an unreasonable risk to, the common defense and security."

VII. FEATURE OF THE 123 AGREEMENT

- The Agreement could be a major contributor to our energy security. For India it is critical that we maintain our current economic growth rate of 8 to 10 per cent per annum if we are to achieve the goal of eradicating poverty. Inadequacy of energy supply is one of the primary constraints on accelerating India's growth rate. We are trying to expand all forms of energy production in a manner which takes care of concerns about environment. Nuclear energy is a logical choice in this context and can make a larger contribution to our overall energy mix. At present its share is only about 3%. We have an ambitious programme to increase our nuclear energy generating capacity to 20,000 MWe by 2020 and double this by 2030. While our domestic three stage programme continues, using our own uranium resources, this Agreement, by adding additional capacity quickly, would help us to reach that target soon.
- The Agreement also opens the door for cooperation in civil nuclear energy with other countries. We are already discussing with France and Russia similar bilateral cooperation agreements on civil nuclear energy. Once the NSG adopts an exemption to its Guidelines we hope to operationalise all these agreements.
- The Agreement places India in a special category as a "State possessing advanced nuclear technology", like the United States, with both parties "having the same benefits and advantages".
- The Agreement provides for full civil nuclear energy cooperation covering nuclear reactors and aspects of the associated nuclear fuel cycle including enrichment and reprocessing.
- The Agreement provides for nuclear trade, transfer of nuclear material, equipment, components, and related technologies and for cooperation in nuclear fuel cycle activities.
- The Agreement contains a full reflection of the March 2, 2006 supply assurances, its linkage to safeguards in perpetuity and the provision for corrective measures in case of disruption of fuel supply.
- The Agreement provides for the development of a strategic reserve of nuclear fuel to guard against any disruption of supply over the lifetime of India's reactors.

- The Agreement provides for the application of IAEA safeguards to transferred material and equipment. There is no provision that mandates scrutiny of our nuclear weapons programme or any unsafeguarded nuclear facility.

VIII. REQUIREMENT UNDER THE ATOMIC ENERGY ACT

Section 123 of the AEA specifies the necessary steps for engaging in nuclear cooperation with another country.

Section 123(a) States that the proposed agreement is to include the terms, conditions, duration, nature, and scope of cooperation and lists nine criteria that the agreement must meet. It also contains provisions for the President to exempt an agreement from any of several criteria described in that section and includes details on the kinds of information the executive branch must provide to Congress.

Section 123(b) specifies the process for submitting the text of the agreement to Congress.

Section 123(c) specifies how Congress approves cooperation agreements that are limited in scope (e.g., do not transfer nuclear material or cover reactors larger than 5 MWe). This report does not discuss such agreements.

Section 123(d) specifies how Congress approves agreements that do cover significant nuclear cooperation (transfer of nuclear material or reactors larger than 5 MWe), including exempted agreements.

IX. TERMS OF THE DEAL

The details of the deal include the following:

- India agrees to allow inspectors from the International Atomic Energy Association (IAEA), the United Nations' nuclear watchdog group, access to its civilian nuclear program. By March 2006, India promised to place fourteen of its twenty-two power reactors under IAEA safeguards permanently. Teresina Schaffer, director of the South Asia program at the Center for Strategic and International Studies, says these will include domestically built plants, which India has not been willing to safeguard before now. India has promised that all future civilian thermal and breeder reactors shall be placed under IAEA safeguards permanently. However, the Indian prime minister says New Delhi "retains the sole right to determine such reactors as civilian." According to him: "This means that India will not be constrained in any way in building future nuclear facilities, whether civilian or military, as per our national requirements." Military facilities and stockpiles of nuclear fuel that India has produced up to now will be exempt from inspections or safeguards.
- India works toward negotiating a Fissile Material Cutoff Treaty (FMCT) with the United States banning the production of fissile material for weapons purposes. India agrees to prevent the spread of enrichment and reprocessing technologies to states that don't possess them and to support international nonproliferation efforts.
- U.S. companies will be allowed to build nuclear reactors in India and provide nuclear fuel for its civilian energy program. (An approval by the Nuclear Suppliers Group lifting the ban on India has also cleared the way for other countries to make nuclear fuel and technology sales to India.)

X. OBJECTION OF THE AGREEMENT

Critics call the terms of the agreement overly beneficial for India and lacking sufficient safeguards to prevent New Delhi from continuing to produce nuclear weapons. "We are going to be sending, or allowing others to send, fresh fuel to India--including yellowcake and lightly enriched uranium--that will free up Indian domestic sources of fuel to be solely dedicated to making many more bombs than they would otherwise have been able to make," says Henry Stokowski, executive director of the Nonproliferation Policy Education Center, a nonprofit organization dedicated to improving awareness of proliferation issues. While India has pledged that any U.S. assistance to its civilian nuclear energy program will not benefit its nuclear weapons program, experts say India could use the imported nuclear fuel to feed its civilian energy program while diverting its own nuclear fuel to weapons production. New Delhi has done similar things in the past; India claimed it was using nuclear technology for civilian purposes right up until its first nuclear weapons test in 1974. A Congressional Research Service report (PDF) on the agreement states, "There are no measures in this global partnership to restrain India's nuclear weapons program."

XI. WHO NEEDS TO APPROVE THE AGREEMENT

The final terms of the nuclear deal were approved by the following bodies before they could be implemented:

- (IAEA.) India signed a safeguards agreement with the IAEA under which all nuclear material and equipment transferred to it by the United States as a part of this deal shall be subject to safeguards. In August 2008, the IAEA's Board of Governors approved an India-specific safeguards agreement (PDF). The IAEA said it will begin to implement the new agreement in 2009, with the aim of bringing fourteen Indian reactors under agency safeguards by 2014. The IAEA currently applies safeguards to six of these fourteen nuclear reactors under previous agreements. IAEA Director General Mohamed El Baradei says the IAEA and India are in dialogue concerning an additional protocol to the draft safeguards agreement.

- (India's Parliament.) While the deal does not require a formal vote by the parliament, the coalition government has faced a confidence vote over it. Many parliamentarians oppose the deal, arguing it will limit India's sovereignty and hurt its security. Some Indian nuclear experts are protesting what they see as excessive U.S. participation in deciding which of India's nuclear facilities to define as civilian, and open to international inspections under the plan.

- (Congress.) In October 2008, the U.S. Congress gave final approval to the bill. Under the U.S. Atomic Energy Act, which regulates the trade of nuclear material, congressional approval was needed to pass the exemptions to U.S. laws required for the nuclear deal to be implemented. Some members of Congress were resistant, and called for India to commit to strict limits on its nuclear weapons program before the deal went through. There is a potential area of dispute with India over the terms for suspending the agreement. Before clearing the bill, the U.S. Senate rejected an amendment that would require U.S. nuclear supplies to be cut off if India tests nuclear weapons. The deal does not explicitly impose that condition, though it is part of a

2006 law known as the Hyde Act, which gave the deal preliminary approval.

XII. ADVANTAGE OF THE NUCLEAR DEAL TO INDIA AND THE U.S.A

Under the new civil nuclear agreement, India has agreed to separate its civilian and military programs and to put two-thirds of its existing reactors, and 65 percent of its generating power, under permanent safeguards with international verification, and in return the United States would be under commitment to supply nuclear fuel and technology to India. This is very vital for India, because one of the biggest constraints for the continuing success of its fast-growing economy is the electricity shortage. Nuclear energy, which at present accounts for only about 3 percent of India's total electricity generation, is an attractive alternative to coal and expensive imported oil and gas. The fourteen nuclear power plants India has agreed to put under International Atomic Energy Agency (IAEA) safeguards exemplify approximately 3,000 megawatts or 3 gig watts of generating capacity. By 2020, India plans to add another 12-16 gig watts of nuclear generating capacity to increase its current capacity. , World Energy Outlook (2004.) As presently nuclear power plays a very marginal role in India's growth, therefore in some quarters it is also being felt that even by 2020, nuclear power will contribute only about seven percent of India's total generating capacity and thus would make only a very marginal difference in India's electricity scene. It is also being argued that though the nuclear power could help India in addressing its energy problems to some extent, but it would not make a major difference in the energy sector and also contribute a little to satisfy the needs of its transportation sector. But on the other hand it is being believed by the supporters of nuclear energy that in the future, nuclear power might play an even bigger role. In view of the various problems associated with the other sources of energy and to satisfy India's huge population's growing energy needs, projected to increase four-fold within 25 years, this group believes that without aggravating its dependence on oil from the Middle East or excessively contributing to pollution and global warming, the growing energy needs could be fulfilled by using the nuclear energy. **Ashton B. Carter,(2005)**

Unfortunately, though, 17 percent of the world's population resides in India but it has a very trivial portion of the world's oil and gas reserves. Therefore in the absence of a reliable source of electricity, industries and households mostly are dependent on scarce and costly energy sources like petroleum, natural gas and coal to produce electricity to meet its requirements. **Rahul Tongia (2006)** In view of India's dependence on imported oil, gas and coal to produce electricity which is not a very practical alternative for meeting India's rapidly increasing electricity and energy needs, it is being opined that these limited sources, besides hampering India's growth and development, would also add to India's mounting pollution problems. They also argue that though coal would continue to be a major source of fuel for generating electricity, that the increasing prices of petroleum and natural gas and the need to control and manage the problem of pollution would push India like other countries to adopt cleaner means of generating electricity. In fact the worries about growing pollution levels have also forced as many as thirty countries in the world to restart their nuclear power plants. Presently the

United States is the biggest producer of nuclear energy, with 103 nuclear power plants and 27 percent of the global nuclear generating capacity, and rising natural gas prices have contributed to extensions of nuclear plant licenses in the United States, the United Kingdom, and Germany. China, with just nine nuclear power plants also intends to build thirty new nuclear plants by 2020. **(Mark Bucknam, (2007)**

In view of the scarcity of alternative sources of electricity generation and India's mounting energy needs to match its economic progress India has perceived this agreement as a means of fulfilling its energy needs. The United States, on the other, hand has been viewing it as a tool to bring India under the control and obligations of the nuclear regimes. In view of India's energy-related problems, this agreement appears to have transformed their relationship by fulfilling the objectives of both the countries. As on the one hand, it would end India's isolation, help it acquire high-technology, and reduce its dependence on oil from the Persian Gulf; and on the other, it would bring India under the IAEA inspection and control system, and prove economically beneficial for the United States, too. Due to this fact the deal was welcomed by Mohamed E Baradei, Director of the International Atomic Energy Agency. In his opinion "the nuclear deal would bring India closer as an important partner in the non-proliferation regime and which would be a milestone, timely for ongoing efforts to consolidate the non-proliferation regime, combat nuclear terrorism and strengthen nuclear safety." **Mohamed El Baradei,(2006)** The forty-five nation Nuclear Suppliers Group (NSG), such as France, Russia and the United Kingdom, also did not take much time in expressing their support for the Indo-U.S. nuclear deal but on the other hand Canada and China, both NSG members, expressed their reservations about this deal.

The U.S. Secretary of State Condoleezza Rice **(Condoleezza Rice, "March 13, 2006, A15)** While arguing in favor of the Indo-U.S. strategic partnership and the civil nuclear deal, stressed that India has a record of thirty years of responsible behavior on proliferation matters, and the agreement would make the world, and the future of India and the United States, safe. While naming the agreement as unique, Rice also emphasized that India's uniqueness as a country, as a democracy with an accountable and transparent government encouraged the United States to move forward for this agreement. In her view point other countries like North Korea and Iran that had also been seeking to develop their programs on the basis of this agreement do not fall in this category, because Iran is a state that promotes terrorism, and North Korea is the least transparent state, threatens its neighbors, and proliferates weapons. She also felt that by satisfying India's energy needs, it would end its dependence on fossil fuels and ease the environmental impact of India's vibrant economic growth; and, on the other hand, it would also help the U.S. economy and enhance the employment and job prospects for the American people also. The nuclear deal grants India the facility of reprocessing the nuclear fuel acquired from the external sources, a concession the United States has presently given only to Japan and European countries. In accordance to the deal the United States would also help India to find fuel if the United States cuts off the supply for any reason particularly if India tests a nuclear weapon. In the viewpoint of several scholars, the reason for the U.S. willingness to take these steps

lies in the fact that lately it has started to recognize India as an important strategic bulwark and an answer against a growing Chinese power and highly unstable and unpredictable Pakistan. India's million-man army, the world's fourth largest, and its blue-water navy makes it a natural buffer as well as a sentinel on the trade route between East Asia and the Middle East. The United States believes that a demographically and economically vibrant India could serve as a counterweight to expanding Chinese influence in Southeast Asia as well as Beijing's great-power ambitions around the globe. **Sadanand Dhume, (2006)** U.S. Ambassador to India David Mumford has also accepted that the United States by adopting such policy moves towards India has succeeded to a large extent in de-hyphenating its relationship with India and Pakistan. **Amit Baruah, (2009)**

Interestingly, now the United States has also tacitly acknowledged India as a responsible state with advanced nuclear know-how, but it has very diplomatically avoided accepting India as the sixth nuclear weapons state. The U.S. stand also makes the nuclear deal noteworthy. It clearly shows that America has agreed to help India acquire the same benefits and advantages as other states with nuclear weapons. India would also be granted full civil nuclear energy co-operation, fuel supplies and the transfer of technology, etc., but the United States would not like to undermine the conditions of the NPT by recognizing India as a sixth nuclear state. In some quarters it is believed that the present U.S. policy, like the NPT which created two classes of states, the nuclear haves and the have-nots, would once again create two classes of the non NPT signatories, "responsible" non-nuclear states such as Japan and the EU countries which are allowed to conduct plutonium reprocessing and uranium enrichment for their civilian programs, and other countries like Iran which are denied this right because of the feeling that they may use their potential to acquire nuclear weapons. . **T.V. Paul,(2006)** In view of this duplicity, it can be said that a country cannot be assured of obtaining full fuel cycle facilities by just signing the NPT or the IAEA safeguards system but its political system and proximity to the western countries would also matter in deciding its suitability for access to the dual use potential sensitive technologies.

However some other scholars have opined that the July 18, 2005 agreement for a civil nuclear deal with the United States has heralded India's strategic liberalization, and has also ensured substantial gains such as the import of nuclear fuel, etc. They feel that an enabled India, free of technology denial restraints and of the category of the strategic outcast, would not only emerge as an important state in the twenty-first century but also help multipolarity to become a reality at the global view. **Paul,(2008)**

XIII. CONCLUSION

Though there is no denying the fact that there are various complications which have made the task of the Congress-led UPA government of India very tough, but in view of the limited alternatives the dilemma seems real. On the one hand, the option of generating clean energy through nuclear fuel due to its inherent cost would not only be very expensive, but it would also very difficult to sustain it for a long time due to the cost factor. But on the other hand in view of the limited options for other sources of energy and pressures of the international community for using clean energy sources on account of the threat of global

warming there is little choice left for India. Since India has also willingly imposed a moratorium on further nuclear tests after the 1998 nuclear test, therefore the acceptance of the civil nuclear deal would only assist India in its economic pursuits and open the door for other international cooperation. If India has to sustain its economic growth and use its full economic potential, India would have to move forward and clutch the deal. But as India has always maintained its freedom of action and independent foreign policy, therefore any pressure on India would be seen as a compromise in its long-held stand by the concerned people. In fact it is a catch-22 situation for India, because if the Congress-led UPA government decides to proceed further with the deal, the coalition partners (left parties) would withdraw their support from the government and push the country towards political instability, and if India fails to complete the process of the nuclear deal in time, the future of the deal would be in jeopardy. Actually, in recent weeks, a dramatic situation was witnessed in the Indian political scene with the political parties of India being divided into two clear camps the supporters and non-supporters of the Indo-U.S. civil nuclear deal. This scene emerged with the Manmohan Singh-led UPA government's decision to go to the IAEA and the NSG to fulfill the requirements of the deal, and the left parties withdrawing their support from the government. This situation left the political ground open to all sorts of pulls, pressures, horse-trading and manipulations. The country observed an ugly political scene where not only the Congress-led UPA government received support from unexpected quarters, but allegations were also made in the parliament about how money changed hands to sustain and save the government. The doubts on the stability of such a government which has survived by using every possible tactic are still being raised. However it is also being assumed that with the government passing the hurdle of sustaining the confidence motion, it would be able to move forward in time to finalize the deal before the United States goes to the election mode, and ensure the economic growth of the country through nuclear energy.

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Innovative PMX - CX- Operators for GA TO TSP

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Abstract- This paper analyses process of Genetic algorithm and its operators. Several cross over operators like partially matched cross over, circular motion of cross over, order cross over are discussed. GA's are powerful methods of optimization used successfully in travelling salesman problem. Various cross over operators in the context of the travelling salesman problem are discussed. The results of different GA cross over operators for the TSP are compared and presented.

Index Terms- Genetic algorithms, travelling salesman problem, order cross over, mutation

I. INTRODUCTION

Genetic algorithm first proposed by John Holland is a derivative free stochastic optimization approach based on the concept of biological evolutionary process. Genetic algorithms are an optimization technique based on natural evolution. They include the survival of the fittest idea into a search algorithm which provides a method of searching which does not need to explore every possible solution in the feasible region to obtain a good result. Genetic algorithms are based on the natural process of evolution. In nature, the fittest individuals are most likely to survive and mate; therefore the next generation should be fitter and healthier because they were bred from healthy parents. This same idea is applied to a problem by first 'guessing' solutions and then combining the fittest solutions to create a new generation of solutions which should be better than the previous generation. We also include a random mutation element to account for the occasional 'mishap' in nature.

Travelling salesman problem

The travelling salesman problem is one of the most famous combinatorial optimization problems. The objective of the travelling salesman problem is to minimize the total distance travelled by visiting all the cities once and only once and then returning to the depot city.

A common application of the travelling salesman problem is the movement of people, equipment and vehicles around tours of duty to minimize the total travelling cost.

The travelling salesman problem is used in various fields such as operations research, computer science, discrete mathematics and graph theory and so on.

II. METHODS OF SOLUTION

Definition:

A set of cities, and known distances between each pair of cities, the travelling salesman problem is the problem of finding

a tour that visits each city exactly once and that minimizes the total distance travelled.

Definition:

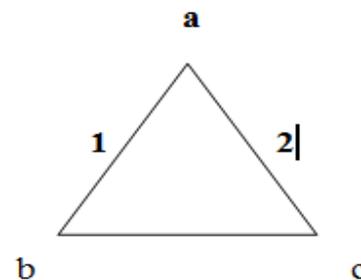
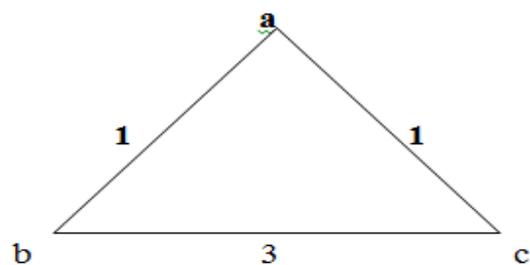
The methods for solving the travelling salesman problem usually can be divided into three basic parts:

- i. a starting point
- ii. a solution generation scheme and
- iii. a termination rule

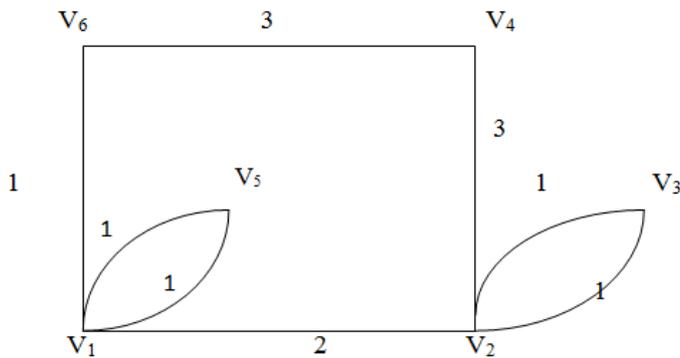
An improved approximation algorithm for the travelling salesman problem

- i. Find a minimum-weight spanning-tree T of fig (a).
- ii. Construct the set V' of vertices of odd-degree in T and find a minimum-weight perfect matching M for V'.
- iii. Construct the Eulerian graph fig (b) obtained by adding the edges of M of T.
- iv. Find an Eulerian circuit C₀ of fig (b) and index each vertex according to the order, L(v), in which v is first visited in a trace of C₀.
- v. Output the following approximate minimum-weight Hamiltonian circuit:

$$C = (v_{i1}, v_{i2}, \dots, v_{in}, v_{i1}) \text{ where } L(v_{ij}) = j.$$



An application of the minimum-weight matching algorithm for the travelling salesman problem



$C_0 = (V_1, V_5, V_1, V_2, V_3, V_2, V_4, V_6, V_1)$ $C = (V_1, V_5, V_2, V_3, V_4, V_6, V_1)$

V	L(V)
V ₁	1
V ₂	3
V ₃	4

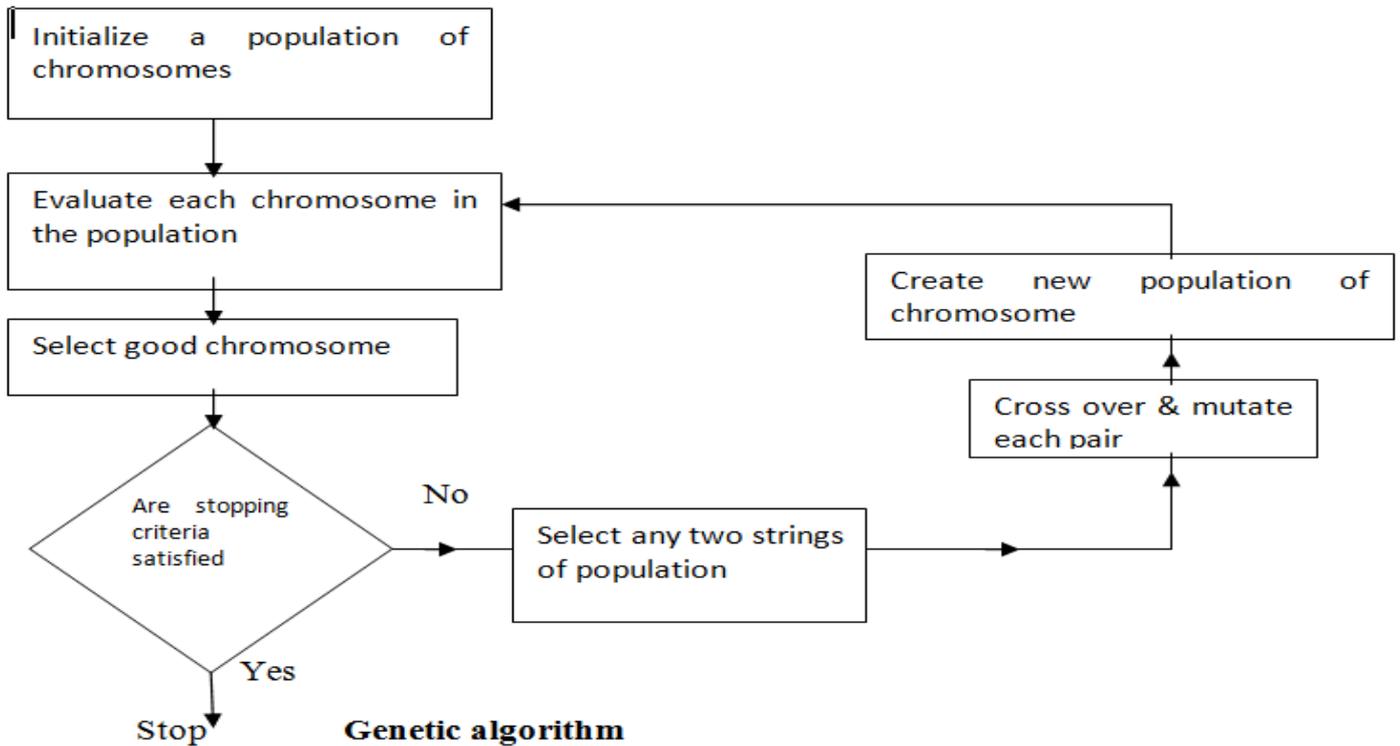
V ₄	5
V ₅	2
V ₆	6

Working of Genetic algorithm

Genetic algorithm works with a population of strings called chromosomes.

Genetic algorithms range from being very straightforward to being quite difficult to understand. Before proceeding, a basic explanation is required to understand how genetic algorithms work. We will use the following problem. We want to maximize the function $f = -2x^2 + 4x - 5$ over the integers in the set $\{0, 1, \dots, 15\}$. By calculus or brute force we see that f is maximized when $x=1$.

The basic way of encoding a problem using a string of zeros and ones, which represent a number in its binary form. We can also use a string of letters, for example $C_1C_2C_3C_4C_5$, or a string of integers, 12345, or just about any string of symbols as long as they can be decoded into something more meaningful.



Imagine we had a problem involving a graph and we needed to encode the adjacency list of the graph. We could create the adjacency matrix, which consists of a one in the i, j^{th} position if there is an arc from node i to node j and a zero otherwise. We could then use the matrix as is or we else could concentrate the rows of the matrix to create one long string of zeros and ones. Notice this time, however, the string is not a binary representation of a number.

This leads us to the first method of encoding a tour of the travelling salesman problem. We do have a graph such as the one described above and we can encode it in the same way, only our matrix will have a one in the i, j^{th} position if there is an arc from node i to node j in the tour and a zero otherwise. For example, the matrix

$$\begin{bmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$$

represents the tour that goes from city 1 to city 3, city 3 to city 2 and city 2 to city 1. This encoding is known as matrix representation. The travelling salesman problem can also be represented by a string of integers in two different ways. The first is by the string

$$v = a_1 a_2 \dots a_n$$

which implies that the tour goes from a_1 to a_2 to a_3 , etc and from a_n back to a_1 . Notice that the strings $v_1 = 1234$ and $v_2 = 2341$ are equivalent in this representation.

The second way to represent the travelling salesman problem is with cycle notation with an integer string

$$v = b_1 b_2 \dots b_n$$

where the tour goes from city i to city b_i . That is, the string $v_1 = 3421$ means that the tour goes from city 1 to city 3, city 3 to city 2, city 2 to city 4 and city 4 to city 1. Note that not every possible string here represents a legal tour, where a legal tour is a tour that goes to every city exactly once and returns to the first city. It is possible for us to have a string that represents disjoint cycles, for example, $v_2=3412$ implies that we go from city 1 to city 3 and back to city 1 and from city 2 to city 4 and back to city 2.

Crossover

Several crossover methods have been developed for the travelling salesman problem. We describe several of them. We start by looking at partially matched crossover (PMX). Recall the two-point crossover and assume we were to use this with the integer representation defined for the travelling salesman problem. If we performed a two-point crossover on the chromosomes of the TSP.

Parent $v_1 = 1234 | 567 | 8$
 Parent $v_2 = 8521 | 364 | 7$

we would get

Child $v_1' = 1234 | 364 | 8$
 Child $v_2' = 8521 | 567 | 7$

which are obviously illegal because v_1' does not visit cities 5 or 7 and visits cities 4 and 3 twice. Similarly v_2' does not visit cities 4 or 3 and visit cities 5 or 7 twice. PMX fixes this problem by noting that we made the swaps $3 \leftrightarrow 5, 6 \leftrightarrow 6$ and $4 \leftrightarrow 7$ and then

repeating these swaps on the genes outside the crossover points, giving us

$$v_1'' = 12573648$$

$$v_2'' = 83215674$$

In other words, we made the swaps, $3 \leftrightarrow 5, 6 \leftrightarrow 6, 4 \leftrightarrow 7$ and the other elements stayed the same. v_1'' and v_2'' still consist of parts from both the parents v_1 and v_2 and are now both legal.

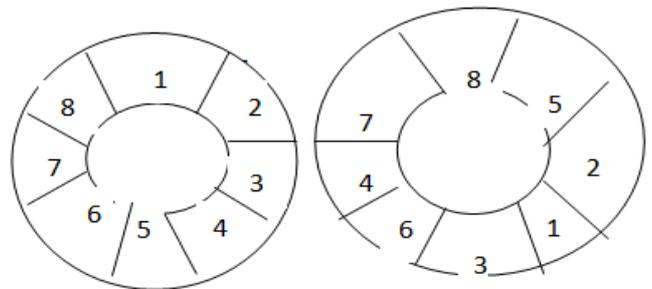
This crossover would make more sense when used with the cycle representation, since in this case it would preserve more of the structure from the parents. If, as in our example, we used the first integer representation, the order that the cities were visited would have changed greatly from the parents to the children - only a few of the same edges would have been kept. With cycle notation a lot more of the edges would have been transferred. However, if we use this crossover routine with cycle representation we do not necessarily get a legal tour as a result. We would need to devise a repair routine to create a legal tour from the solution that the crossover gives us, by changing as little as possible in order to keep a similar structure.

Cycle crossover (CX) works in a very different way. First of all, this crossover can only be used with the first representation we defined, that is, the chromosome $v = 1234$ implies that we go from city 1 to city 2 to city 3 to city 4. This time we do not pick a crossover point at all. We choose the first gene from one of the parents

Parent $v_1 = 123456788$
 Parent $v_2 = 85213647$

say we pick 1 from v_1

$$v_1' = 1 \text{ --- } 5$$



we must pick every element from one of the parents and place it in the position it was previously in. Since the first position is occupied by 1, the number 8 from v_2 cannot go there. So we must now pick the 8 from v_1 .

$$v_1' = 1 \text{ --- } 8$$

This forces us to put the 7 in position 7 and the 4 in position 4, as in v_1 .

$$v_1' = 1 \text{ --- } 4 \text{ --- } 78$$

Since the same set of positions is occupied by 1, 4, 7, 8 in v_1 and v_2 , we finish by filling in the blank positions with the elements of those positions in v_2 . Thus

$$v_1' = 15243678$$

and we get v_2' from the complement of v_1'

$$v_2' = 82315647$$

This process ensures that each chromosome is legal. Notice that it is possible for us to end up with offspring being the same as the parents. This is not a problem since it will usually only occur if the parents have high fitness, in which case, it could still be a good choice.

Order crossover (OX) is more like PMX in that we choose two crossover points and crossover the genes between the two points. However instead of repairing the chromosome by swapping the repeats of each node also, we simply rearrange the rest of the genes to give a legal tour. With the chromosomes

$$v_1 = 135 \mid 762 \mid 48$$

$$v_2 = 563 \mid 821 \mid 47$$

we would start by switching the genes between the two crossover points.

$$v_1' = _ _ _ \mid 821 \mid _ _ _$$

$$v_2' = _ _ _ \mid 762 \mid _ _ _$$

we then write down the genes from each parent chromosome starting from the second crossover point.

$$v_1 : 48135762$$

$$v_2 : 47563821$$

then the genes that were between the crossover points are deleted. That is, we would delete 8, 2 and 1 from the v_1 list and 7, 6 and 2 from the v_2 list to give

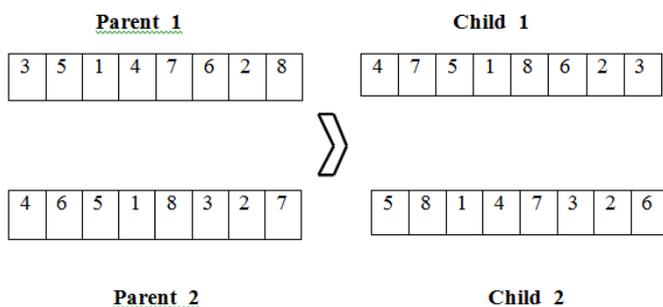
$$v_1 : 43576$$

$$v_2 : 45381$$

which are then replaced into the child chromosomes, starting at the second crossover point.

$$v_1' = 57682143$$

$$v_2' = 38176245$$



Mutation

The operation of mutation allow new individual to be created. It begins by selecting an individual from the population based on its fitness. A point along the string is selected at random and the character at that point is randomly changed, the alternate individual is then copied into the next generation of the population.

Mutation is performed after cross over by randomly choosing a chromosome in the new generation to mutate. We randomly choose a point to mutate and switch that point. Many types of mutation operators exist. Here we are using the bit flip method which is only used with a binary chromosome representation, that changes a particular point on the chromosome to its opposite.

Matrix Representation:

According to the algorithm we are presenting the tour as binary matrix. In $(C_1, C_2, C_3, C_4, C_5)$ every gene is presented as binary bits, if the element (i, j) in the matrix is a set to 1 its mean there is an edge (directed path) between the city i to city j in the tour.

For symmetric matrix in TSP that the $d_{ij} = d_{ji}$. For asymmetric matrix that is when $d_{ij} \neq d_{ji}$.

The left upper triangular matrix (LUTM) represents the movement from left to right that is the forward movement. In(LUTM) we have the path from C_1C_2, C_2C_3, C_3C_5 whereas the right upper triangular matrix (RUTM) represents the movement from the bottom to top, in (RUTM) there is the path from C_5C_4, C_4C_1 . In this way the complete tour will be, $C_1C_2C_3C_5C_4C_1$

The matrix representation must satisfy the two conditions to satisfy a legal tour:

For symmetric case:

- i. The number of matrix element that has the value (1) must equal to the number of vertices in the tour.
- ii. The number of matrix elements that have the value of (1) in each row and each column of the same vertex must be less than or equal to two

For asymmetric case:

- i. The total number of the element that has the value (1) in both (LUTM) and (RUTM) must be equal to the number of vertices in the tour.
- ii. For the same vertex the sum of both matrix elements that has the value (1) must be less than or equal to two.

Cross over operation:

Here we are using the cross over operator by applying the OX operator on the two parent matrices to get a single matrix.

Mutation operation:

If the resultant tour (matrix) is an illegal tour (i.e does not satisfy the two condition mentioned above), then it must be repaired. This is done by counting the number of element with (1) value in each row and column for the city, if the number is greater than repeat. Deleting the longest edge from the resultant

tour until the number of element in the resultant tour is equal to 2. However, if the number of elements in the resultant tour is less than 2 then add the missing edges in the tour by greedy algorithm. Considering two tours

T1: C₁C₅C₃C₄C₂C₁ = 17
T2: C₁C₂C₅C₃C₄C₁ = 22

Value of the assignment:

Consider the weighted matrix of the given problem and solve it by using assignment algorithm and called the optimal total cost as a value of the assignment problem.

III. STEPS OF ALGORITHMS

- i. Randomly create the initial population of individual strings of the given TSP problem and create a matrix representation of each, must satisfy the two basic conditions as mentioned earlier.
- ii. Assign a fitness to each individual in the population using fitness criteria measure,

$$F(t) = \frac{\text{value of the assignment of the given problem}}{\text{value of the string}}$$

The selection criterion depends upon the value of the strings if it is close to 1.

- iii. Create new off-spring population of strings from the two existing strings in the parent population by applying cross over operation.
- iv. Mutate the resultant off-springs if required.

After the cross over and mutation off-spring population has the fitness higher than the parents.

- v. Call the new off-springs as parent population and continue the steps (iii) and (iv) until we get a single off-spring that will be an optimal or near optimal solution to the problem.

Example:

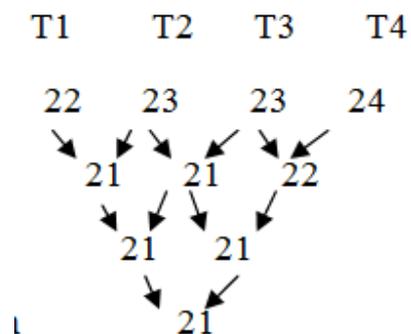
Consider the weighted matrix,

	C1	C2	C3	C4	C5
C1	∞	4	7	3	4
C2	4	∞	6	3	4
C3	7	6	∞	7	5
C4	3	3	7	∞	7
C5	4	4	5	7	∞

The value of the assignment of the above problem is 21.
Initial population:

T1 : C₁ C₄ C₂ C₅ C₃ C₁ = 22
T2 : C₁ C₂ C₅ C₃ C₄ C₁ = 23
T3 : C₁ C₂ C₄ C₃ C₅ C₁ = 23
T4 : C₁ C₄ C₃ C₂ C₅ C₁ = 24

According to the fitness we are selecting these four tours.



Initial population:

- After 1st cross over and mutation
- After 2nd cross over and mutation
- After 3rd cross over and mutation

The resultant tour will be
C₁ C₅ C₃ C₂ C₄ C₁.

IV. CONCLUSION

In this paper Genetic algorithms have proved that they are suitable for solving TSP. The operators PMX, CX, OX etc., playing an important role by developing Robust Genetic algorithms. The TSP problem with the GA devised is that it is difficult to maintain structure from the parent chromosomes and still end up with a legal tour in the child chromosomes.

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Text Independent Speaker Recognition System using GMM

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Abstract- The idea of the AUDIO SIGNAL PROCESSING (Speaker Recognition [4] Project) is to implement a recognizer using Matlab which can identify a person by processing his/her voice. The Matlab functions and scripts were all well documented and parameterized in order to be able to use them in the future. The basic goal of our project is to recognize and classify the speeches of different persons. This classification is mainly based on extracting several key features like Mel Frequency Cepstral Coefficients (MFCC [2]) from the speech signals of those persons by using the process of feature extraction using MATLAB. The above features may consist of pitch, amplitude, frequency etc. It can be achieved by using tools like MATLAB. Using a statistical model like Gaussian mixture model (GMM [6]) and features extracted from those speech signals we build a unique identity for each person who enrolled for speaker recognition [4]. Estimation and Maximization algorithm is used, An elegant and powerful method for finding the maximum likelihood solution for a model with latent variables, to test the later speeches against the database of all speakers who enrolled in the database.

Index Terms- Speaker Recognition, feature extraction, statistical model, Gaussian mixture model, Mel Frequency Cepstral Coefficients, Estimation and Maximization, likelihood

I. INTRODUCTION

This project encompasses the implementation of a speaker recognition [4] program in Matlab. Speaker recognition [4] systems can be characterized as text-dependent or text-independent. The system we have developed is the latter, text-independent, meaning the system can identify the speaker regardless of what is being said. The program will contain two functionalities: A training mode, a recognition mode. The training mode will allow the user to record voice and make a feature model of that voice. The recognition mode will use the information that the user has provided in the training mode and attempt to isolate and identify the speaker. Most of us are aware of the fact that voices of different individuals do not sound alike. This important property of speech-of being speaker dependent-is what enables us to recognize a friend over a telephone. Speech is usable for identification [1] because it is a product of the speaker's individual anatomy and linguistic background. In more specific, the speech signal produced by a given individual is affected by both the organic characteristics of the speaker (in terms of vocal tract geometry [3]) and learned differences due to ethnic or social factors. To consider the above concept as a basic,

we have tried to establish an "Speaker Recognition [4] System" by using the simulation software Matlab Speaker recognition [4] can be classified into identification and verification. *Speaker identification* is the process of determining which registered speaker provides a given utterance. *Speaker verification*, on the other hand, is the process of accepting or rejecting the identity claim of a speaker. The system that we will describe is classified as *text-independent speaker identification* system since its task is to identify the person who speaks regardless of what is saying.

In this paper, we will discuss only the text independent but speaker dependent Speaker Recognition [4] system. All technologies of speaker recognition [4], identification and verification, text-independent and text dependent, each has its own advantages and disadvantages and may require different treatments and techniques. The choice of which technology to use is application-specific. At the highest level, all speaker recognition [4] systems contain two main modules: feature extraction and feature matching. Feature extraction is the process that extracts a small amount of data from the voice signal that can later be used to represent each speaker. Feature matching involves the actual procedure to identify the unknown speaker by comparing extracted features from his/her voice input with the ones from a set of known speakers.

A wide range of possibilities exist for parametrically representing the speech signal for the speaker recognition [4] task, such as Linear Prediction Coding (LPC), Mel-Frequency Cepstrum Coefficients (MFCC [2]). LPC analyzes the speech signal by estimating the formants, removing their effects from the speech signal, and estimating the intensity and frequency of the remaining buzz. The process of removing the formants is called inverse filtering, and the remaining signal is called the residue. Another popular speech feature representation is known as RASTA-PLP, an acronym for Relative Spectral Transform - Perceptual Linear Prediction. PLP was originally proposed by Hynek Hermansky as a way of warping spectra to minimize the differences between speakers while preserving the important speech information [Herm90]. RASTA is a separate technique that applies a band-pass filter to the energy in each frequency subband in order to smooth over short-term noise variations and to remove any constant offset resulting from static spectral coloration in the speech channel e.g. from a telephone line.

MFCC's are based on the known variation of the human ear's critical bandwidths with frequency, filters spaced linearly at low frequencies and logarithmically at high frequencies have been used to capture the phonetically important characteristics of

speech. This is expressed in the mel-frequency scale, which is linear frequency spacing below 1000 Hz and a logarithmic spacing above 1000 Hz . MFCC [2] is perhaps the best known and most popular. Here is just overview of our approach to this project, first we extracted features from the speech signal and then we give them to the statistical model, here we use GMM [6] as statistical model to create a unique voice print for each identity.

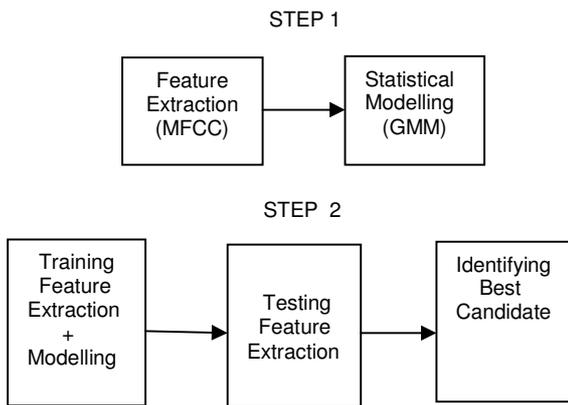


Fig. 1: Block Diagram Of Project

After creation of all voice prints for all identities we check the data base of these voice prints against another voice print which was created by GMM [6] using testing data. In this project, the GMM [6] approach will be used, due to ease of implementation and high accuracy.

1.1 Mel Frequency Cepstral Coefficients(MFCC’S):

MFCC’s are coefficients that represent audio, based on perception. It is derived from the Fourier Transform or the Discrete Cosine Transform of the audio clip. The basic difference between the FFT/DCT and the MFCC [2] is that in the MFCC [2], the frequency bands are positioned logarithmically (on the mel scale) which approximates the human auditory system's response more closely than the linearly spaced frequency bands of FFT or DCT. This allows for better processing of data, for example, in audio compression. The main purpose of the MFCC [2] processor is to mimic the behaviour of the human ears.

The MFCC [2] process is subdivided into five phases or blocks. In the frame blocking section, the speech waveform is more or less divided into frames of approximately 30 milliseconds. The windowing block minimizes the discontinuities of the signal by tapering the beginning and end of each frame to zero. The FFT block converts each frame from the time domain to the frequency domain.

In the Mel frequency wrapping block, the signal is plotted against the Mel-spectrum to mimic human hearing. Studies have shown that human hearing does not follow the linear scale but rather the Mel-spectrum scale which is a linear spacing below 1000 Hz and logarithmic scaling above 1000 Hz. In the final step, the Mel-spectrum plot is converted back to the time domain by using the following equation:

$$Mel(f) = 2595 * \log_{10} \left(1 + \frac{f}{700} \right) \dots \dots \dots (1)$$

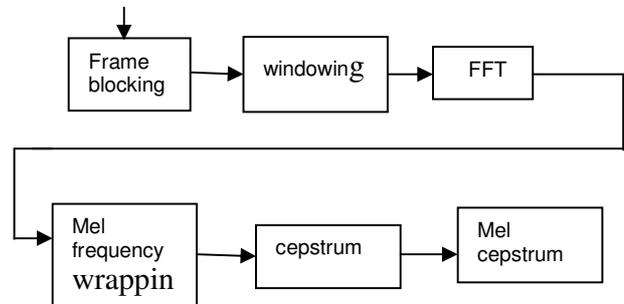


Fig. 2: MFCC BLOCK DIAGRAM

The resultant matrices are referred to as the Mel-Frequency Cepstrum Coefficients [2]. This spectrum provides a fairly simple but unique representation of the spectral properties of the voice signal which is the key for representing and recognizing the voice characteristics of the speaker. A speaker voice patterns may exhibit a substantial degree of variance: identical sentences, uttered by the same speaker but at different times, result in a similar, yet different sequence of MFCC [2] matrices. The purpose of speaker modelling is to build a model that can cope with speaker variation in feature space and to create a fairly unique representation of the speaker's characteristics.

1.2 Feature Extraction Module:

Input: Digital speech signal (vector of sampled values)

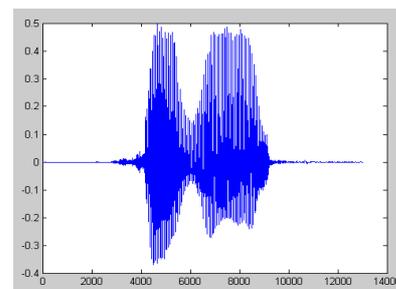


Fig. 3: Sample Speech Signal
 Output: A set of acoustic vectors

In order to produce a set of acoustic vectors, the original vector of sampled values is framed into overlapping blocks. Each block will contain N samples with adjacent frames being separated by M samples where M < N. The first overlap occurs at N-M samples. Since speech signals are quasi stationary between 5msec and 100msec, N will be chosen so that each block is within this length in time. In order to calculate N, the sampling rate needs to be determined. N will also be chosen to be a power of 2 in order to make use of the Fast Fourier Transform in a subsequent stage. M will be chosen to yield a minimum of 50% overlap to ensure that all sampled values are accounted for within

at least two blocks. Each block will be windowed to minimize spectral distortion and discontinuities. A Hamming window will be used. The Fast Fourier Transform will then be applied to each windowed block as the beginning of the Mel-Cepstral Transform. After this stage, the spectral coefficients of each block are generated. The Mel Frequency Transform will then be applied to each spectrum to convert the scale to a mel scale. The following approximate transform can be used (refer equation 1).

Finally, the Discrete Cosine Transform will be applied to each Mel Spectrum to convert the values back to real values in the time domain. After creating speaker model we need to identify speaker based on some features such as MFCC [2] as mentioned above. The features of each user are matched against unknown user. And the speaker with best score is declared to be the claimed speaker.

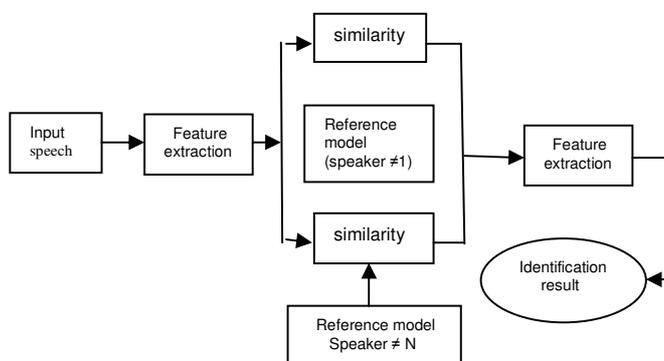


Fig. 4: basic structure of speaker identification

II. MATHEMATICAL BACKGROUND

2.1 Gaussian mixture probability density function:

After extracting features we need to create a speaker model using some statistical model like GMM [6] statistical model. Finite mixture models and their typical parameter estimation methods can approximate a wide variety of pdf's and are thus attractive solutions for cases where single function forms, such as a single normal distribution, fail. However, from a practical point of view it is often sound to form the mixture using one predefined distribution type, a basic distribution. Generally the basic distribution function can be of any type, but the multivariate normal distribution, the Gaussian distribution, is undoubtedly one of the most well-known and useful distributions in statistics, playing a predominant role in many areas of applications. For example, in multivariate analysis most of the existing inference procedures have been developed under the assumption of normality and in linear model problems the error vector is often assumed to be normally distributed. In addition to appearing in these areas, the multivariate normal distribution also appears in multiple comparisons, in the studies of dependence of random variables, and in many other related fields. Thus, if there exists no prior knowledge of a pdf of phenomenon, only a general model can be used and the Gaussian distribution is a good candidate due to the enormous research effort in the past.

2.2 Multivariate normal distribution

A non-singular multivariate normal distribution of a D dimensional random variable

$X \rightarrow x$ can be defined as

$$X \sim N(\mu, \Sigma) = \frac{1}{(2\pi)^{D/2} |\Sigma|^{1/2}} \exp\left[-\frac{1}{2} (x-\mu)^T \Sigma^{-1} (x-\mu)\right] \dots\dots\dots(2)$$

Where μ is the mean vector and Σ the covariance matrix of the normally distributed random variable X . In Figure 5 an example of 2-dimensional Gaussian pdf is shown. Multivariate Gaussian pdf's belong to the class of elliptically contoured distributions, which is evident in Fig. 5 where the equi probability surfaces of the Gaussian are centered hyper ellipsoids. The Gaussian distribution in Eq. 1 can be used to describe a pdf of a real valued random vector ($x \in \mathbb{R}^D$). A similar form can be derived for complex random vectors ($x \in \mathbb{C}^D$) as

$$N^c(x; \theta, \Sigma) = \frac{1}{\pi^D |\Sigma|} \exp[-(x - \theta) * \Sigma^{-1} (x - \theta)] \dots\dots\dots(3)$$

Where $*$ denotes adjoint matrix (transpose and complex conjugate).

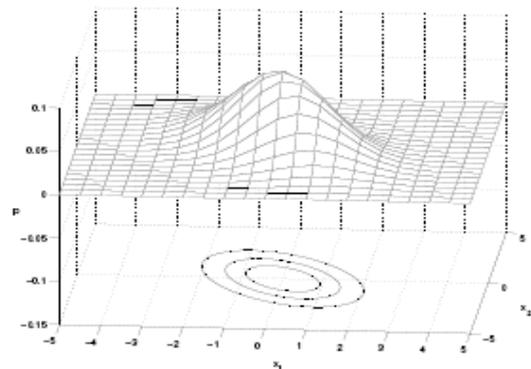


Fig. 5: A two dimensional gaussian pdf and contour plots

2.3 Finite mixture model

Despite the fact that multivariate Gaussian pdf's have been successfully used to represent features and discriminate between different classes in many practical problems the assumption of single component leads to strict requirements for the phenomenon characteristics: a single basic class which smoothly varies around the class mean. The smooth behavior is not typically the most significant problem but the assumption of unimodality. For multimodality distributed features the unimodality assumption may cause an intolerable error to the estimated pdf and consequently into the discrimination between classes. The error is not caused only by the limited representation power but it may also lead to completely wrong interpretations (e.g. a class represented by two Gaussian distributions and another class between them). In object recognition [4] this can be the case for such a simple thing as a human eye, which is actually an object category instead of a class since visual presence of the eye may include open eyes, closed eyes, Caucasian eyes, Asian eyes, eyes with glasses, and so on. For a multimodal random variable, whose values are generated by one of several randomly occurring independent sources instead of a single source, a finite

mixture model can be used to approximate the true pdf. If the Gaussian form is sufficient for single sources, then a Gaussian mixture model (GMM [6]) can be used in the approximation. It should be noted that this does not necessarily need be the case but GMM [6] can also approximate many other types of distributions.

The GMM [6] probability density function can be defined as a weighted sum of Gaussians

$$p(x; \theta) = \sum_{c=1}^C \pi_c N(x; \mu_c, \Sigma_c) \dots\dots(3)$$

Where c is the weight of cth component. The weight can be interpreted as a priori probability that a value of the random variable is generated by the cth source, and thus,

$$0 \leq \alpha_c \leq 1 \text{ and } \sum_{c=1}^C \alpha_c = 1 \dots\dots\dots(4)$$

Now, a Gaussian mixture model probability density function is completely defined by a parameter list [6]

$$\theta = \{\alpha_1, \theta_1, \Sigma_1, \dots, \alpha_C, \theta_C, \Sigma_C\} \dots\dots\dots(5)$$

2.4. Estimation Maximization:

An elegant and powerful method for finding the maximum likelihood solution for a model with latent variables.

Total data log-likelihood:

$$L = \ln p(D|\pi, \mu, C) \dots\dots\dots(6)$$

Setting the derivatives of L with respect to the means μ_k to zero, we obtain:

$$\mu_k = \frac{1}{N_k} \sum_{n=1}^N \gamma(q_{nk}) x_n \dots\dots\dots(7)$$

N_k =Effective number of points assigned to the component k

III. ESTIMATION-MAXIMISATION FOR GMM S (ALGORITHM)

Given a Gaussian mixture model, the goal is to maximize the likelihood function with respect to the parameters.

1. Initialize the means μ_k , covariances C_k and mixing coefficients π_k , and evaluate the initial value of the log likelihood.

2. E step: Evaluate the responsibilities $\gamma_{(z_{nk})}$ using the current parameter values

3. M step: Re-estimate the parameters μ_k^{new} , C_k^{new} , π_k^{new} and Using the current responsibilities.

4. Evaluate the log likelihood and check for convergence of either the parameters or the log likelihood. If the convergence criterion is not satisfied return to step 2.

3.1 Log likely hood Calculation:

Another quantity that plays an important role is the conditional probability of z given x

- Let $\gamma(q_k)$ denote $p(q_k|x)$
- Using Baye's theorem

$$\gamma(q_k) \equiv P(q_k|x) = \frac{P(q_k=1)P(x|q_k=1)}{\sum_{j=1}^K P(q_j=1)P(x|q_j=1)} \dots\dots\dots(8)$$

$$\gamma(q_k) \equiv P(q_k|x) = \frac{\pi_k N(x|\mu_k, C_k)}{\sum_{j=1}^K \pi_j N(x|\mu_j, C_j)} \dots\dots\dots(9)$$

Where

π_k : prior probability of qk

$\gamma(q_k)$ is the responsibility that component k takes for 'explaining' the observation x

After the EM step the values converge i.e. they become stable. This is the end of training of speaker models. After this step unknown speaker are tested against the trained samples this is done by using "lmultiguass.m" function.

Start from M initial Gaussian Models $N(\mu_k, \Sigma_k), k=1 \dots M$, with equal priors set to $P(q_k|x)=1/M$.

3.2Mathematical Background:

Estimation Step:

Compute the probability $P(q_k|X_n)$ for each data point X_n to belong to the mixture q_k .

$$P(q_k|x_n, \theta) = \frac{P(q_k|\theta) \cdot P(x_n|q_k, \theta)}{P(x_n|\theta)} \dots\dots\dots(10)$$

$$= \frac{P(q_k|\theta) \cdot P(x_n|\mu_k, \Sigma_k)}{\sum_j P(q_j|\theta) \cdot P(x_n|\mu_j, \Sigma_j)} \dots\dots\dots(11)$$

Maximization Step:

Update means

$$\mu_k^{new} = \frac{\sum_{n=1}^T x_n P(q_k|x_n, \theta)}{\sum_{n=1}^T P(q_k|x_n, \theta)} \dots\dots\dots(12)$$

Update Variances

$$\Sigma_k^{new} = \frac{\sum_{n=1}^T P(q_k|x_n, \theta) (x_n - \mu_k^{new})(x_n - \mu_k^{new})^T}{\sum_{n=1}^T P(q_k|x_n, \theta)} \dots\dots(13)$$

Update weights

$$p(q_k^{new}|\theta^{new}) = \frac{1}{T} \sum_{n=1}^T P(q_k|x_n, \theta) \dots\dots\dots(14)$$

IV. RESULTS

The implementation of this project is done in MATLAB and the results can be seen in a GUI. The GUI takes the filename of the speaker as input and gives the name of the speaker as output. The GUI basically

contains a button named “train” when this button is pressed the data is trained and stored in the excel sheets. And it also contains a text field in which the input file name is given. After giving the input file name we have to press “Enter” then the result will be displayed in the same text box. The snapshots of the GUI when providing inputs and when results are displayed are shown below.

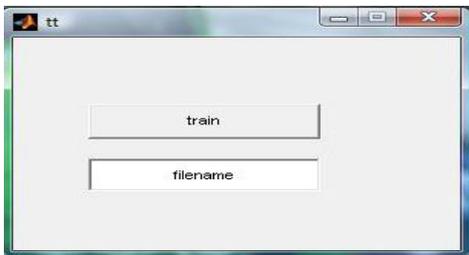


Fig. 6:GUI Snapshot

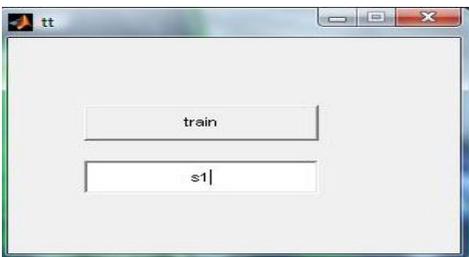


Fig. 7:Input given in GUI



Fig. 8:Output in the GUI

V. CONCLUSION

Over the last decade, the GMM [6] has become established as the standard classifier for text-independent speaker recognition [4]. It operates on atomic levels of speech and can be effective with very small amounts of speaker specific training data. The primary focus of this work was on a task domain for a real application, such as voice mail labelling and retrieval. The Gaussian Mixture speaker model was specifically evaluated for identification tasks using short duration utterances from unconstrained conversational speech, possibly transmitted over noisy telephone channels. Gaussian mixture models were motivated for modelling speaker identity based on two interpretations. The component Gaussians were first shown to represent characteristic spectral shapes (vocal tract configurations) from the phonetic sounds which comprise a person’s voice. By modelling the underlying acoustic classes, the

speaker model is better able to model the short term variations of a person’s voice, allowing high identification performance for short utterances. The Gaussian mixture speaker model was also interpreted as a non-parametric, multivariate pdf model, capable of modelling feature distributions. The experimental evaluation examined several aspects of using Gaussian mixture speaker models for text independent speaker identification. Some observations and conclusions are An identification performance of Gaussian mixture speaker model is insensitive to the method of model initialization. Variance limiting is important in training to avoid model singularities. There appears to be a minimum model order needed to adequately model speakers and achieve good identification performance.

The Gaussian mixture speaker model maintains high identification performance with increasing population size. These results indicate that Gaussian mixture models provide a robust speaker representation for the difficult task of speaker recognition [4] using corrupted, unconstrained speech. The models are computationally inexpensive and easily implemented on a real time platform [6]. Furthermore their probabilistic frame-work allows direct integration with speech recognition [4] systems and incorporation of newly developed speech robustness techniques.

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Implementation of Neural Networks in Flood Forecasting

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Abstract- This paper focuses on the implementation of Soft-Computing Technique (Artificial Neural Network) on Flood Management System. This paper presents an alternate approach that uses artificial neural network to simulate the critical level dynamics in heavy rain. The algorithm was developed in a decision support system environment in order to enable users to process the data. The decision support system is found to be useful due to its interactive nature, flexibility in approach and evolving graphical feature and can be adopted for any similar situation to predict the critical level. The potential benefit of a flash flood forecast depends on three main factors. Firstly its accuracy, which in turn depends on the accuracy of the forecast data, the observational data and the numerical weather modeling and updating procedures. Secondly the magnitude of the lead time it provides before critical levels are reached which can be improved by using quantitative precipitation forecasts from meteorological satellite cloud image, weather radar and numerical weather prediction models. Thirdly, the benefits depend on the effective use of the forecast information, for flood monitoring, flood warning, the operation of flood protection structures and the evacuation of people and livestock. This requires appropriate decision information in a timely manner to those who need it, where they need it, in a manner that is easy to understand. Finally, use of Artificial neural network may serve as a tool for real-time flood monitoring and process control.

Index Terms- Decision Support System; Neural Network; Automatics weather station; Flood level; Numerical Weather Prediction (NWP)

I. INTRODUCTION

Hydroinformatics is a branch of informatics which concentrates on the application of information and communications technologies (ICTs) in addressing the increasingly serious problems of the equitable and efficient use of water for many different purposes. Growing out of the earlier discipline of computational hydraulics, the numerical simulation of water flows and related processes remains a mainstay of hydroinformatics, which encourages a focus not only on the technology but on its application in a social context. On the technical side, in addition to computational hydraulics, hydroinformatics has a strong interest in the use of techniques originating in the so-called artificial intelligence community, such as artificial neural networks or recently support vector machines and genetic programming. These might be used with large collections of observed data for the purpose of data mining for knowledge discovery, or with data generated from an existing, physically based model in order to generate a computationally efficient emulator of that model for some purpose. Hydroinformatics draws on and integrates hydraulics,

hydrology, environmental engineering and many other disciplines. It sees application at all points in the water cycle from atmosphere to ocean, and in artificial interventions in that cycle such as urban drainage and water supply systems. It provides support for decision making at all levels from governance and policy through management to operations.

A. Flood Management

A Flood (natural calamity is an overflow of water that submerges land. Floods are caused by many factors: heavy rainfall, highly accelerated snowmelt, severe winds over water, unusual high tides, tsunamis, or failure of dams, levees, retention ponds, or other structures that retained the water. Flooding can be exacerbated by increased amounts of impervious surface or by other natural hazards such as wildfires, which reduce the supply of vegetation that can absorb rainfall. Flood management evolves taking appropriate measures for flood control such as predicting floods and warnings etc.

B. Study Area: Mumbai Floods

The 2005 monsoon proved to be extremely erratic for Maharashtra. In the beginning, a serious deficiency of rainfall, particularly in the western Vidarbha and Marathwada, created a drought-like situation with shortage of drinking water and fodder. The situation changed dramatically in the course of a week from July 21, when unusually heavy rains lashed the coastal areas of Konkan and Western Ghats. It caused extensive flooding in Raigad and Ratnagiri districts, with many towns and villages under waters. On July 26, when the highest ever rainfall recorded in the last 100 years in the country battered the suburban Mumbai and Thane, Maharashtra experienced one of the worst floods in its history. For the first time ever, Mumbai's domestic and international airports (including Chatrapati Shivaji International Airport, Sahar and Juhu aerodrome) were shut for more than 30 hours due to heavy flooding of the runways, submerged Instrument Landing System equipment and extremely poor visibility. The Mumbai-Pune Expressway, which witnessed a number of landslides, was closed the first time ever in its history, for 24 hours.

C. Artificial Neural Network

An Artificial Neural Network (ANN), usually called neural network (NN), is a mathematical model or computational model that is inspired by the structure and/or functional aspects of biological neural networks. A neural network consists of an interconnected group of artificial neurons, and it processes information using a connectionist approach to computation. The word network in the term 'artificial neural network' refers to the



Fig 1: Study Area

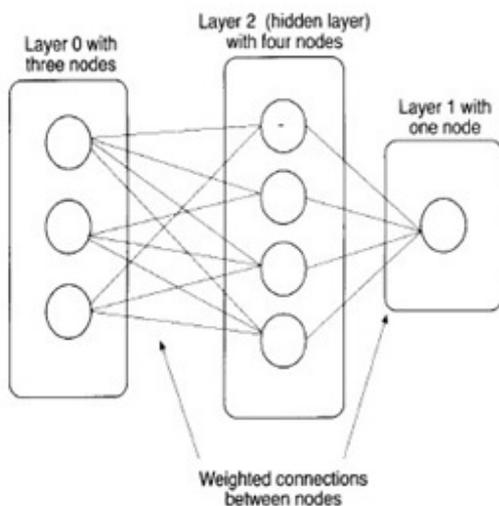


Fig 2: Artificial Neural Network

interconnections between the neurons in the different layers of each system. An example system has three layers. The first layer has input neurons, which send data via synapses to the second layer of neurons, and then via more synapses to the third layer of output neurons. More complex systems will have more layers of neurons with some having increased layers of input neurons and output neurons. The synapses store parameters called "weights" that manipulate the data in the calculations.

II. IMPLEMENTATION OF NEURAL NETWORKS IN FORECASTING

A. Neural Networks

The ANN nodes in neighbouring layers are linked via weighted connections. The values of those weights can be adaptively modified during the process of training the network.

Shortly the Multi-Layer Perceptron network (see Figure 2) operates in the following way: signals S_i ($i=1,..N$) from the input nodes (e.g. values of input variables normalized to 0-1 interval) are multiplied by proper weights w_{ji} ($j =1,..K$), connecting the neuron from which signal has been dispatched and a suitable neuron in the second layer. In the second layer the weighted sum of all the inputs are computed and then transformed by logistic function giving the output value of a neuron in the second layer. Afterwards the weighted signals z_j (multiplied by proper weights v_j), are transferred to the neuron of the third layer. In the neuron of the third layer the new weighted sum is computed and after de-normalization of the output, the sought (forecasted) value may be determined. This is a feed-forward network, which means that there is only one direction of the flow of information, from the input to the output layer.

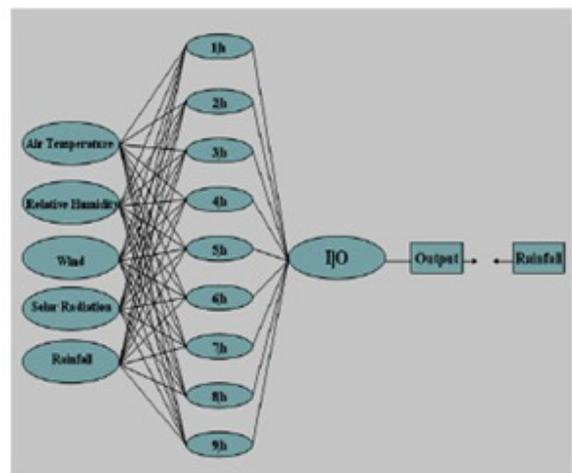


Fig 3: Estimation with ANN

B. Automatic Weather Stations

An automatic weather station (AWS) is an automated version of the traditional weather station, either to save human labour or to enable measurements from remote areas. An AWS will typically consist of a weather-proof enclosure containing the data logger, rechargeable battery, telemetry (optional) and the meteorological sensors with an attached solar panel or wind turbine and mounted upon a mast. The specific configuration may vary due to the purpose of the system. The system may report in near real time via the Argos System and the Global Telecommunications System, or save the data for later recovery. In the past, automatic weather stations were often placed where electricity and communication lines were available. According to the article published on 30th June 2012, "An erratic monsoon coupled with not so accurate Met Department predictions has spurred the Maharashtra Government to accelerate the proposed installation of over 2,000 private Automatic Weather Stations (AWS) in the state."

C. Working

The purpose of this network consisting of AWSs (3 stations) is monitoring the amount of rainfall. Part of these Stations are equipped with meteorological sensors as temperature, relative humidity, windspeed /direction, solar radiation and this information is useful for making meteorological forecast that are

part of the material that is going to be employ in the warning alert system. The network works fully automatically or by including observer information. Also monitoring and administration of the stations, data communication, store data, alarm handling and process of the measurements are discussed, as the system is part of the national warning alert system a brief explanation of the inter institutional system is treated. The main target of the research is to design, verify and integrate the Automatic Weather Stations (AWS), remote sensing such as meteorological satellite image and Numerical Weather Prediction (NWP) product such as relative vorticity. The all data from everything as above to the server was analyzed by using decision support system program and the process of real- time reporting situation by the network system was monitored and adjusted.

D. Decision Support System

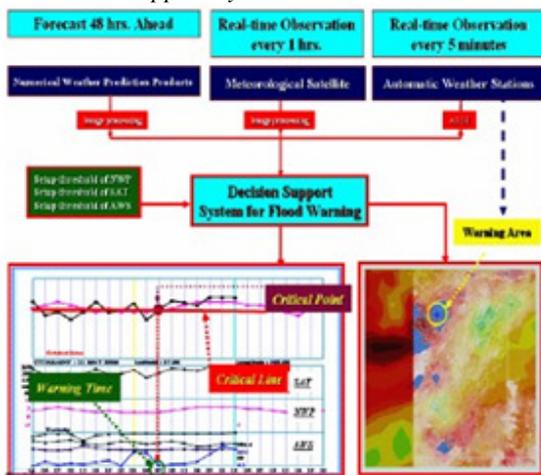


Fig 4: DSS

E. Warning

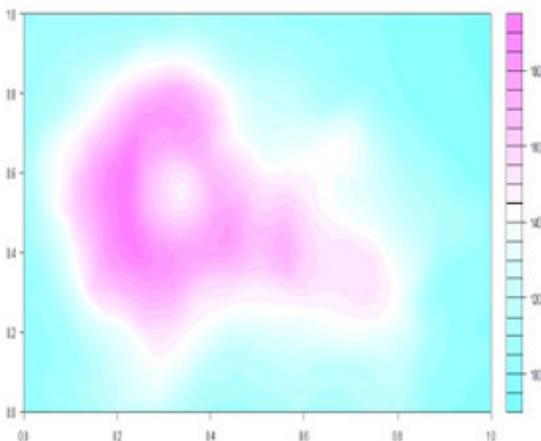


Fig 5: Warning Area

F. Conclusion

The principal conclusion from this research is that the new AWS network is an excellent Technology that permits a quantitative and qualitative improvement of the measurement of meteorological parameters. The introduction of this system is giving to risk area protection more information In type and detail

to be an effective tool in providing advance notice of potential flooding So orderly evacuations can take place prior to the onset of flooding will require a strong effort to assure the long term sustainability of the system. Integrating human knowledge with modeling tools, an intelligent decision support system (DSS) is developed to assist decision makers during different phases of flood management. The DSS is able to assist in: selecting suitable flood damage reduction options (using an expert system approach); forecasting floods (using artificial neural networks approach); modeling the operation of flood control structures; and describing the impacts (area flooded and damage) of floods in time and space.

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A Theoretical Study on Unstable Control System Using Machine Vision: Combining Hardware and Software Processing

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Abstract- Unstable control systems and computing are two close entities but always very less combined when modeling or designing a system which needs a good feedback capability. Computer Vision or Machine Vision is field which can exploit the functionality of being real time similar to human eye and the SoC(System on Chip) systems which comes with CPU, GPU and FPGA elements pre-fabricated makes computing real-time algorithm faster than before. Even cameras which are currently being manufactured are being integrated easily into many systems for passive observation or remote viewing. Here the investigation is basically to see if systems can be integrated together to form a feedback system without external measurement units like IMU(Inertial Measurement Units), accelerometers etc and form a part of the embedded system already present thus reducing more circuitry and increase more stand alone automated control. The main aim is to have the processing unit act as a digital comparator and camera act as an inertial measurement unit and the system dynamics which include servos are controlled through I/O ports of the processing unit.

We shall see many different methods which can be used for controlling a self-balancing robot which is an example of an inverted pendulum and inverted pendulum is one of the most basic forms of an unstable control system. The examples which apply to this principle includes in-line production robots, UAVs, applications based on visual controls for example positioning solar panels in a solar power plant according to the direction of the sun and many others.

I. INTRODUCTION

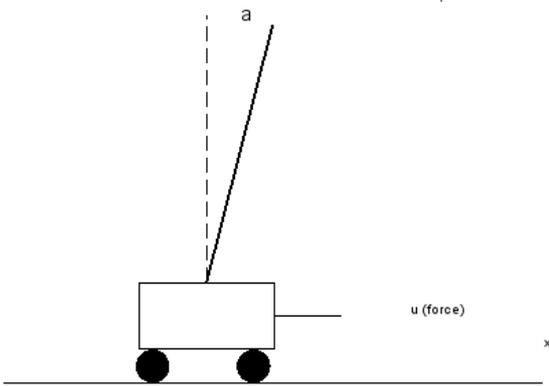
There are many systems which work on human actions and others being automated. The goal for present day and future scenario is to automate but to automate we need external circuitry and external circuitry is networked so that feedback occurs and certain critical adjustment can be made and this adjustment can also be either automated or programmed. This is not always the case for some independent systems which doesn't need human intervention or human presence. So machine vision plays a very important role here to help automate things. Similar to what Sanderson, A. and Neuman, C. [1] have proposed but in this case we address unstable control. And it is very much necessary to discuss the hardware because it is where the algorithm for the feature to be detected or manipulated needs to be in real time and also at a good rate with respect to the response needed.

Here the problem is basically controlling a 2 DoF inverted pendulum using all these setup which includes an image sensor and a combined system which includes a FPGA and a CPU which may or may not be integrated in a chip together but networked with the controller in the system or even attached to the system to act on the system dynamics. Further information will be given when discussing about the processing and controlling systems which forms an integral part of the whole system.

This is further translated into 3 or more DoF systems which may use a stereoscopic vision sensor or many cameras which are chosen according to the problem. The abstractions are multiplied from the basic inverted pendulum model and so is the complexity and to support this complexity the algorithm should also be adopted and optimized and also the hardware should be capable to run without any lag or interrupt. This is very important as far as the latency should be managed at a permissible limit in certain time constrained applications.

A. Inverted Pendulum Control Problem

The inverted pendulum is a unique control system problem which is basically balancing a mass of body whose center of gravity is above the centre which causes the imbalance when trying to maintain it in equilibrium position with the mass above the desired center of gravity. This kind of problem is very common and familiar to aerospace engineering where the masthead of the vehicle is having more mass than the rest of the body because of the payload which it carries. But inverted pendulum is not only limited to one example, there are many examples which work on similar lines. The output simulations done on Scilab are as shown in Figure 2. and Figure 1. shows the inverted pendulum itself.



$$a'' = \frac{(-\sin(a)) \cos(a) (m/(m+M)) a'^2 + 2/(mb^2) (\sin(a)) m g - qm \cos(a) u}{d}$$

$$x'' = \frac{(u+m'(l/2) (\sin(a)) a'^2 - \cos(a) a'')}{(m+M)}$$

m: weight of the pendulum
 M: weight of the cart
 l: length of the pendulum

Fig 3: Inverted Pendulum

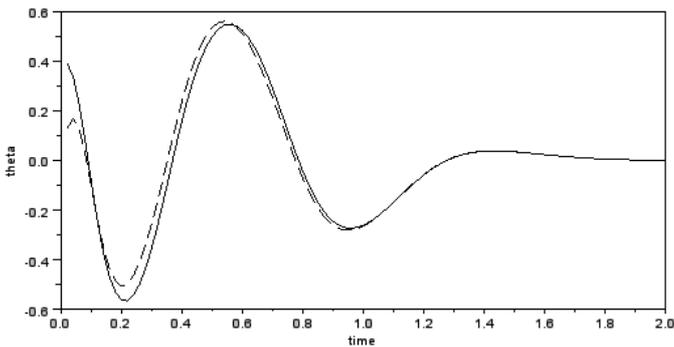
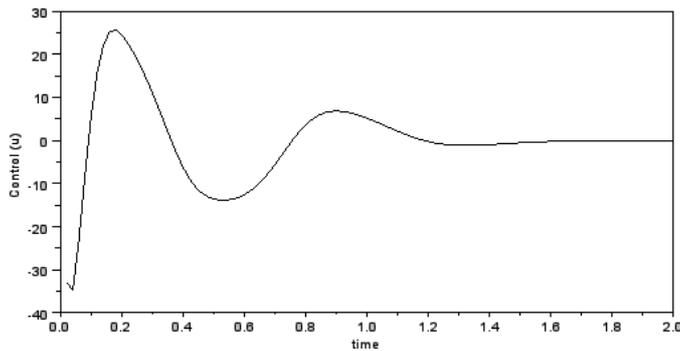


Fig 2: Output simulations

From the simulations it is evident that the balance only takes place only after some time and not immediately or robustly. All this is a problem when the system needs to be robust in certain really demanding environments like in a production line which moves swiftly and needs automatic sorting or automatic orientation and if the system is forced with many number of errors it should be able to handle it in a very short time. An

inverted pendulum needs an IMU which needs calibration and measurement to control in a very short time.

B. Machine Vision Problem

Machine Vision is basically used in many applications for remote access and monitoring. The scope beyond this is very limited and can be put in places to passively check for incorrect features in a production line or remote human visuals considering human safety in the environment of the system. Despite the fact that machine vision algorithms are fast and do processing only limited to revealing errors or corrections to be made there is no effort made to automate to self correct itself based on learning from previous visuals provided to the system. All this can be done by machine learning algorithms which see and learn the patterns which are having the maximum probability of correctness and maybe arrange or correct the feature accordingly. The figures 3, 4 given below are few things which happen in production line. These can be considered unstable if many things can be manufactured in the same production line and many features are needed to be measured and the order is unknown. This implementation might be impossible in a large scale manner but possible in a small scale manner. The figure 3 represents a missing bottle in a rack and figure 4 represents the wrong orientation of baked bread sent for packaging. All this can be corrected manually and also can be put in the same production line.



Fig 3: Missing bottle detection (Source: Microscan)

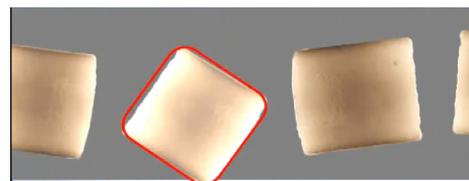


Fig 4: Wrong orientation detection (Source: Microscan)

This is the place where instability problem of an inverted pendulum helps us to get the solution along with the machine vision algorithms backed by powerful hardware.

II. HARDWARE REQUIRED FOR TRACKING AND PROCESSING

Hardware is one of the most important things we need for tracking, learning, detecting and control because the type of hardware needed for doing the processes is defined based on how efficiently it handles and performs the task with the lowest possible latency and at a good rate of learning based on the processing need to be done before hand so that the interrupts are reduced. The hardware should not lag any part of the system and

continue to deliver the requirements. We therefore should discuss the processing unit and the image sensor which help in processing and capturing the required information. Finally considering the requirements, the options available being limited and the need for powerful processing we consider an all programmable SoC which contains both Programmable Logic and Processing system. In this case let us consider the very recent product brought out by Xilinx which is Zynq™-7000 series which consists of a Programmable Logic which is Xilinx based 28nm technology and Processing system which is ARM® Cortex™-A9 a dual core processor[2] which runs the Linux based Operating system Ubuntu. And this SoC consists of both units of processor and FPGA (Field Programmable Gate Array) integrated which helps in maintaining low latency.

A. Hardware and software handling capabilities

Certainly, the combined systems which include a processor and FPGA work well in machine vision problems which involve good control and processing. The goal is to make the system optimized for any kind of machine vision application and the way which this can happen is when the video processing algorithm is programmed into the FPGA using AutoESL™ by Xilinx which is coding in C programming language rather than RTL. This high level synthesis is easy because the algorithm runs on the FPGA and not in the processor which makes the processor free and helps to run other important applications in it which include control, monitoring and other miscellaneous processes. The detailed analysis done by BDTi™ [3] shows the power of high level synthesis in fast development time. So at the device level the programmable logic runs the image processing and processing system is used for more processing and giving the amount of power which ARM® Cortex™-A9 possesses. Figure 5. shows the example which runs a sobel filter running on the FPGA and the CPU which is totally free and can do further more critical processing because it is supported by hardware acceleration with the help of FPGA.

The other option which can be explored for relatively low speed or less challenging applications which doesn't need much of image processing can be implemented in a system like TI's TMS320C665x Multi-core series of DSPs (Digital Signal Processors) and a white paper [4] suggesting this which can be connected to the FPGA externally if needed and act similar to the Xilinx's Zynq 7000 series and will be able to tackle similar problems. Although both the hardware are different, they tend to handle the problem with almost same approach and the only difference would be the internal processing which is based on which part of the hardware handles different processes and in the end it all depends on the programmer who can optimize according to the application in which the machine vision is to be applied.

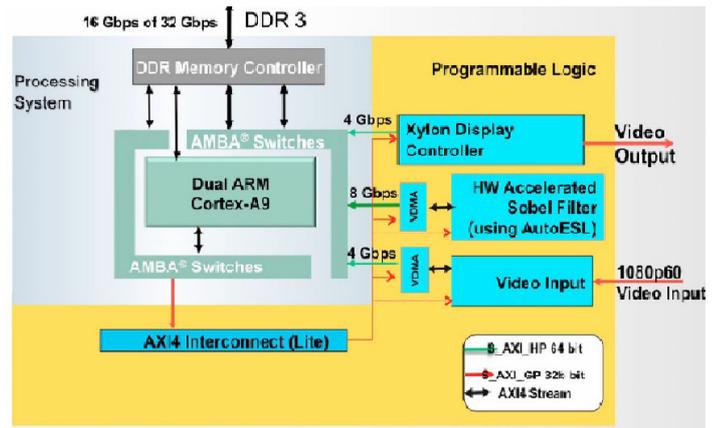


Fig 5: Hardware Accelerated Video processing (Source: Xilinx)

The process flow is as shown in the figure 6. The software can be further optimized to help the process flow reduce the latency from the processor side.

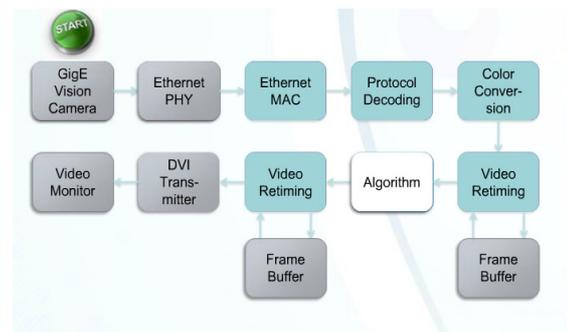


Fig 6: Process Flow (Source: iVeia)

B. Image Sensor or Camera system

Camera is also one of the most important components which need to be selected in order to access the control environment. The camera should be of high speed, low buffer, programmable, suitable for most operations in high or low illuminated conditions with high performance and low cost. With this respect the camera can also have stereoscopic capture capabilities which will be able to capture the poses given by a rigid body so that it can process using algorithms like pose estimation converting 2D to 3D and feature detection. For this, cameras such as GigE™ Vision Camera can be used or even SwissRanger™ SR400 camera or a Bumblebee2™. The figure 7. shows the setup of Zynq™ 7000 series board with GigE™ vision camera

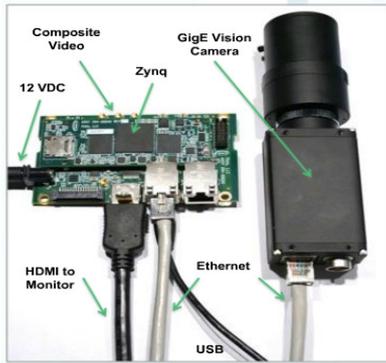


Fig 7: Zynq 7000 series board networked with GigE Vision camera (Source: Xilinx and iVeia)

III. ALGORITHM FOR FEATURE TRACKING, LEARNING AND CONTROL

With all the hardware ready the algorithm necessary for feature tracking, learning and control should be implemented in both programmable logic and processing system so that the system works as desired. For this we need a video/image processing algorithm which tracks continuously online and also tracks many features simultaneously. This is a very complex method of tracking, learning and control and even detection. Such algorithms can only be run online because of the massive scaling and the complexity. There are many works done by Zdenek Kalal[5,6,7] which explains the tracking in various methods and various paradigms. Here the focus is consistence, robustness, speed, prediction, and accuracy. The bounding boxes over the object of interest finds the pose change and also find a feature within the bound box which helps in detecting. This is continuous learning either by off-line training of the example sets or on-line detection. The algorithm should be carefully chosen according to the requirements. And again there are several uses for the same algorithm and also the algorithm can be altered to meet the needs. In the case of inverted pendulum the algorithm which includes online unstable tracking [5] or even the algorithms which employ feature classifiers [6] and also in most unstable conditions where the detection is very tough tracking failure method [7] can be employed.

The figures 8, 9 and 10 shows the methods which can used in tracking, learning and control with the features. And all these features can be applied using multi-core processors which sometimes have built in DSP functions like IMGLIB in TMS320C6657 DSP [4], similar function can be put in the Xilinx's Zynq platform too to bring out similar software routines.

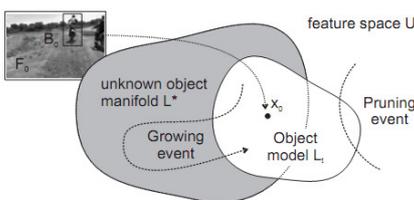


Fig 8: Online learning model (Source: Reference [5])



Fig 9: Classifying Detector (Source: Reference [6])

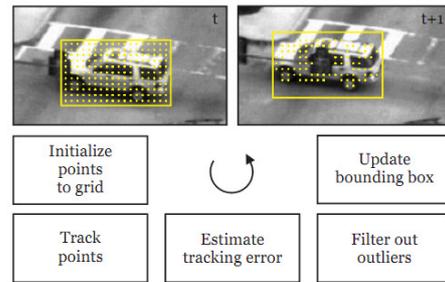


Fig 10: Tracking with failure and error (Source: Reference [7])

IV. SOLVING THE UNSTABLE PROBLEM IN THE INVERTED PENDULUM AND OTHER SYSTEM

The bound box which covers the inverted pendulum and the algorithm which tracks the feature in 2 DoF and the feature changes which include change in the angle and immediate control using robust control algorithms brings in same effect as an IMU and brings stability to the system unlike the previously control system environments which only limits itself to circuitry the current system has more power than before with human like control.

And extending this to other systems which employ control and observation like in-line production units, police monitoring systems etc which act dynamically to the unknown situation and the system learns from its memories. Several infrastructure can be built around this because there is very is still large portion of CPU which is unused.

The applications are simply limitless because as every year the number of transistors increases per square mm (millimeter) the power to process and increase in multi-functionality also changes the paradigm of applications. Beyond human intervention is the key to this kind of independent self learning automated system which leverages on the power of machine learning tools.

V. CONCLUSION

We have shown that the control systems which are unstable can be stabilized without the use of IMU using hardware acceleration and choosing the right algorithm to find the features which changes and these features can be changing and the algorithm can keep learning continuously and still be robust.

A control system for an inverted pendulum is easy because of limited number of poses and variable change which can be seen in a 2 DoF system and if the DoF increases the complexity of the algorithm to control will also increase. But still the system can

adapt by adding many cores to the processor and many cells to the FPGA. There are many applications which can use these control system features and automate the processes which otherwise needs human intervention. The abstraction of the simple inverted pendulum can be multiplied many folds and with the increased optimization in hardware and software the system can manage many features in many cores in the processor.

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Study and Development of Novel Feature Selection Framework for Heart Disease Prediction

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Abstract- Heart disease prediction is designed to support clinicians in their diagnosis. We proposed a method for classifying the heart disease data. The patient's record is predicted to find if they have symptoms of heart disease through Data mining. It is essential to find the best fit classification algorithm that has greater accuracy on classification in the case of heart disease prediction. Since the data is huge attribute selection method used for reducing the dataset. Then the reduced data is given to the classification. In the Investigation, the hybrid attribute selection method combining CFS and Filter Subset Evaluation gives better accuracy for classification. We also propose a new feature selection method algorithm which is the hybrid method combining CFS and Bayes Theorem. The proposed algorithm provides better accuracy compared to the traditional algorithm and the hybrid Algorithm CFS+FilterSubsetEval.

Index Terms- Data mining, Feature Selection and Classification.

I. INTRODUCTION

The Heart Disease Data Prediction is designed to support clinicians in their diagnosis for heart disease prediction. They typically work through an analysis of medical data and a knowledge base of clinical expertise. The quality of medical diagnostic decisions for heart disease can be increased by improvements to these Predicting systems. Data mining provides a way to get the information buried in the data. Here we propose the hybrid Algorithm combining the best Feature Selection methods for Classification. Since, We have large collections of data which consumes more time for classification. The patient's record is classified and predicted if they have the symptoms of heart disease. It is essential to find the best fit algorithm that has greater accuracy on classification in the case of heart disease classification.

The large number of data can be reduced that using hybrid attributes selection methods. In order to find the best two algorithms of attribute selection method, the attribute selection method which gives higher accuracy after removing attributes for both classification and clustering are identified and combined to form the hybrid attribute selection method. Then the reduced data are fed into sequence of classifiers classified to attain better accuracy.

A. Feature Selection

In machine learning and statistics, feature selection, also known as variable selection, feature reduction, attribute selection or variable subset selection, is the technique of selecting a subset of relevant features for building robust learning models. By

removing most irrelevant and redundant features from the data, feature selection helps improve the performance of learning models.

B. Classification

Classification is a data mining function that assigns items in a collection to target categories or classes. The goal of classification is to accurately predict the target class for each case in the data.

A learning classifier is able to learn based on a sample. The dataset used for training consists of information x and y for each data-point, where x denotes what is generally a vector of observed characteristics for the data-item and y denotes a group-label. The label y can take only a finite number of values.

C. Organization of the Paper

The Second chapter is a literature survey on heart disease prediction, and Feature selection. The third chapter contains the proposed methodology which includes the Proposed Hybrid Feature Selection Algorithm. The Fourth chapter shows the Results and Discussion. The Fifth chapter concludes the paper with Further Directions.

II. LITERATURE REVIEW

A novel technique to develop the multi-parametric feature with linear and nonlinear characteristics of HRV (Heart Rate Variability) was proposed by Heon Gyu Lee et al [11]. Statistical and classification techniques were utilized to develop the multi-parametric feature of HRV. Besides, they have assessed the linear and the non-linear properties of HRV for three recumbent positions, to be precise the supine, left lateral and right lateral position. Numerous experiments were conducted by them on linear and nonlinear characteristics of HRV indices to assess several classifiers, e.g., Bayesian classifiers [11], CMAR (Classification based on Multiple Association Rules) [19], C4.5 (Decision Tree) [24] and SVM (Support Vector Machine) [4]. SVM surmounted the other classifiers.

A model Intelligent Heart Disease Prediction System (IHDPS) built with the aid of data mining techniques like Decision Trees, Naïve Bayes and Neural Network was proposed by Sellappan Palaniappan et al. [26]. The results illustrated the peculiar strength of each of the methodologies in comprehending the objectives of the specified mining objectives. IHDPS was capable of answering queries that the conventional decision support systems were not able to. It facilitated the establishment of vital knowledge, e.g. patterns, relationships amid medical factors connected with heart disease. IHDPS subsists well being web-based, user-friendly, scalable, reliable and expandable. The prediction of Heart disease, Blood Pressure and Sugar with the aid of neural networks was proposed by Niti Guru et al. [22].

Experiments were carried out on a sample database of patients' records. The Neural Network is tested and trained with 13 input variables such as Age, Blood Pressure, Angiography's report and the like. The supervised network has been recommended for diagnosis of heart diseases. Training was carried out with the aid of back propagation algorithm. Whenever unknown data was fed by the doctor, the system identified the unknown data from comparisons with the trained data and generated a list of probable diseases that the patient is vulnerable to.

The problem of identifying constrained association rules for heart disease prediction was studied by Carlos Ordonez [3]. The assessed data set encompassed medical records of people having heart disease with attributes for risk factors, heart perfusion measurements and artery narrowing. Three constraints were introduced to decrease the number of patterns. First one necessitates the attributes to appear on only one side of the rule. The second one segregates attributes into uninteresting groups. The ultimate constraint restricts the number of attributes in a rule. Experiments illustrated that the constraints reduced the number of discovered rules remarkably besides decreasing the running time. Two groups of rules envisaged the presence or absence of heart disease in four specific heart arteries. Data mining methods may aid the clinicians in the prediction of the survival of patients and in the adaptation of the practices consequently.

The work of Franck Le Duff et al. [9] might be executed for each medical procedure or medical problem and it would be feasible to build a decision tree rapidly with the data of a service or a physician. Comparison of traditional analysis and data mining analysis illustrated the contribution of the data mining method in the sorting of variables and concluded the significance or the effect of the data and variables on the condition of the study. The main drawback of the process was knowledge acquisition and the need to collect adequate data to create an appropriate model.

A novel heuristic for efficient computation of sparse kernel in SUPANOVA was proposed by Boleslaw Szymanski et al. [25]. It was applied to a benchmark Boston housing market dataset and to socially significant issue of enhancing the detection of heart diseases in the population with the aid of a novel, non-invasive measurement of the heart activities on basis of magnetic field generated by the human heart. 83.7% predictions on the results were correct thereby outperforming the results obtained through Support Vector Machine and equivalent kernels. The spline kernel yielded equally good results on the benchmark Boston housing market dataset. In [17] Latha Parthiban et al. projected an approach on basis of coactive neuro-fuzzy inference system (CANFIS) for prediction of heart disease. The CANFIS model diagnosed the presence of disease by merging the neural network adaptive capabilities and the fuzzy logic qualitative approach and further integrating with genetic algorithm. On the basis of the training performances and classification accuracies, the performances of the CANFIS model were evaluated. The CANFIS model is promising in the prediction of the heart disease as illustrated by the results.

In [29] Kiyong Noh et al. put forth a classification method for the extraction of multi-parametric features by assessing HRV from ECG, data preprocessing and heart disease pattern. The efficient FP-growth method was the basis of this method which is

an associative. They presented a rule cohesion measure that allows a strong push of pruning patterns in the pattern generating process as the volume of patterns created could possibly be huge. The multiple rules and pruning, biased confidence (or cohesion measure) and dataset consisting of 670 participants, distributed into two groups, namely normal people and patients with coronary artery disease, were employed to carry out the experiment for the associative classifier.

In Lei Yu and Huan Liu [19] introduced a novel concept, predominant correlation, and proposed a fastfilter method which can identify relevant features as well as redundancy among relevant features without pair wise correlation analysis. The efficiency and effectiveness of their method is demonstrated through extensive comparisons with other methods using real world data of high dimensionality.

A methodology for comparing classification methods through the assessment of model stability and validity in variable selection was proposed by J. Shreve, H. Schneider, O. Soysal [16]. This study provides a systematic design for comparing the performance of six classification methods using Monte Carlo simulations and illustrates that the variable selection process is integral in comparing methodologies to ensure minimal bias, enhanced stability, and optimize performance. They quantify the variable selection bias and show that, for sufficiently large samples, this bias is minimized so that methods can be compared.

Feature selection for SVM via optimization of kernel polarization with Gaussian ARD kernels proposed by Tinghua Wanga, Houkuan Huang, Shengfeng Tian, Jianfeng Xu [7]. This work focused on effective feature selection method for support vector machine (SVM). Unlike the traditional combinatorial searching method, feature selection is translated into the model selection of SVM. The basic idea of this method is to tune the hyperparameters of the Gaussian Automatic Relevance Determination (ARD) kernels via optimization of kernel polarization, and then to rank all features in decreasing order of importance so that more relevant features can be identified.

Feature selection for Bayesian network classifiers using the MDL-FS score proposed by Madalina M. Drugan, Marco A. Wiering [8]. They propose a new definition of the concept of redundancy in noisy data. They show that the MDL-FS function serves to identify redundancy at different levels and is able to eliminate redundant features from different types of classifier.

Sarah Ashoori and Shahriar Mohammadi [6] proposed a Comparison of failure prediction models based on feature selection Technique. A huge amount of information about the corporations that derived from financial reports could be used to determine the failure of companies, but it needs much time and human resources. For Selection of financial variables or features, Two prediction models would be compared with each other in 3 stages. These models are neural networks that named "MultiLayer Perceptron". One of these models is trained with original dataset and the other one is trained with a dataset contained the selection of features of original data set.

A decision rule-based method for feature selection in predictive data mining proposed by Patricia E.N. Lutu Andries P. Engelbrecht [2]. This method incorporates domain specific definitions of high, medium and low correlations techniques. The

proposed algorithm conducts a heuristic search for the most relevant features for the prediction task.

Tina Tirelli , Daniela Pessani proposed the importance of feature selection in decision-tree and artificial-neural-network ecological applications. [15]. In this work, They use four different feature selection methods (χ^2 , Information Gain, Gain Ratio, and Symmetrical Uncertainty) and evaluate their effectiveness in preprocessing the input data to be used for inducing artificial neural networks (ANNs) and decision trees (DTs).

Fatemeh Amiri , MohammadMahdiRezaeiYousefi , CaroLucas , AzadehShakery , NasserYazdani proposed Mutual information based feature selection for intrusion detection systems [21] .They proposed two feature selection algorithms and studied the performance using these algorithms compared to a mutual information based feature selection method. These feature selection algorithms require the use of a feature goodness measure. Experiments on KDDCup99 dataset address that their proposed mutual information based feature selection method

results in detecting intrusions with higher accuracy, especially for remote to login (R2L) and user to remote (U2R) attacks.

III. PROPOSED METHOD

A. CFS and Bayes Theorem

We proposed a new hybrid feature selection method by combining CFS and Bayes Theorem. The CFS algorithm reduces the number of attributes based on the SU measure, In CFS each attributes are compared pair wise to find the Similarity and the Attributes are compared to class attribute to find the amount of contribution it provides to the class value , based on these the attributes are removed. The selected attributes from the CFS algorithm is fed into Bayes theorem for further reduction. Bayes theorem calculates the conditional probability for each attribute and the attribute which has highest conditional probability is selected. Both the Algorithms CFS and Bayes theorem works on the Conditional Probability measure.

B. Proposed Algorithm

```

input: S(F1; F2; ::: FN;C) // a training data set
 $\delta$  // a predefined threshold
output: Sbest {Abest(highest IG)} // an optimal subset
1 begin
2   for i = 1 to N do begin
3     calculate  $SU_{i,c}$  for  $F_i$ ;
4     if ( $SU_{i,c} \geq \delta$ )
5       append  $F_i$  to  $S'_{list}$ ;
6     end;
7     order  $S'_{list}$  in descending  $SU_{i,c}$  value;
8      $F_p = \text{getFirstElement}(S'_{list})$ ;
9     do begin
10       $F_q = \text{getNextElement}(S'_{list}, F_p)$ ;
11      if ( $F_q \neq \text{NULL}$ )
12        do begin
13           $F'_q = F_q$ ;
14          if ( $SU_{p,q} < SU_{q,c}$ )
15            remove  $F_q$  from  $S'_{list}$  ;
16           $F_q = \text{getNextElement}(S'_{list}, F'_q)$ ;
17          else  $F_q = \text{getNextElement}(S'_{list}, F_q)$ ;
18        end until ( $F_q == \text{NULL}$ );
19       $F_p = \text{getNextElement}(S'_{list}, F_p)$ ;
20    end until ( $F_p == \text{NULL}$ );
21   $S_{best} = S'_{list}$ ;
22   $S_{best} = \{X_1, X_2, \dots, X_N\}$ 
23  for j=1 to N begin
24    for k=j+1 to N begin
25       $P[C_m/(X_j, X_k)] = P[(X_j, X_k)/C_m] * P(C_m)$ 
26       $P[C/(X_j, X_k)] = P[C_1/(X_j, X_k)] + P[C_2/(X_j, X_k)] + \dots + P[C_n/(X_j, X_k)]$ 
27      If ( $P[C/X_j, X_k] > \Omega$ )
28        {
29          if ( $P[C/X_j] > P[C/X_k]$ )
30            Remove  $X_k$  from Sbest
31          Sbest=IG(X)
32        }
33      Else
34        Remove  $X_j$  from Sbest
35        Sbest=IG(X)
36      }
37  }
38 end;
```

C. Dataset used in the Experiment

The following is the sample of the Heart Disease Data.arff

```
@relation heart-statlog
@attribute age real
@attribute sex real
@attribute chest real
@attribute resting_blood_pressure real
@attribute serum_cholesterol real
@attribute fasting_blood_sugar real
@attribute resting_electrocardiographic_results real
@attribute maximum_heart_rate_achieved real
@attribute exercise_induced_angina real
@attribute oldpeak real
@attribute slope real
@attribute number_of_major_vessels real
@attribute thal real
@attribute class { absent, present}
@data
70,1,4,130,322,0,2,109,0,2,4,2,3,3,present
67,0,3,115,564,0,2,160,0,1,6,2,0,7,absent
57,1,2,124,261,0,0,141,0,0,3,1,0,7,present
64,1,4,128,263,0,0,105,1,0,2,2,1,7,absent
74,0,2,120,269,0,2,121,1,0,2,1,1,3,absent
65,1,4,120,177,0,0,140,0,0,4,1,0,7,absent
56,1,3,130,256,1,2,142,1,0,6,2,1,6,present
59,1,4,110,239,0,2,142,1,1,2,2,1,7,present
```

The Heart Disease data after applying traditional method in Weka, The number high number of attributes reduced is 7 and then these attributes can be fed to various classifiers. The CFS+Bayes theorem algorithm is coded, where the attribute after CFS is 4 and the selected attributes after Bayes theorem is only 3. CFS Feature selection method which selects the attributes based on the symmetrical uncertainty reduces the number of attributes from 13 to 4. The reduced attributes is fed to Bayes theorem for further reduction.

Table 3.1: Number of original and reduced attributes.

Attribute Selection method	Total Number of Attributes	Number of Attributes after attribute selection
CFS	14	4
CFS+Bayes Theorem	14	3

We applied four classification algorithms for heart disease data such as NB, J48, KNN and NN. First we applied these algorithms for whole data set. The whole data in ARFF document is given to weka and classification algorithm is applied to it.

The heart ARFF will contain large quantity of data and applying classification algorithms to this dataset is time consuming and also gives result with less accuracy. Hence we have to reduce the data set by using attribute selection method. Then this reduced dataset is fed into the four classification algorithm and which algorithm is best fit for this prediction is investigated. Likewise, all other attribute selection and classification algorithms are applied for heart disease dataset. From that we identified that NB classification algorithm gives

better accuracy after applying the CFS attribute selection method.

D. Hybrid Feature Selector

The two best Feature Selection methods are applied in sequence. (i.e) CFS followed by Filtered Subset Evaluation. In this method the reduced number of attributes after CFS is 7 and this 7 attributes are fed to Filtered Subset Evaluation which reduces as 6 attributes. After applying the hybrid feature selector, the data is applied to the classification algorithm in which Naïve bayes gives higher Accuracy comparing to the other classifiers.

After applying into Naïve bayes, the incorrectly classified instances are separated. The correctly classified samples are kept as training set and the incorrectly classified samples as test set are fed into various other classifiers, where the J48 gives greater accuracy.

E. CFS and Bayes Theorem

We proposed a new hybrid algorithm that is CFS+Bayes Theorem. When applying this feature selection algorithm, the attributes are reduced as 3. Then reduced dataset is given to classifiers. Here Naïve bayes gives the greater accuracy compared to other classifiers.

IV. RESULT AND DISCUSSION

The hybrid feature selector method is automated, where CFS and Bayes theorem's algorithm is coded into program. The number of reduced attributes by CFS and Bayes Theorem is shown in Table 4.1.

Table 4.1: Reduced attributes by CFS and Bayes theorem

Attribute Selection Method	Number of Attributes	Reduced attributes
CFS+Bayes Theorem	14	3

Accuracy refers to the percentage of correct predictions made by the model when compared with the actual classifications in the test data. The Measure of a model's ability to correctly label a previously unseen test case. If the label is categorical (classification), accuracy is commonly reported as the rate which a case will be labeled with the right category. If the label is continuous, accuracy is commonly reported as the average distance between the predicted label and the correct value.

A confusion matrix displays the number of correct and incorrect Predictions made by the model compared with the actual classifications in the test data. The matrix is n -by- n , where n is the number of classes. From that we calculated the accuracy of each classification algorithms.

Table 4.2: Classifiers Accuracy with full dataset.

S.No	Classifiers	Correctly Classified Samples	Incorrectly Classified Samples	Accuracy
1.	Naïve Bayes	226	44	83.70%
2.	J48	207	63	76.66%
3.	KNN	203	67	75.18%
4.	Multilayer	211	59	78.148%

	perception		
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attribute selection method, the following number of attributes are selected from the whole attributes.

A. *Attribute Selection*

The data set contains the large volume of data. The data are reduced using the attribute selection method. After apply the

Table 4.3: Number of selected attributes by each attribute selection method.

Attribute Selection Methods	Number of Attributes Selected
CFS subset evaluation	7(3,7,8,9,10,12,13)
Chi-squared attribute evaluation	13(1,2,3,4,5,6,7,8,9,10,11,12,13)
Consistency subset Evaluation	10(1,2,3,7,8,9,10,11,12,13)
Filtered attribute Evaluation	13(1,2,3,4,5,6,7,8,9,10,11,12,13)
Filtered subset evaluation	6(3,8,9,10,12,13)
Gain ratio attribute Evaluation	13(1,2,3,4,5,6,7,8,9,10,11,12,13)
Info gain attribute Evaluation	13(1,2,3,4,5,6,7,8,9,10,11,12,13)
Latent semantic analysis	1(1)
One attribute evaluation	13(1,2,3,4,5,6,7,8,9,10,11,12,13)
Relief attribute evaluation	13(1,2,3,4,5,6,7,8,9,10,11,12,13)

B. *Accuracy measure after attribute selection*

After reducing the number of attributes, the resulting data is given to the classification and clustering algorithms. It takes less time for computation and improves the accuracy also.

Table 4.4: Accuracy of classifiers with reduced attributes (in %)

Attribute selection Methods	Accuracy of NB	Accuracy of KNN	Accuracy of J48	Accuracy of Multilayer Perceptron	Average
CFS subset eval	85.5	78.14	81.11	82.22	81.74
Chi-squared attribute eval	83.70	75.18	76.66	80.37	78.97
Consistency subset evaluation	84.07	78.14	78.88	81.11	80.55
Filtered attribute Evaluation	83.70	75.18	76.66	80.37	78.97
Filtered subset eval	85.18	80	79.60	78.88	80.91
Gain ratio attribute Evaluation	83.70	75.18	76.66	78.88	78.60
Info gain attribute Evaluation	83.70	75.18	76.66	80.37	78.97
Latent semantic analysis	54.07	51.11	55.55	52.96	53.42
One attribute eval	83.70	75.18	76.66	79.25	78.69
Relief attribute evaluation	83.70	75.18	76.66	78.14	78.42

1. *CFS+Filter Subset Evaluation*

Table 4.5: Number of selected features by CFS and Filtered subsetEval

Attribute Selection method	Selected attributes
CFS+FilteredSubsetEval	6(3, 8, 9, 12, 13)

perceptron	
KNN	80.74
J48	79.62
Average	83.62

Then this reduced data is given to the classification and clustering algorithms to analyze which is best fit for heart disease prediction.

Table 4.6: Accuracy of classification after CFS+Filtered subsetEval.

Classification method	Accuracy (in %)
Naïve bayes	85.18
Multilayer	78.88

From the above table, we found classification gives the better accuracy. So we take the best classification method on this result.

Table 4.7: Comparison of accuracy of classifiers after CFS+FilteredSubsetEval

Classification Methods	Correctly classified	Accuracy (in %)
NB	230	85.18
Multi layer Perceptron	213	78.88
KNN	218	80.74
J48	215	79.62

2. CFS and Bayes Theorem

We proposed a new hybrid Feature selector combining CFS and Bayes theorem.

Table 4.8: Hybrid feature selection

Attribute Selection methods	Selected attributes
CFS+Bayes theorem	3(3, 12, 13)

Then this reduced data is given to the classification algorithms and calculate the accuracy for identifying the best algorithm.

Table 4.9: Accuracy of classification after CFS+Bayes theorem

Classification algorithms	Accuracy (in %)
Naïve bayes	80.37
Multilayer perceptron	85.18
KNN	85.55

J48	85.18
Average	84.07

Table 4.10: Comparison of Accuracy of classifiers with CFS+Bayes theorem as feature selector

Classification method	Correctly classified instances	Accuracy (in %)
NB	217	80.37
Multi layer perceptron	230	85.18
KNN	231	85.55
J48	230	85.18

Table 4.11: Comparison of feature selection methods

Feature Selection	Accuracy (in %)
CFS	81.74
Filtered Subset eval	81.01
CFS+FilteredSubset eval	83.62
CFS+Bayes Theorem	84.07



Figure 4.1: Comparison of various feature selectors

From the above investigation, we have to conclude that CFS+Bayes theorem gives the better accuracy compared to the other algorithms.

for NB and KNN classifier. We conclude that **CFS and BAYES THEOREM** based feature selector is best suitable for heart disease data prediction.

V. CONCLUSION

This paper investigated the significance of feature selection methods for improving the performance of classification methods. The experimentation is conducted on dataset of health care domain. It is found that the CFS and FILTER SUBSET EVALUATION reduces more number of irrelevant and redundant attributes thereby increases the performance of classifiers. In addition the new feature selection namely CFS and BT was proposed. The proposed algorithm gives better accuracy

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A Study of Indian English Poetry

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Abstract- Indian English poetry is remarkably great. The pre- Independence poets expressed Indian themes in the Romantic and Victorian modes and adhered to their form and prosody as well as the post- independence poets manifests extensive experimentation, divergence from the conventional modes of expression and exercise of liberty in form and content, and use of language. The conflict between tradition and modernity at various levels- social, cultural, familiar, national and cosmopolitan is well marked in the works of these new poets. They also show the influence of western poets like Yeats, Pound, Eliot, Whitman, Hughes, Cumming, Platch etc. One of the most significant events in the post independence Indian English poetry is the rise of women’s poetic voice. The new women poet depicts the changing position of women in the modern Indian society. Their poetry is a complex blend of aestheticism and activism, representing women’s struggle to break out of the patriarchal taboos and attain an unbiased position of their own.

Index Terms- Culture, Indian Theme, Post Independence, Tradition, Women’s Impact

I. INTRODUCTION

Indian English poetry is the oldest form of Indian English literature, which has attained, both fecundity and excellence of cross monestry. It represents various phases’ development of our multitudinous cultural and national life right from the beginning of the nineteenth to the mid nineties of the twentieth century. It has three phases of development. In the first phase there is a number of co-development which is responsible for generating Indian English poetry. The early pioneers-**Henry Derozio**, Michael Madusudan Dutt, Toru Dutt, B.M.Malahari, S.C.Dutt and R.C.Dutt-were the trend setters who began to poetize the Indian echoes in a foreign language. Although their efforts were imitative and derivative of English poetry, they successfully gave a new direction to Indian poetry in English by writing on Indian history, myths and legends. This phase is called imitative phase. The poets of 1850 to 1900 were trying how to establish this part of poetry. They have followed the British Romantics and Victorian poets.

The second phase of poets is the assimilative. This period starts from 1947. They were compulsive nationalist seeking to project the renascent consciousness of India caught in the maelstrom of historical conflict and turmoil and change, and culminating in the attainment of political freedom in 1947, self-expression was all important to the poets of imitation self-definition, accompanied by heart-searching probing into the cultural inheritance became the genuine concern of the poets of

assimilation. The early poets were projecting landscapes, moods, fancies and dreams, while their followers sought a more radical assurance of their sense of origins and their sense of destiny. Toru Dutt and Sarojini Naidu constitute a kind of watershed between these two phases, in that they share their predecessor’s individual nostalgia as well as their successor’s sense of crisis and quest of identity. Toru Dutt is the inheritor of unfulfilled renown and the saint poets.

Swami Vivekananda, Swami Ramtirtha, Swami Yogananda, Sri Aurbindo and Rabindranath Tagore left a body of poetry which is glorious summation of Indian’s hoary cultural spiritual and methodological heritage which dates back to the Vedas, the Upanishads and the Gita. In their poetry they endeavoured to nativize English language in order to make it a befitting instrument for the expression of Indian sensibility.

The third is the experimental phase, which begins after the Independence. There has been a conspicuous outbreak of poetic activity demanding the urgency of national self-definition and reflecting a painful heart-searching.

Rajyalaxmi said:

Our models have been neither exclusively Indian nor British, but “cosmopolitan. Europe, Africa, America and Asia have all become a part of our cultural consciousness, offering impetus and stimulation. Our poets have been suddenly lifted from an exclusive to an extensive range of creative experience. They have been raised from a conservative to a cosmopolitan culture, to confront the new shape of things and acquire a new view of human destiny. The age has changed and requires a new image. This has been largely met by the poet.”

The modern Indian English poets have imitative Whitman, T. S. Eliot, Ezra Pound, W. B. Yeats. They have also the guardian streets to the new Indian poetry. The new poet has their faith in a vital language to compose their poetry. Their poetry deals in concrete terms with concrete experience.

The new poetry by Indian poets adhere their own principles. There is much experimentation in an effort to achieve modernity. Modern techniques derived from such English craft men as Eliot, Auden and Dylan Thomas, as well as from the film industry and the advertising industry is being used. This experimental approach, this

quest for originality and newness, this stress on individuality and the rejection of all

That is traditional often leads to fantastic results. There is much ‘image- hunting’ and ‘word- hunting’ in contemporary Indian English poetry. But there are a number of good poets also like Don Moraes, Nissim Ezekiel, P.Lal, Kamala Das,

A.K.Ramanujan, Krishna Srinivas, Mahanand Sharma and others. [1]

Amalendu Bose writes:

‘Modern poets in their poetry are free to use English which is not mechanically but organically out of a natural inwardness which gives a poem its immediacy of experience. The poets of the modern time have been suddenly lifted from an exclusive to an extensive range of creative experience. They have been raised from a conservative to a cosmopolitan culture to confront the new shape of things and to acquire a new view of human destiny. The age has changed and requires a new change. This has largely been met by the poet. They have no influence of the British poets and they have their aim at working in their own way. They prefer originality and experiment in word-craft intensity and strength of feeling, clarity in thought structure and sense of actuality, freshness, sensibility, concrete, experience, trained intelligence and vitality are essential for good poetry. Nissim Ezekiel writes in this connection:’

“Good poetry is not always lucid and clear. Nevertheless, the amateur poet ought to aim at clarity and lucidity concrete and relevant images are usually superior to vogue immensities, simple disciplined forms within which much freedom can be exercised, help the poet to discover what he feels more than sprawling accumulation of lines. Rhyme and other devices may be discarded only if structural compensations and very especial effects are provided instead. Development within a poem is a sign of maturity in the poet”

Modern poets like Nissim Ezekiel, A. K. Ramanujan, R. Parathasathy, K. N. Daruwalla, O. P. Bhatnagar, Jayanta Mahapatra, Kamala Das, Monika Verma, Gauri Deshpande and many others have revealed tension in their respective poems. Their poetry has inborn Indianness. Although some of them like A. K. Ramanujan settled outside India but even then they explore in their poetry their roots in India.

K. N. Daruwalla rightly thinks:-

“Then why should I tread the Kafka beat or the wasteland

When mother you are near at hand one vast, sprawling defeat”. [2]

Modern poetry is full of ironic remarks. The new poets have used irony as a great weapon in their poetry. New poets like Shiva K. Kumar, Ramanujan, Daruwalla, Grieve Patel, Arun Kolatkar, Kamala Das, and I. H. Rizvi etc. excel in the use of the ironic mode. They have not the blind followers of British English. They have evolved

a distinct idiom to express their voice. They have succeeded to nativize or indianize English in order to reveal typical Indian situations. Shiva K. Kumar uses the apt idiom to describe the abominable practice of floor crossing in an Indian politician:

“Vasectomized of all genital urges for love and beauty he often crossed floors as his wife leaped across beds”

KRISHNA SRINIWAS

“Krishna Srinivas” has been a leader of world poetry; He is endearingly called “Krishna” by poets and poetry lovers. The sweet fragrances of the flowers of poems

were in fact indicating towards a full ripe fruit which is given to us by him in the form of ‘Dance of the Dust’. He is rooted with the Indian sensibility and therefore one cannot appreciate his creative genius without a sense of sympathy, spiritual feeling and sensibility for he is intensely committed, dynamic, profound, symbolic, philosophical, prophetic and above all, spiritual. He operates at a high level without attempting at deliberate mystifying. Science, metaphysics and history in his poetry coalesce to form a refreshing imagistic pattern; he makes philosophy takes into its fold several sciences. His poetry like Emerson, R. N. Tagore and Sri Aurbindo has mysticism, classical and prophetic element. His poetry couched in a natural intonation. It has the act of catalyst for spiritual awakening the structure of his pivot ideas provide a sharp ethical and psychological insight into the fabric of the present-day moral culture. His poetic output consists of ‘Dance of Dust,’ ‘Maya’ ‘Everest’, ‘Beyond,’ ‘Void’, ‘Sonnets’, ‘Five Elements’, ‘Sankara’, ‘Ramanuja’, ‘Madhva’, ‘Christ’, ‘Mohammad,’ ‘Vallalar’, ‘Mahavir’, ‘Tamil Vedas’ etc. His entire poetry is mystical, metaphysical, spiritual and cosmic. Like Sri Aurbindo he is the exponent of realizing supra-consciousness through poetry. His poetry exhibits his vast knowledge of Vedanta, Upanishads, Bhagvad Gita, mysticism, pantheism, Muslim philosophy, Christianity, history, geography, geology, astronomy, modern science and different languages. His poetry has religious mission mysticism and pantheism is the two important characteristics of his poetry. He condemns the Western materialistic values and holds out the hope of redemption to dust – ridden, lust torn men and women in following the spiritual values of the East:

*Despair not;
You and dust anon must
Fix the lease of rigmarole
And hush the wrath of wormy wars
And crack its typhus in an iron tomb
Its keys buried millions of fathoms deep.*

(Dance of Dust)

NISSIM EZEKIEL

Nissim Ezekiel is an outstanding poet of post – Independence India. A brief survey of this large body of poetry is essential for a proper understanding of the poet’s art, of his major themes, and of the evolution of his genius. His poetical works are- A Time to Change (1952), Sixty Poems (1953), The Third (1959), The Unfinished Man,(1960), The Exact Name,(1965), Hymns In Darkness (1976), and Collected Poems 1952-88 (1989), etc. He is a versatile genius and the most outstanding Indian English poet. He is a great love poet and his poetry reveals a gradual evolution of his art and genius. A number of major themes run through his poetry gaining in depth and intensity with each successive volume that he has published. No theme recurs so frequently as the theme of love and sex. There are highly sensuous descriptions of the human body and of love-making in the bed. His treatment of the act of love, and of the charms of the

female body, is characterized by extreme frankness. This has exposed him to the charge of being a poet of the body, of the female anatomy, of wallowing in sex, but such criticism is superficial and unjust. He is certainly neither a Platonist nor romantic dreamer, nor does he object the claims of the body. His all poems have a great impact on the readers. For example:

*Don't curse the darkness
Since you're old not to,
But don't be in a hurry
To light a candle either.
The darkness has its secrets
Which light does not know?
It's a kind of perfection.
While every light
Distorts the truth.*

Prof. A. N. Dewedi rightly remarks:
Ezekiel's experimental poem, "A very Indian poem in Indian English", clearly visualizes the reality of situation in Indian society. It enacts a real situation for the use of 'Babu Angrezi or what we roughly call today "Indian English".

KAMALA DAS

Kamala Das is one of three most significant Indian poets writing in English today, the other two being Nissim Ezekiel and Ramanujam. She is one of the members of poetic trinity of Indian English poets. The other two are Nissim Ezekiel and A. K. Ramanujam. Her important poetic works are 'Summer in Calcutta,' 'The Descendants', [3] 'The old Playhouse' and other poems most of her poems deal with the theme of unfulfilled love and yearning for love. 'The Dance of the Eunuchs' is a good example of a poem dealing with the theme:

*It was hot so hot before the eunuchs came
To dance, wide skirts going round and round,
cymbals
Richy, Dashing, and anklets jingling, jingling*

*Jingling beneath the fiery gulmohur, with
Long braids flying, dark eyes flashing, they danced
and
They dance; oh they danced till they bled*

In the poem she finds an objective correlative in 'The Dance of the Eunuchs' to represent the theme of suppressed desire within. The dance of the eunuchs with their wide skirts going round, "cymbals /richly clashing and anklets jingling, jingling....." is contrasted with their vacant ecstasy suggesting a gully between the external, simulated passion and the sexual drought and rottenness inside. The contrast

is sustained all through the poem. The dance of the eunuchs is a dance of the sterile, and therefore, the unfulfilled and unquenchable love of the woman in the poet. In The Freaks too the theme is the same. "In the hands of Kamala Das and Sunita Jain, the poetry of protest is largely personal; in the case of Mānta Kalia and Eunice De Souza, it becomes ironical as well." Some critics think that Kamala Das is an obscene poet but it is not so she has presented in her poems the reality of life. She says that "Love is beautiful whatever four lettered name the puritans call it by. It is the foretaste of paradise. It is the only pastime that involves the soul." Her personal no doubt are given to carnal hungers and suffer like tragic protagonists the catastrophe inflicted upon them by their own doings.

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Kamala's own disgust and failures led her to a frantic search for the mythic Krishna, the ideal lover, in whom she could establish eternal bond. This search made her aware of the need to study all men: "all at once the plot thickened with a researcher's hunger for knowledge, I studied all men." Since the quest has, by and large failed in her case, sex is no more than a "mindless surrender" or a heartless participation not a "humming fiesta". [4]

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JAYANTA MAHAPATRA

Jayanta Mahapatra needs no introduction; perhaps any discussion is incomplete without reference to his poetical works. Physicist, Bi-lingual poet and Essayist. Jayanta Mahapatra hold the distinction of being the first Indian English poet to have received the 'Sahitya Academy Award' (1981) for 'Relationship'. In his poetry, Mahapatra sings of the hearts and minds of many things of nature, on the basis of his sincere love for all creation, poverty, deprivation, social injustice, the plight of the Indian woman prostitution recur in his verses. He says, 'All things happen around me'. He cannot ignore them and write about the 'better things' of life. ----- about the lives of upper classes. His belief in poetry as a social reality sets him off from other contemporary poets writing in English. Jayanta Mahapatra like many other Indian poets writing in English is bi-lingual. R. Parthasarthy rightly points out, 'The true poets among Indo - Anglian seem to be those who write in English as well as in their own language. They are poets in their own Right who have something significant to say, and know how to say it, both in English and their native tongue. They are not out to 'sell' their poetry through a skilful manipulation of words and the employment of Sophisticated techniques. Mahapatra belongs to this small group of genuine poets. He, too,

is a bi-lingual writer, the secret of whose success lies in his not disowning his Indian inheritance, and not falling a prey to what has been called a feeling of alienation. He has, by and large, steered clear of the pitfalls listed above and the result is an unmistakable authenticity of tone and treatment.'

Mahapatra's sensibility is essentially Indian, but he does not create the impression of Indianness by bringing in such traditional items as tigers, snakes, snake-charmers, jugglers, crocodiles etc. He is really Indian because he does not consciously try to be Indian and thus is able to avoid many a hackneyed cliché and posture. His Indianness is seen at its best in his poems about Orissa, where the local and the regional are raised to the level of the Universal. 'Oriya Landscapes', 'Evening in an Orissa Village', 'The Oriya Poems', 'Dawn at Puri' etc. are Oriya first and therefore, Indian too. Of how many other Indo-English poets could we say something like this with equal validity? In Mahapatra's best work, the language is English, but the sensibility and not only subject-matter is Oriya, writes K.A. Panikar.

'An examination of the recurring images in Mahapatra's poems reveals that he is Oriya to the core. The sun of the eastern coast of India shines through his poems. The eastern sea sends its morning wind through them. Mahapatra, a child of the sun and sea, delights in invoking the god of fire and the god of water in poems like 'Sunburst', 'The Exile', 'Indian Summer Poems', 'This Stranger', 'My Daughter' and 'The Beggar', and 'Takes It As Solace.' Puri is a living character in several of these poems. 'The Temple', 'The Priest', 'The Beggar', 'The Fisherman', 'The Crow' there rise before us in all their objective reality and concreteness and then slowly transform themselves, almost imperceptibly, into monument-like images and symbols.'

R. Parthasarathy and Arun Kolatkar are the two great poets to compose their poems on the themes of Indian social problems. There is a group of Parsi poets also who contributed contemporary Indian English poetry. The notable contributions to contemporary Indian English poetry; the group comprises K.N. Daruwalla, Gieve Patel and Adid Jassawalla. There is also a group of new poets called 'academicians,' and Shiv K. Kumar, Jayanta Mahapatra, A. K. Mehrotra, O. P. Bhatnagar, A. N. Dwivedi, Niranjana Mohanty, Saleem Peeradina, Syed Amanuddin, Syed Ameeruddin, R. C. Shukla, S. C. Dwivedi and many others belong to this group. A.K. Mehrotra is primarily an experimentalist in 'surrealism' (a French movement of the 1920s) who makes his poetry out of "incongruity, choice and free association. Both Mahapatra and Mehrotra are addicted to the drug of imagery. O. P. Bhatnagar's ironic vision comes at vividly in his poetry, and A. N. Dwivedi is a social realist having a keen eye on the social and political developments around him. In their innovative application of language and rhythm, Dwivedi and Syed Amanuddin come close to each other. This is how Syed writes in his poems: -

*Love me for what I am
I love you what you are
Let's create a culture of younme*

There are some talented contemporary poets also who are composing their work keeping with the recent social problems of India. These poets are Prithvi Nandy, Rabindranath Menon Dilip Chitre, Sharat Chandra, K. D. Katrak Gauri Deshpande, Nandy is "innovative and profuse" in his poetry. After Rabindranath Tagore, he is one great poet who has produced prose poems packed with passion.

Kamala Das, Gauri Deshpande and Monika Varma are of good stature; Lila Ray and Margaret Chatterjee are also of the same rank and status. "The Female of the Species." Where her female feelings come out vividly. [5]

*Sometimes you want to talk
About love and Despair
And the ungratefulness of children
A man is no use whatever them*

Similar is the case with some male poets too. Of such poets, we may mention Pranab Bandyopadhyay, S. C. Saha, C. S. Singh, Ravi Nandan Sinha, R. C. Shukla, I. H. Rizwi, D. C. Chhabial, I. K. Sharma, R. K. Singh, B. K. Dubey, Suresh Kohli, Mahanand Sharma and a few others. Many male and female poets mentioned cursorily here demonstrate their poetic talent and aptitude, not necessarily the fulfillment that befalls with maturity of mind and commitment to art. [6-7]

II. CONCLUSION

In sum up, we can say that in the ancient period the body of Indian English poetry has certainly been greater during this period than in any preceding era. Professor P. Lal has brought out a book over 130 poets with the title Indian Poetry in English 'An Anthology' in which he has composed selected poems of new poets. The poetry of this period ranges from personal emotion and lyricism to complex linguistic experiments, dry intellectual tone, pungent satire and nursery rhyme. It has a new note and a new urgency of utterance but even then it is not possible to escape this poetry completely from tradition. This penetrates deeper and deeper into the poet's consciousness and influences their observations of the living present and past, thus runs into the present and shapes our future. Our racial traditions, issuing from the Vedas, The Upanishads, The Ramayana, The Mahabharata, the devotional saint poetry, the great rivers of India, the treasure house of Indian myth and legend, the memory of our racial or local history, have shaped modern poetry. Sri Paramhansa Yogananda, Mahanand Sharma and Krishna Srinivas represent the mystical and spiritual tradition of India in their poetry. But they are not mere traditionalists. Their poetry is a fine coalescence of tradition and modernity. Even poets like Nissim Ezekiel, A.K. Ramanujan, R. Parthasarathy, Arun Kolatkar, Jayanta Mahapatra, Gieve Patel, K.N. Daruwalla, Kamala Das, Shiva K. Kumar and many others can not completely get rid of tradition. [8] The modern poets deal with the concrete experiences of men living in the modern world but the concreteness of experiences is influenced by 'the aroma of the private life of the experiencing self.' P.K.J. Kurup remarks:

“They are mostly concerned with themselves and the surroundings allied to them. Their poetry records the artists own life history and his struggle against himself. They centre themselves within their selves is an attempt to discover their roots, both as individuals and as cultists, and during the process of which Endeavour their poetic personality appears undisguised. Viewed in this perspective the poetry of most of the new Indian poets in English reveals a tension resulting from their acute self awareness and the restraint imposed upon them by the hostile environment and becomes a private quest for values and an effort to peer into the dark abysmal contents of the poet’s own mind.”[9]

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Ranking Based Web Search Algorithms

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Abstract- As Internet is rapidly gaining popularity these days, web searching has become more important. A collection of pages where all pages are interlinked looks like a Spider's Web, therefore called as "Web". A search engine makes use of the combination of textual keywords to display the results. When internet user searches some information using search engine, the result contains all the relevant and irrelevant data. As this data is so vast indexing complete web is impractical, so some filtering should be applied to deliver the quality result. A filter mechanism called as "Ranking" is used now days in many popular search engines. This paper gives the idea of Web Search, how it works? And a comparative study of two Ranking based algorithms PageRank and UsersRank for web search.

Index Terms- Indexing, PageRank, Search Engine, UsersRank.

I. INTRODUCTION

Internet has a vast range of information with thousands of web sites and billions of web pages. From this enormous range of information it is difficult to find the information which user wants. Web Search is the process of looking for information stored on the web. When user wants to find some data online, web search helps to get that data within no time. Web searching is the technique where a large set of online data is traversed on user's demand and the results are served to the user. In turn it acts as a filter which filters out some links or web pages depending upon user's request from a vast database of web pages.

Web search can be determined by making the use of Search Engines. A search engine is a computer program which finds the information online when keywords are fed to it by the user and it automates the process of collecting web links^[1]. The results produced by search engines are typically prioritized by reference. When the domain comprising requested information is not known, finding resources and information on the web is very difficult without making use of search engine. Search engines regularly crawls the internet looking for information from the web servers and uses indexing to arrange the information, as long as hosts are discoverable to crawlers. Therefore they give latest results and help the people to get the desired information only in one click. Different search engines use different methods and algorithms to crawl or find the information on the internet; the results produced are not same all the time. And regular crawling helps to obtain latest results for the same information.

A portion of web called Invisible Web is used for the hosts who are not discovered by search engines. These invisible webs restrict the crawlers from accessing information they contain.

Therefore large part of information from the web remain hidden hence inaccessible to most of the people.

Because of the complex and vast nature of the web the process of finding information and producing results is a bit difficult and hence time consuming. To make this process faster many search engines uses a concept called as "Meta Search". These Meta search engines combine search results produced from different search engines and give a single comprehensive list.

II. HOW WEB SEARCH ENGINE WORKS?

Web is a collection of pages that are interlinked. This structure is like a Spider Web. Hence a search engine contains its own database where it stores variety of information related to the web. Fig. 1 shows Search engine architecture:

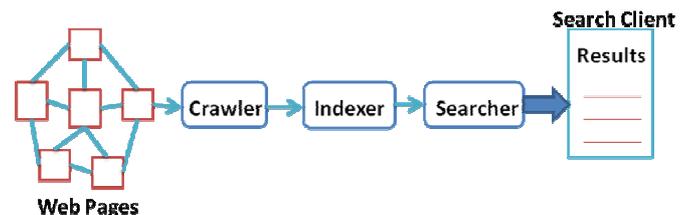


Fig. 1 Search engine architecture

Web search engine is comprised mainly of three modules as given below:

1. Web Crawling
2. Indexing
3. Searching

A program which travels the web from page to page is called as "Web Crawler". To seek out only relevant information from the millions of web pages search engines uses special software Robots known as "Spiders". To establish a list of words obtained from the web sites these spiders roam around the web, this process is known as "Web Crawling"^[2]. Many crawling algorithms are available to make successful searches. After gathering the data crawler forwards that data for Indexing.

A complete collection of information given by crawler is then sorted by using Indexers. Indexers are responsible for serving various demands like reading the stored information, uncompressing document and parsing the document^[3]. An Anchor file is maintained for storing parsed information of links. Indexing is done to arrange the data in an ordered format like a book index to make it searchable.

Task of a searcher is executing the query requested by the user and producing the results. Searcher looks for the information demanded by user in the index generated by the indexers. The

generated result set are then arranged according to user's preferences and the final list of links is shown in the search engine as an answer to user's query.

III. RANKING ALGORITHMS

Many ranking algorithms are available for searching the data on the web like PageRank, UsersRank, ObjectRank, etc. In this paper only two algorithms are explained. They are:

A. PageRank Algorithm

PageRank was developed at Stanford University by Larry page and Sergey Brin. It is the ranking based algorithms which employees hyperlinks on the web. PageRank algorithm's results are ordered according to pertinence and importance of that page^[4]. A rank is calculated for every page on the web by counting total number of votes earned by that page. Using the Markov chain matrix from the vast structure of hyperlinks, static ranking of a web page is formed. Hyperlink from page A to page B interprets one vote from page A to page B^[5]. As the PageRank algorithm does not rely on search queries, Rank of a web page is calculated offline and updated after certain duration. It is based on the principle that says when a page contains important incoming links then its outgoing links to other pages are also important^[6]. To calculate the Overall page rank previous rank is added to text matching score.

The original PageRank algorithm given by Larry page and Sergey Brin is shown below:

$$PR(A) = (1 - d) + d \frac{PR(T1)}{C(T1)} + \dots + \frac{PR(Tn)}{C(Tn)}$$

Where,

- PR (A) is the Rank of page A,
- PR (Ti) is the PageRank of pages Ti which link to page A,
- C(Ti) is the number of outbound links on page Ti and
- d is a damping factor which can be set between 0 and 1

The PageRank theory holds that even an imaginary surfer who is randomly clicking on links will eventually stop clicking. The probability, at any step, that the person will continue is a damping factor *d*.

PageRank can also be calculated as:

$$PR(X) = \sum_{Y \in B_x} \frac{PR(Y)}{|Y|}$$

Where,

B_x is the numbers of incoming links of page X and $|Y|$ is the number of outgoing links from Y^[7].

B. UsersRank Algorithm

When an internet user searches some information online at that time there are chances that the user may bookmark any link or URL if the link is important for him. A bookmark is explicitly generated by the web

and it is the place (folder) which stores multiple links when user realises importance of some link. It may be of two types Personal Bookmark or Social Bookmark. A personal bookmark is stored inside user's system and a social bookmark is shared among users^[8]. Bookmark is necessary for some reasons: web searching is dynamic in nature, so even if user finds out the same information after certain amount of time, search engine may produce different results every time. Therefore the link may be lost. Another reason could be it saves the time; instead of searching it again and again user may use it from bookmark's folder^[9].

UsersRank algorithm makes use of these bookmarks and produces valuable information for search engines. Here user is treated as a core ingredient for making web search more powerful. It believes in the logic that if user is having some links as bookmarked then those links are actually used by someone hence really valuable and gives effective results for web searches. Main objective of UsersRank Algorithm is to concentrate on the information which is actually referred by number of users thus gives quality search results. Here user is treated as a crawler discovering information using different media and collected information contains a group of URLs visited, gathered and tagged by users.

Every bookmarked entry is considered as a vote given by the user to that page. UsersRank is achieved by summing up total number of votes given by the users to that page.

UsersRank algorithm is shown below:

$$UR(p) = \sum_{q=1}^n R_q(p)$$

Where,

UR(p) is the User Rank of page p. A set R of $n = |R|$ users is stored in database. $R_q(p)$ calculates ranking of page p for every q^{th} user.

C. PageRank versus UsersRank

Though PageRank algorithm is popular and widely used, it can be costly because of these reasons: First, web sites are increasing day-by-day hence the size of the web is immensely increasing. It has become a cumbersome task to calculate web matrix, even if rapid functioning computers are used. Second, gradual development of the web allows modifications like

adding new pages, deleting old ones, updating links between these pages, etc. So PageRank's quality will be degraded if frequent calculation and modification to a web page's rank is not done. Third, for some web pages more than one rank can be calculated and stored. At that time maintaining multiple ranks for a single page will be a tedious job^[10].

UsersRank has many advantages over PageRank. UsersRank supports expansion of web pages comfortably, because of its nature of working. Total number of votes is calculated only using users bookmark's data, so no complexity is involved even if number of web pages grows. As UsersRank generates the results based on the data which is actually used by thousands of users, it gives quality results.

Athanasios Papagelis and Christos Zaroliagis conducted an experiment of 20,000 URLs for comparison. Fig. 2 shows comparison of PageRank versus UsersRank^[8]. For each UsersRank range of PageRank and an average PageRank is shown. According to discovery low UserRank pages frequently have a high PageRank. This means UsersRank results take users point of view into consideration but PageRank may produce results according to predefined methods.

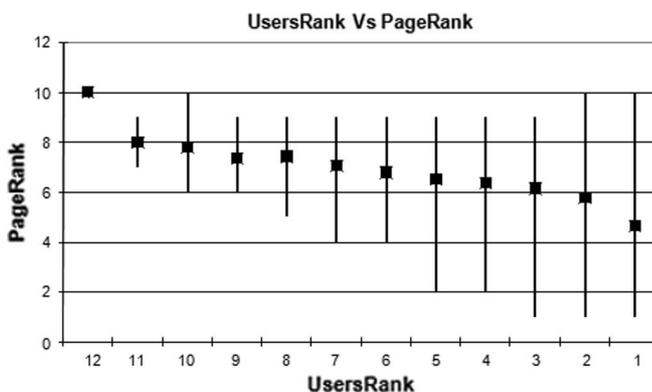


Fig. 2 PageRank versus UsersRank

IV. CONCLUSION

In this paper we have studied web searching and how it is done. Also working of two rank based algorithms PageRank and UsersRank is shown.

This work is accompanied by an experimental analysis done by Athanasios Papagelis and Christos Zaroliagis which shows us comparison between PageRank and UsersRank algorithm. Hence we can say that web search is effective when used PageRank algorithm but it can be made more effective by using

UsersRank. Also we can produce quality results when we integrate UsersRank with PageRank.

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Efficient Removal of Impulse Noise in Digital Images

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Abstract- Image Noise Suppression is a highly demanded approach in digital imaging systems. Impulsive noise is one such noise, which is frequently encountered problem in acquisition, transmission and processing of images. In the area of image restoration, many state-of-the art filters consist of two main processes, classification (detection) and reconstruction (filtering). Classification is used to separate uncorrupted pixels from corrupted pixels. Reconstruction involves replacing the corrupted pixels by certain approximation technique.

In this paper such schemes of impulsive noise detection and filtering thereof are proposed. Here we presents a comparative study on six methods such as median filter, Progressive switching median filter, Fuzzy switching median filter, Adaptive median filter, Simple adaptive median filter and its modified version i.e. Modified Simple Adaptive median filter. Objective evaluation parameters i.e. mean square error; peak signal-to-noise ratio is calculated to quantify the performance of these filters.

Index Terms- Median Filter, Progressive Switching Median Filter, Fuzzy Switching Median Filter, Adaptive Median Filter, Simple Adaptive Median filter

I. INTRODUCTION

Digital images which are related to digital signals are normally corrupted by many types of noise, including impulse noise [1]. Impulse noise is a set of random pixels which has a very high contrast compared to the surroundings. So, even a small percentage of impulse noise distorts the image greatly compared to other noises. Malfunctioning pixels in camera sensors, faulty memory locations in hardware, or transmission of the image in a noisy channel, are some of the common causes for impulse noise. The amplitude of the corruption is relatively very high compared to the strength of original signal. So, when the signal is quantized into L intensity levels, the corrupted pixels are generally digitized into either of the two extreme values (i.e. 0 or L-1). The impulse noise generally appears as white and black spots in the image.

Conventional median filtering approaches apply the median operation to each pixel unconditionally whether it is uncorrupted or corrupted. As a result, even the uncorrupted pixels are filtered and this causes degradation of image quality. To overcome this situation, some decision making process has to be incorporated in the filtering frame work. They are adaptive median filter and the median filter based on homogeneity information is called decision based or 'switching' filters. Here, the filter identifies possible noisy pixels and then replaces them with median value or its variants by leaving all the other pixels unchanged. On replacing the noisy pixels with some median value in their

vicinity, the local features such as the possible presence of edges are not taken into account. Hence details and edges are not recovered satisfactorily especially when the noise level is high. When the noise level is over 50% some details and edges of the original image are smeared by the filter. This disadvantage can be overcome by using SAM and its modified version filter where a high degree of noise suppression and preservation of image sharpness can be achieved. SAM filter uses the intensity value of the pixels to determine the window size and also to identify whether the pixel is corrupted or uncorrupted. The window size is increased or decreased based on the amount of noises present in the input signal. After this selection, the output image produced by this filter with least mean square error is considered as input image for impulse noise detection which can be achieved by using SAM and its modified version filter.

II. MEDIAN FILTER (MF)

The Median Filtering [2] Technique can successfully remove Impulse noise from the distorted image but in this case the filtered image suffers the blurring effect. For the median filtering techniques each pixel is considered to calculate the median and also every pixel is replaced by that calculated median. So affected pixels are considered to calculate the median and unaffected pixels are also replaced by this calculated median. This undesirable feature prevents the median filtering techniques from providing higher PSNR or better quality image

III. PROGRESSIVE SWITCHING MEDIAN FILTER (PSMF)

The Progressive median filter (PMF) [4] is a two phase algorithm. In phase one noise pixels are identified using fixed size window (3x3). In second phase prior knowledge of noisy pixels are used and noise pixels are replaced by estimated median value.

Here, the difference of the median value of pixels in the filtering window and the current pixel value is compared with a threshold to decide about the presence of the impulse. Now a 3x3 window is taken whose central pixel is $x(i,j)$. In the Progressive switching median filter the output of the filter is given by:

$$y(i, j) = m_{i,j} ; \text{ if } |m_{i,j} - x(i, j)| > \text{Threshold} \\ y(i, j) = x(i, j) ; \text{ Otherwise} \quad \text{----- (1)}$$

where, $m_{i,j}$ represents the median value of the pixels inside the filtering window. Here median value is calculated same as in AMF without considering the corrupted pixel present in window. If calculated median value is less than minimum value present in window and greater than maximum value present in window then median value is treated as corrupted value. If calculated median

is corrupted then increase the window size and recalculate the median value until we get correct median value or else window size reach maximum limit. When the above scheme is applied for impulse detection, a binary flag image $\{f(i, j)\}$ is constructed such that $f(i, j)=1$, when the pixel $x(i, j)$ is noisy and $f(i, j)=0$ for noise less pixel. Now during filtering operation, the noisy pixels are replaced by the median of the noise-free pixels. This algorithm provide suitable and good results at smaller percent of noise level and find difficulty with higher level noises.

IV. FUZZY SWITCHING MEDIAN FILTER (FSMF)

This nonlinear filtering technique contains two separated steps: an impulse noise detection step and a reduction step that preserves edge sharpness. Noise detection method uses fuzzy gradient values to determine if a certain pixel is corrupted with impulse noise or not.

A. DETECTION USING FUZZY GRADIENT VALUES

For each pixel of the image (that is not a border pixel), we use a 3 x3 neighborhood window as illustrated in Fig. 1. Each neighbor with respect to corresponds to one direction {NW = North West, N = north, NE = north east, W = west, E = east, SW = south west, S = south, SE = south east}. Each such direction with respect to (i,j) can also be linked to a certain position indicated in Fig1. If we denote A as the input image, then the gradient then the gradient $\nabla^{(k)}A(i, j)$ is defined as the difference

$$\nabla^{(k)}A(i, j) = A(i+k, j) - A(i, j) \text{ with } k, j \in \{-1, 0, 1\} \text{-----} \text{-----}(2)$$

where the pair (k, j) corresponds to one of the eight directions and (i,j) is called the center of the gradient[3]. The eight gradient values (according to the eight different directions or neighbors) are called the basic gradient values.

One such gradient value with respect to (i,j) can be used to determine if a central pixel is corrupted with impulse noise or not, because if this gradient is quite large then it is a good indication that some noise is present in the central pixel, but there are two cases in which this conclusion is wrong.

- 1) If the central pixel is not noisy, but one of the neighbors then this can also cause large gradient values.
- 2) An edge in an image causes some kind of natural large gradient values.

To handle the first case, we use not only one gradient value, but eight different gradient values to make a conclusion. To solve the second case, we use not only one basic gradient for each direction, but also one basic and two related gradient values for each direction. The two related gradient values in the **same direction** are determined by the **centers** making a right angle with the direction of the first (basic) gradient. For example, in the NW-direction, we calculate the basic gradient value plus the two related gradient values. The two extra gradient values are used

for making the separation between noisy pixels and edge pixels: when all these gradients are large, then is considered to be not a noisy but an edge pixel.

In Table I, we give an overview of the involved gradient values: each direction (column 1) corresponds to a position with respect to a central position. Column 2 gives the basic gradient for each direction; column 3 gives the two related gradients. Thus, we define eight fuzzy gradient values for each of the eight directions. These values indicate in which degree the central pixel can be seen as an impulse noise pixel.

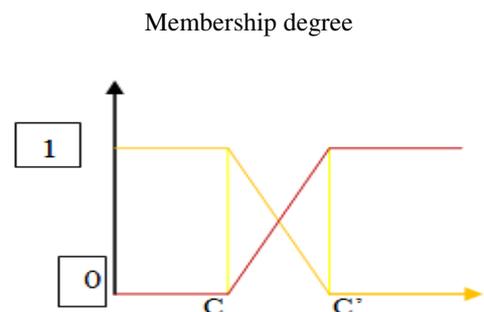
TABLE 1
 INVOLVED GRADIENT VALUES TO CALCULATE THE FUZZY GRADIENT

R	BASIC GRADIENT	RELATED GRADIENT
NW	$\nabla_{NW}A(i, j)$	$\nabla_{NW}A(i+1, j-1), \nabla_{NW}A(i-1, j+1)$
N	$\nabla_NA(i, j)$	$\nabla_NA(i, j-1), \nabla_NA(i, j+1)$
NE	$\nabla_{NE}A(i, j)$	$\nabla_{NE}A(i-1, j-1), \nabla_{NE}A(i+1, j+1)$
E	$\nabla_EA(i, j)$	$\nabla_EA(i-1, j), \nabla_EA(i+1, j)$
SE	$\nabla_{SE}A(i, j)$	$\nabla_{SE}A(i-1, j+1), \nabla_{SE}A(i+1, j-1)$
S	$\nabla_SA(i, j)$	$\nabla_SA(i, j-1), \nabla_SA(i, j+1)$
SW	$\nabla_{SW}A(i, j)$	$\nabla_{SW}A(i-1, j-1), \nabla_{SW}A(i+1, j+1)$
W	$\nabla_WA(i, j)$	$\nabla_WA(i-1, j), \nabla_WA(i+1, j)$

Since ‘large’, ‘small’, ‘Big Positive’, ‘Big Negative’ are non deterministic features, these terms can be represented as fuzzy set [7]. Fuzzy sets are sets whose elements have degree of membership. Examples of the membership functions large, small, big positive and big negative are shown in Fig. 1a and 1b.

B. MEMBERSHIP FUNCTION

A membership degree indicates the degree in which a certain gradient value matches the predicate (e.g., large). Since we are searching for noise pixels, we choose $c \in [50, 80]$ And $c' \in [100, 150]$. The idea behind the usage of the fuzzy sets *big positive* and *big negative* is that if the basic gradient and the two related gradients are both large but have different signs then it is a good indication that noise is present. Therefore, we also use the fuzzy sets *big-negative* and *big positive*. Gradient values around zero are seen as more or less unsigned and gradient values above 15 or under -15 become significant to matching the feature big positive, respectively, big negative.



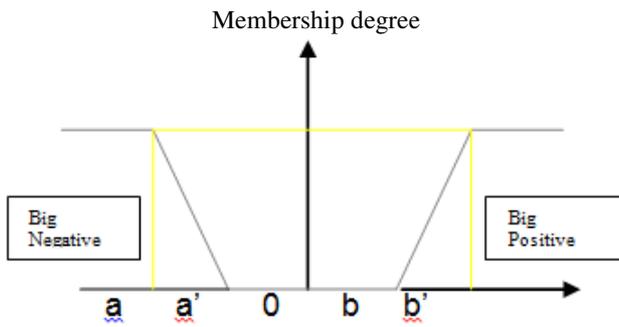


Fig.1. Membership functions (a) SMALL, respectively, LARGE; (b) BIG NEGATIVE, respectively, BIG POSITIVE

Correction method using switching median filter

To decide if a central pixel (a nonborder pixel) is an impulse noise pixel, we use following (fuzzy) rule:

IF $|\nabla R A(i, j)|$ is large AND $|\nabla'' R A(i, j)|$ is small

OR

$|\nabla R A(i, j)|$ is large AND $|\nabla'' R A(i, j)|$ is small

OR

$\nabla R A(i, j)$ is big positive AND $\nabla'' R A(i, j)$ AND $\nabla'' R A(i, j)$ are big negative

OR

$\nabla R A(i, j)$ is big negative AND $\nabla R A(i, j)$ AND $\nabla'' R A(i, j)$ are big positive
 THEN $\nabla FR A(i, j)$ is large

We translate this rule by: if for a certain central pixel more than half of the fuzzy gradient values (thus more than four) are part of the support of the fuzzy set *large*, then we can conclude that this pixel is an impulse noise pixel.

Let x_{ij} and y_{ij} represent the pixel values at position (i, j) in the corrupted image and the restored image, respectively. The impulse detector generates a binary flag map where each pixel (i, j) is given a binary flag value, f_{ij} , indicating whether it is considered as an impulse; i.e., $f_{ij} = 1$ means the pixel in position (i, j) is a corrupted pixel and $f_{ij} = 0$ means the pixel in position (i, j) is noise free. To give the pixel x_{ij} a fuzzy flag indicating how much it looks like an impulse pixel, the following two parameter membership function is used for correction method.

$$f_{ij} = \begin{cases} 0 & M_{ij} \leq T1 \\ \frac{M_{ij}-T1}{T2-T1} & T1 \leq M_{ij} \leq T2 \\ 1 & M_{ij} \geq T2 \end{cases} \quad \text{-----(3)}$$

Where M_{ij} is the minimum value of $|x_{ij} - s_{ij}|$, for all $s_{ij} \in w_{ij}$ and $s_{ij} \neq x_{ij}$. $T1$ and $T2$ are two predetermine parameter given in [4], $10 \leq T1 \leq 20$ and $22 \leq T2 \leq 32$. If a pixel is detected as an impulse noise pixel, then we can calculate restore image value y_{ij} by using switching median value m_{ij} of window w_{ij} i.e.

$$y_{ij} = (1 - f_{ij}) * x_{ij} + f_{ij} * m_{ij} \quad \text{-----(4)}$$

And if pixel is noise free pixel ($f_{ij} = 0$) then we copied it as it is means value is unchanged. i.e. $y_{ij} = x_{ij}$. For Heavily corrupted pixel, i.e. $f_{ij} = 1$, its value is replaced by the median m_{ij} . For all other pixels ($0 < f_{ij} < 1$), the restored pixel value y_{ij} is a linear combination of x_{ij} and m_{ij} as in (4)

V. ADAPTIVE MEDIAN FILTER (AMF)

The adaptive median filter (AMF) [3] is non linear conditional filter. Here, the size of the median filter is made adaptable to the local noise content. Smaller filter size is applied at pixel locations with low noise level in order to keep the image details. On the other hand, larger filter size is applied at pixel locations with higher noise level in order to remove the noise successfully. Two levels of operations

➤ Level A:

- ✦ $A1 = Z_{med} - Z_{min}$
- ✦ $A2 = Z_{med} - Z_{max}$
- ✦ If $A1 > 0$ AND $A2 < 0$, Go to level B else increase the window size by 2
- ✦ If window size $\leq S_{max}$ repeat level A else output Z_{xy}

➤ Level B:

- ✦ $B1 = Z_{xy} - Z_{min}$
- ✦ $B2 = Z_{xy} - Z_{max}$
- ✦ If $B1 > 0$ AND $B2 < 0$, output Z_{xy} else output Z_{med}

It uses varying window size to noise reduction. Size of window increases until correct value of median is calculated and noise pixel is replaced with its calculated median value. If calculated median is corrupted then increase the window size and recalculate the median value until we get correct median value or else window size reach maximum limit.

But in this type of filter there is limitation on size of window. So we are using another filter i.e. SAM, Simple Adaptive Median Filter which is the combination of adaptive median filter and switching median filter

VI. SIMPLE ADAPTIVE MEDIAN FILTER (SAMF)

It is the hybrid of adaptive median filter and Switching median filter Known as Simple Adaptive Median Filter [6]. This novel method comprises two stages. The first stage is to detect the impulse noise in the image. In this stage, based on only the intensity values, the pixels are roughly divided into two classes, which are "noise-free pixel" and "noise pixel".

Noise Detection is done at each pixel location (x,y), we mark the mask α by using following equation

$$\alpha(x, y) = \begin{cases} 1; & f(x, y) = L-1 \\ 0; & \text{otherwise} \end{cases} \quad \text{-----(5)}$$

Where 1 represent ‘noise –pixel’ and 0 represent ‘noise-free pixel’.Next , calculate the total number of ‘Noise-Pixels’

$$k = \sum_{x=0}^{M-1} \sum_{y=0}^{N-1} \alpha(x, y) \quad \text{-----(6)}$$

Then , estimate the impulse noise level that corrupts the image

$$\eta = \frac{k}{MN} \quad \text{-----(7)}$$

Noise cancellation is done by using following equation

$$g(x, y) = [1 - \alpha(x, y)]f(x, y) + \alpha(x, y)m(x, y) \quad \text{-----(8)}$$

Where α is the noise mask defined by (5) in stage 1 and m is the median value obtained from adaptive method.

Due to adaptive methodology ,the size of the filter used at every pixel location is changing according to the local information.

Median m(x,y) find by adaptive method

Initialize the size of the filter,generally with 3x3 window, it is calculated by

$$W = 2R \min + 1 \quad \text{-----(9)}$$

$$R \min = \frac{1}{2} \sqrt{\frac{7}{1-\eta}} \quad \text{-----(10)}$$

Where

Compute the number of ‘noise-free pixel’ in window. If number of noise -free pixels are less than half of pixels in the window, then increase the size of the filter by two i.e. W=W+2 and return to step 2. Calculate the value of m (x,y) based on the ‘noise-free pixels’ contained in WxW window. Update the value of g(x,y) using (8) .

VII. MODIFIED SIMPLE ADAPTIVE MEDIAN FILTER (MSAMF)

Here we use a local window of size 21x21, which is centred around the current pixel. Calculate the histogram [3] of the local window and the bin indices are the gray levels. Find the maximum and minimum gray level of the local window, noted as Min and Max respectively. For the indices between Min and (Min +Max) / 2, compute differences of nonzero adjacent bin indices. Find the maximum difference and mark the corresponding index as boundary b1 and b2 is similarly computed between (Min +Max) / 2 and Max, three clusters are formed now. ‘uncorrupted’ is assigned to the pixel if it belongs to the median cluster; otherwise, ‘corrupted’ is assigned. Now this detected

pixel filtered using a binary matrix to indicate every pixel is corrupted or not, based on the binary decision matrix, those ‘uncorrupted’ pixels are remain unchanged, while switching median filter with adaptive determined window size is applied to those ‘corrupted’ pixel. Starting with window size W = 3, the filtering window extends one pixel in all the four sides of the window provided that the number of uncorrupted ones is less than 3. Suppose exploiting switch median filter to a noise pixel $x_{i,j}$ and finally decided window size is w_{max} and the output pixel $y_{i,j}$ is given as

$$y_{i,j} = \text{median}\{ x_{i+s,j+k} \mid -(w_{max}-1)/2 \leq s, k \leq (w_{max}-1)/2 \} \quad (11)$$

Attention that in the median filter process, those corrupted pixels are excluded; only those uncorrupted ones are considered to get median value. In filter process, if the number of uncorrupted pixels in filter window exceeds 3, extension stopped. So most of the finally decided window size w_{max} will not larger than 7, even for higher noise density level, so it is fast and suitable for higher noise density.

VIII. SIMULATION RESULTS

The performance is compared and tested with different gray scale images (Lena and Pepper) and in the simulation, images will be corrupted by impulse noise with equal probability. The noise levels are varied from 10% to 90% with increments of 10%. These filters are applied to Lena and Pepper image , after adding impulse noise of different levels i.e. 10%-60%.The restoration performance is assessed according to the noise density of the corrupted pixels in the Lena and Pepper images. Both PSNR, MSE measure the difference in the intensity values of a pixel in original and enhanced images .It is measured in decibel (dB) and for gray scale image it is defined as

$$PSNR = 20 \log_{10} \frac{255}{\sqrt{MSE}} \quad (12)$$

$$MSE = \frac{1}{MN} \sum_{i=1}^M \sum_{j=1}^N [x(i, j) - y(i, j)] \quad (13)$$

IQI measure is given by

$$Q = \frac{4\sigma_{xy}\bar{x}\bar{y}}{(\sigma_x^2 + \sigma_y^2)(\bar{x}^2 + \bar{y}^2)} \quad (14)$$

We assume that the image is of size MxN . IQI measures the similarity between two images. The definition of the new quality of index Let X = xi and Y = yi Where i = 1; 2; :::;N be the original and filtered images respectively. IQI is equal to 1 if both images are identical.

These values are calculated and comparison performance with various filters MF, PSMF, FSMF, AMF, SAMF, MSAMF are shown in Table-2 & Table-3.

TABLE-2

Table2: Comparison of PSNR of Cameraman and Lena at various noise conditions for various filters

Percentage of Noise	PSNR					
	MF	PSMF	FSMF	AMF	SAMF	MSAMF
Lena 20%	29.16276	32.02734	29.93355	34.38793	39.44658	41.43248
CM 20%	23.98603	25.13867	26.81751	27.99731	29.56197	31.67108
Lena 50%	15.01889	21.28433	18.552	20.9874	32.76267	34.93368
CM 50%	14.35945	18.71977	17.78448	19.74553	24.48182	26.07396
Lena 80%	7.739613	7.722932	9.350805	14.15797	24.45557	29.33685
CM 80%	7.699998	7.68929	9.31395	13.70817	19.12036	21.90337

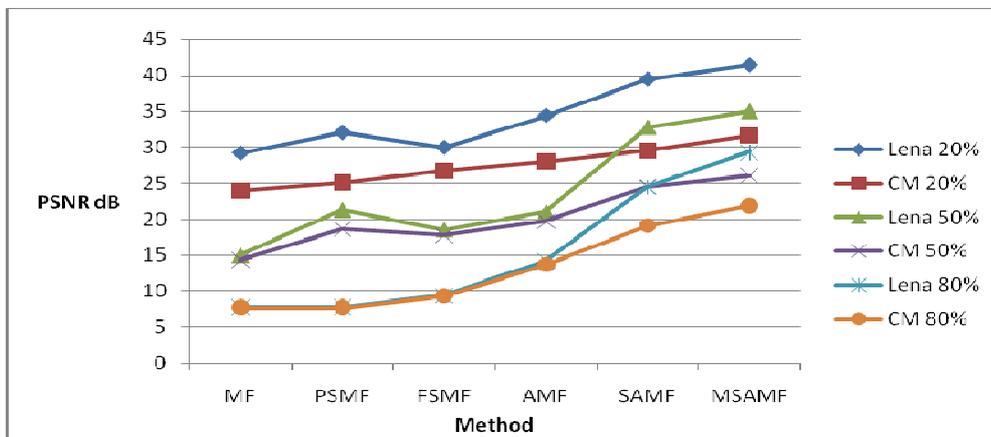


Figure 2: Graphical comparison of PSNR of Cameraman and Lena at various noise conditions for various filters

TABLE-3

Table3: Comparison of Image Quality Index (IQI) of Cameraman and Lena for various filters.

Percentage of Noise	IQI					
	MF	PSMF	FSMF	AMF	SAMF	MSAMF
Lena 20%	0.751269	0.870005	0.842474	0.856318	0.917788	0.960903
CM 20%	0.596327	0.795612	0.797354	0.768401	0.84667	0.930891
Lena 50%	0.176008	0.474843	0.292935	0.285153	0.828253	0.870911
CM 50%	0.171935	0.401826	0.291199	0.292039	0.718411	0.77972
Lena 80%	0.020268	0.021575	0.035696	0.084451	0.532156	0.684185
CM 80%	0.038812	0.040356	0.062209	0.110875	0.361299	0.514205

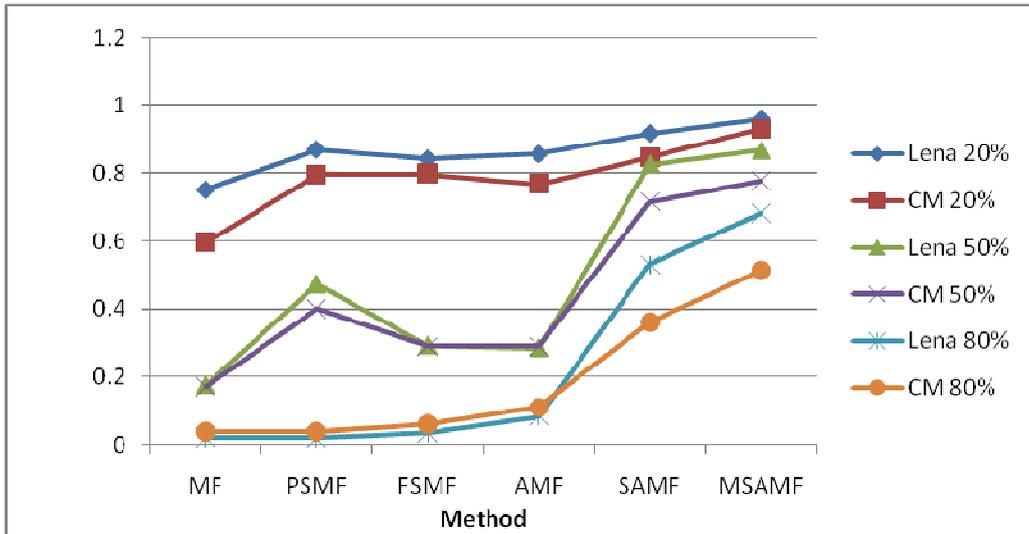


Figure3: Graphical comparison of Image Quality Index (IQI) of Cameraman and Lena for various filters.

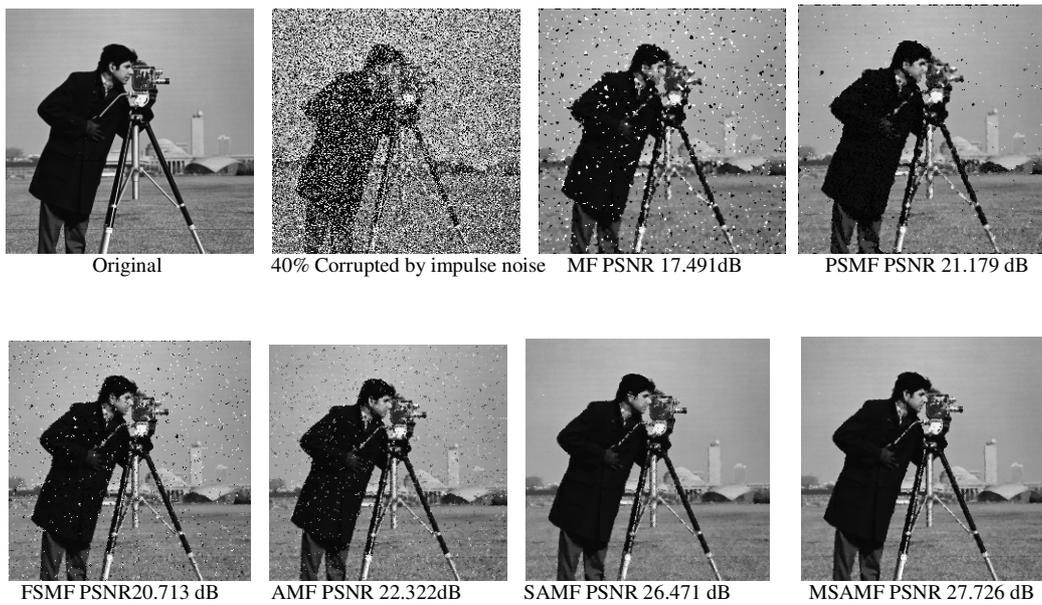
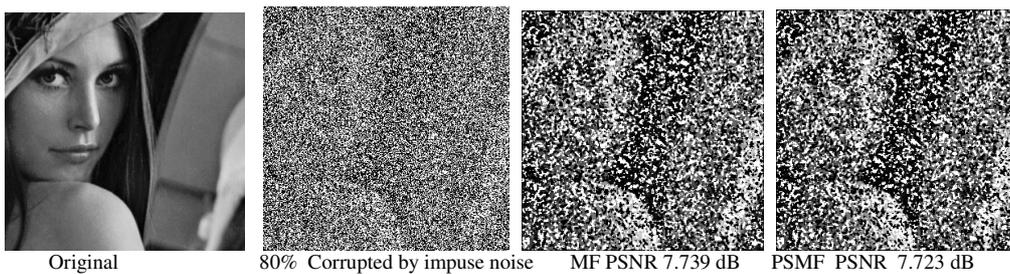


Fig.4 : Restored images of Cameraman(512x512) for MF, PSMF, AMF,FSMF,SAMF and MSAMF for 40 % Corruption by impulse noise.



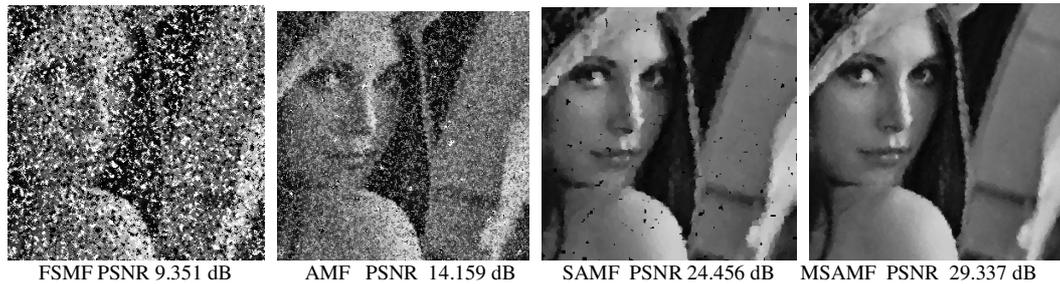


Fig.5: Restored images of Lena (512x512) for MF, PSMF, AMF,FSMF,SAMF and MSAMF for 80 % Corruption by impulse noise

IX. CONCLUSION

In this paper a different non linear algorithms for impulse noise detection are compared and analyzed. SAMF and MSAMF algorithms efficiently handles high density noise i.e. noise ratio more than 50%. But for low density noise MF PSMF, FSMF, AMF perform better and give better PSNR value. FSMF takes slightly larger time as compare to other filter, but give very sharp image. So selections of filters depend upon noise density and images. Some filters are good for low noise and some for higher noise.

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A Study on Recycling Of Crumb Rubber and Low Density Polyethylene Blend on Stone Matrix Asphalt

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Abstract- Stone Matrix Asphalt (SMA) is hot mixture asphalt consisting of a coarse aggregate skeleton and a higher binder content mortar. To minimize the pollution from waste tires and to improve the properties of SMA, Recycled Crumb Rubber (CR) plus Low Density Polyethylene (LDPE) flakes were used as additive using dry process as a research study. This research investigated the feasibility of using 15% and 30% CR+LDPE by weight of bitumen with 60/70 penetration grade bitumen for SMA. SMA mixture meeting the desired volumetric properties could be produced using the combination of 30% (Combined Combination with 30% CR and 70 % LDPE) by weight of the bitumen). No fiber was needed to prevent drain down when this rubber blend was used. Based on results of indirect tensile tests, unconfined compression test and variance analysis, it was observed that the addition of recycled CR+ LDPE using dry process could improve engineering properties of SMA mixtures, and the rubber content has a significant effect on long term performance.

Index Terms- Recycled crumb rubber, low density polyethylene flakes, dry process, properties.

I. INTRODUCTION

With the rapid development of the automobile industry and higher standard of living of people in India, the quantity of autos increased sharply, India is facing the environmental problem related to the disposal of large-scale waste tyres. The world generates about 1.5 billion waste tyres annually, 40 percent of them in emerging markets such as China, India, South Africa, South East Asia, South America and Eastern Europe. With more than 33 million vehicles added to the Indian Roads in the last three years. Now, In accordance with the statistic data, 80 million scrap tires were produced in 2002, and with 12% of growth rate every year, the total number of abandoned tires will be expected to reach 120 million in 2005 and 200 million in 2010[1]. How to deal with the huge number of waste tyres has become an urgent problem of environment in India.

The disposal of waste tyres in the world primarily has three ways to deal with such as landfill, burning and recycling. Recycled tire rubber applied to pavement may be the best way to reduce waste tyres in large quantities and, at the same time, improve some engineering properties of asphalt mixtures. Crumb rubber can be incorporate by a wet process or dry process. Wet process refers to modification of asphalt cement binder with 5-25wt% of fine tyre rubber Crumb Modifier (CRM) at an elevated temperature. The dry process includes

mixing the rubber particles with aggregates prior to addition to asphalt. The main differences between the two processes consist in rubber particle size, rubber amount, rubber function, and incorporation facility [3]. Although the dry process presents some advantages in relation to the wet process, mainly concerning the costs involved and to the higher amount of rubber to be used, the research all over the world have concentrated mainly on the wet process. This choice may be explained by the irregular performance of some experiment sections built with the dry process, unlike the wet process, which has presented more satisfactory results [4].

Stone Matrix Asphalt (SMA) is hot mixture asphalt consisting of a coarse aggregate skeleton and a high binder content mortar. SMA was developed in Germany during the mid-1960s and it has been used in Europe for more than 20 years to provide better rutting resistance and to resist studied tyre wear [1]. Because of its success in Europe, some States, through the cooperation of the Federal Highway Administration, constructed SMA pavements in the United States in 1991 [2]. Since that time the use of SMA in the US has increased significantly. Japan has also started to use SMA paving mixtures as well with good success [3]. Recently, the Ministry of Communications in Saudi Arabia has introduced SMA in its road specifications. In the year 2006 and 2008, two experimental sections were constructed using both drum mix plant as well as batch mix plant in New Delhi, India [4].

SMA is a gap graded aggregate-asphalt hot mixture that maximizes the asphalt cement content and coarse aggregate fraction. This provides a stable stone-on-stone skeleton that is held together by a rich mixture of asphalt cement, filler, and stabilizing additive. The original purpose of SMA was to provide a mixture that offered maximum resistance to studded tire wear. SMA has also shown high resistance to plastic deformation under heavy traffic loads with high tire pressures, as well as good low temperature properties [2, 5]. The main concept of having a gap gradation of 100% crushed aggregates is to increase pavements through interlock and stone-to-stone contact. This mixture is designed to have 3-4% air voids, and relatively high asphalt content due to the high amount of voids in the mineral aggregate. The mixture contains high filler content (10% passing the 0.075-mm sieve), and typically contains a polymer in the asphalt cement, or fiber (cellulose or mineral) in the mixture to prevent drainage of the asphalt cement. This mixture has a surface appearance similar to that of an open graded friction course; however it has low in-place air voids similar to that of a dense graded HMA.

In this research study, a dry processing of Crumb Rubber (CR) and Low Density Polyethylene (LDPE) blend were used as

additive for SMA mixture was investigated. The main purpose of this research was to determine the effects of incorporating CR + LDPE waste on the engineering properties of SMA. The volumetric and mechanical properties of SMA that include various percentages of CR+LDPE were calculated and assessed with laboratory tests. The outcomes were statistically analyzed and determination of the significance at certain confidence limits was performed with single factor variance analysis (ANOVA).

II. TEST MATERIALS AND TESTING PROGRAM

2.1 Materials

The materials that have been used in this study are crushed blue granite stone for coarse aggregate and fine aggregate, hydrated lime as mineral filler with SMA13 grading as per Indian specification IRC-SP: 79-2008. Table 1 displays the selected grading of the aggregate and Table 2 shows its properties. The bitumen used for this study was 60/70 penetration grade. The physicochemical properties of the used bitumen are available in Table 3. Table 4 presents the specific gravities of the materials. In this study, the size of CR was below 30 mesh (0.600 mm) and LDPE flakes of 16MA400 grade injection molding grade film was used as additive in SMA mixture, its appearance is shown in Fig.1a-b.



Fig. 1 a: Appearance of crumb rubber powder



Fig. 1 b: Appearance of LDPE flakes

Table 1 Gradations and Gradation Limits used for the study

Sieve Size (mm)	Adopted Gradation	Specification Limits
19	100	100
13.2	98	90 -100
9.5	73	50 – 75
4.75	22	20 -28
2.36	20	16 – 24
1.18	18	13 – 21
0.6	15	12 -18
0.3	13	10 – 20
0.075	9	8 – 12

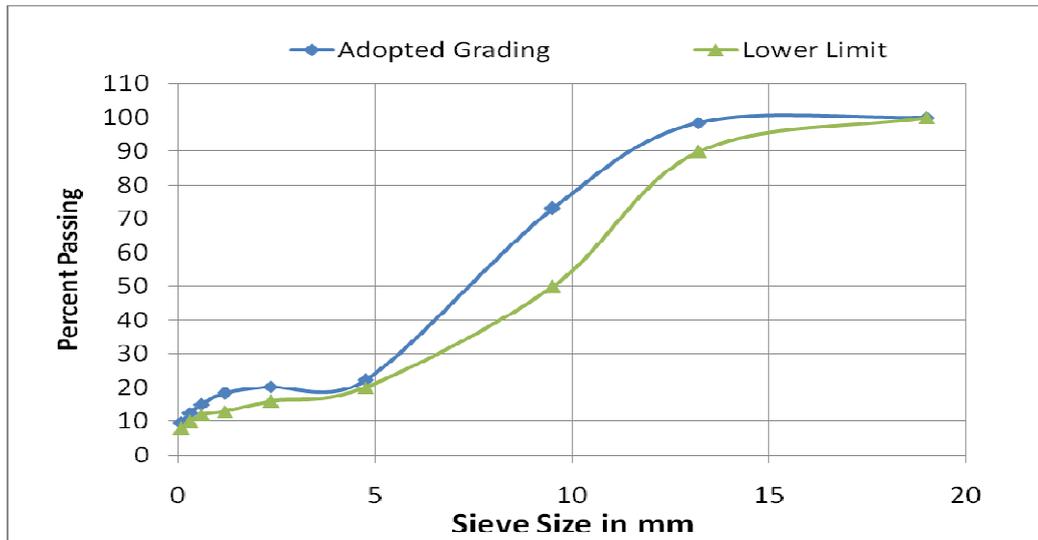


Fig.2: Aggregate gradation curves.

Table 2 Physical properties of crushed aggregate

Property	Test	Method	Specification	Test results
Cleanliness	Grain Size Analysis	IS:2386 (P-1)	< 2% passing 0.075 mm sieve	1%
Particle Shape	Flakiness index	IS:2386 (P-1)	<12%	10%
	Elongation Index		< 18%	15%
Strength	Los Angeles Abrasion Value	IS:2386 (P-4)	< 25%	22%
	Aggregate Impact Value	IS:2386 (P-4)	< 18%	14.7%
Water Absorption	Water Absorption	IS:2386 (P-3)	< 2%	1.7%
Specific gravity	Specific gravity	IS:2386 (P-1)	-	2.85

Table 3 The results of tests performed on bitumen

S.NO	Properties	Test Method	Units	Permissible Values	Test Results
1	Specific Gravity test	IS 1202 - 1978	-	-	1.02
2	Penetration at 25 °C	IS 1203 - 1978	0.1mm	60 – 70	64
3	Softening Point	IS 1205 - 1978	OC	55	55
4	Ductility	IS 1208 - 1978	cm	Min. 50	76

Table 4 Specific gravities of materials (g/cm³)

S.NO	Materials	Specific gravity (g/cm ³)
1	Coarse aggregate	2.85
2	Fine aggregate	2.7
3	Bitumen	1.02
4	CR	1.25
5	LDPE	0.95

2.2 Marshal Mix Design

The Marshall Mix design procedure as specified in ASTM D1559 was used in this study. Laboratory mixing and compaction temperature for all mixtures were selected according to viscosity criteria. Two rubber contents were considered (15% and 30% by weight of bitumen) in dry process. In dry process, the additives were blended with the aggregate before adding bitumen. In order to fabricate the samples, the stages were followed:

- 1) Before adding aggregate to the mixture, it was heated to 200°C for a period of approximately 2h. The weight of aggregate for each sample was 1100g.
- 2) The CR+LDPE blends were introduced at the rate of 15% and 30% respectively.
- 3) After the addition of additive, the blending time of aggregate was prolonged 10-20 s to disperse rubber evenly.
- 4) The combination of aggregate, bitumen and filler was mixed at a temperature of 160±5 °C for about 5 min.
- 5) The bitumen contents used in the mixture was varied at the rate of 5.5%, 6% and 6.5% by weight of aggregate. The selected bitumen was heated to 160 °C for about 1 h prior to blending with the aggregate.
- 6) The Marshall compactor was used for the compaction stage of the process with 50 blows applied to both the faces of the sample at 150 °C.
- 7) Samples were cooled at room temperature for a period of 12 h before de-molding.
- 8) The Optimum bitumen Content (OBC) was estimated at which the air voids (V_a), and the minimum voids in mineral aggregates (VMA) are 4 and 17 percent respectively.

2.3 Testing Program

After determining the OBC of each mixture, drain down tests were performed per AASHTO T 305 *determination of drain down characteristics in uncompacted asphalt mixtures*. Drain down was tested by placing the uncompacted mixture in a basket in an oven at the mixing temperature of the binder (162 °C) and at 177 °C per AASHTO T 305. The drain down was calculated as the percentage of binder that drained out of the basket compared to the original weight of the sample. Drain down was also tested at binder contents exceeding the OBC to determine the stabilizing capacity of fiber. Most states require that the drain down of SMA mixtures not exceed 0.3% by weight of the mixture. The binder contents used in this portion of the study started at 5.5% (by weight of mixture) and increased by 0.5%

until a draindown of 0.3% was reached. The stabilizing capacity of fiber was determined as the binder content at which the draindown reached 0.3%.

Moisture susceptibility was conducted by comparing the indirect tensile strength (ITS) of three 100mmdiameter×63.5mmtall specimens conditioned in 60±1 °C water for 24 h to the ITS of three specimens, of the same dimensions, dry conditioned at 25±1 °C (modified ASTM D 4867). The ITS specimens were compacted to 6–8% air voids with a Marshall hammer. Each specimen was loaded to failure and the following parameters were evaluated:

1. Indirect tensile strength (ITS):

$$ITS = 2P_{max}/\pi td, \quad (1)$$

where P_{max} is peak load (N), t the average height of specimen (mm) and d the diameter of specimen (mm).

1. Tensile strength ratio (TSR):

$$TSR (\%) = \frac{ITS_{wet}}{ITS_{dry}} \times 100, \quad (2)$$

The unconfined compression tests were performed using a 15-ton capacity universal testing machine in a room temperature of around 25° C. Test specimens 2.5 inches thick and 4 inches diameter were placed on the lower fixed plate of the testing machine. Load was applied with a uniform rate of 2 mm/min on the circular face of the testing samples until failure occurred. The maximum load to failure was recorded and hence the compressive strength was calculated.

The compressive strength can be calculated using the following expression;

1. Unconfined Compressive strength (UCS):

$$\sigma_c = \frac{4P_{max}}{\pi D^2} \quad (3)$$

where, σ_c = Unconfined Compressive Strength, P_{max} = Maximum applied compressive load, and D = Diameter of the specimen.

III. RESULTS AND DISCUSSION

3.1 Bulk Specific Gravity

The volumetric properties of the samples were determined and the test results of the samples with various combinations and

relations were presented below. The Bulk Density for the various combinations of the Crumb Rubber and LDPE as additive in the SMA Mix was shown in the Table 5 and Fig.2 (a) and 2(b). The Bulk Density varies from 2.31 to 2.36 for the various combinations of the Crumb Rubber and LDPE.

Table 5 Relationship between Bulk Density Vs Binder Content

Additive	15%			30%		
Binder Content, %	5.5	6	6.5	5.5	6	6.5
Control	2.341	2.328	2.315	2.341	2.328	2.315
70C+ 30L	2.354	2.341	2.328	2.351	2.337	2.329
50C +50L	2.360	2.345	2.332	2.358	2.346	2.332
30C +70L	2.360	2.346	2.335	2.360	2.347	2.335

Note: 70C = 70% of Crumb Rubber by weight of bitumen in SMA Mix; 30L = 30% of LDPE by weight of bitumen in SMA Mix.

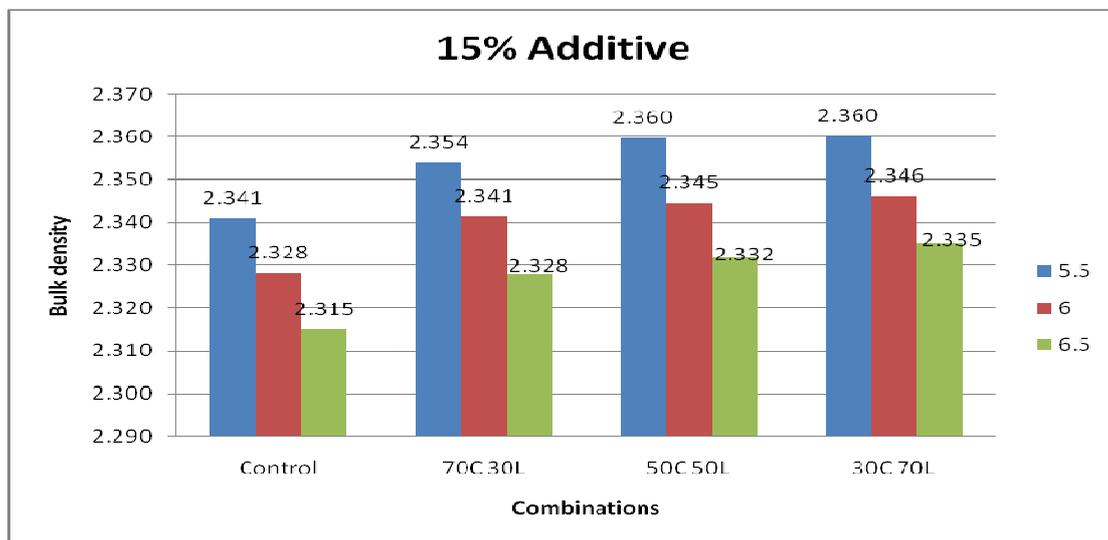


Fig.2(a) : Bulk Density for SMA with 15% Additive

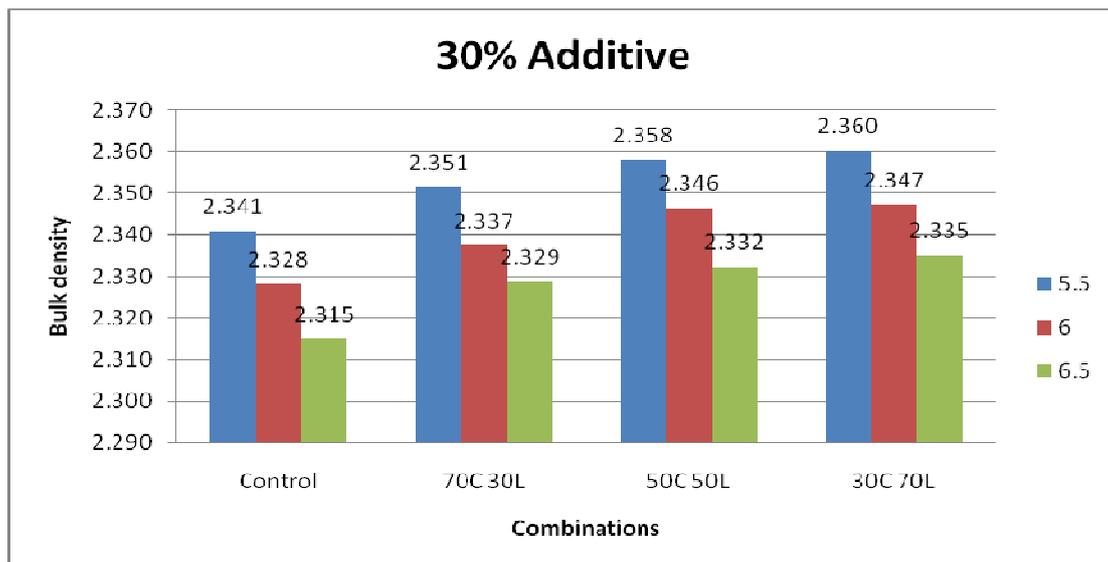


Fig.2(b): Bulk Density for SMA with 30% Additive

3.2 Air Voids

The air voids V_A is the total volume of the small pockets of air between the coated aggregate particles throughout a compacted paving mixture. The variation of V_A with various

combinations is shown in the Table 6, Fig. 3(a) and 3(b). The Air voids vary from 3.8% - 4.8 % for the various dosages of the Crumb Rubber and LDPE. As per specification requirement, 3% - 5 % Air Voids is given as the Mix Design parameters.

Table 6 Relationship between Air Voids Vs Binder Content

Additive	15%			30%		
	5.5	6	6.5	5.5	6	6.5
Binder Content, %	5.5	6	6.5	5.5	6	6.5
Control	5.22	4.97	4.74	5.22	4.97	4.74
70C +30L	4.70	4.43	4.20	4.80	4.59	4.16
50C +50L	4.46	4.30	4.04	4.53	4.23	4.02
30C +70L	4.45	4.23	3.71	4.45	4.19	3.90

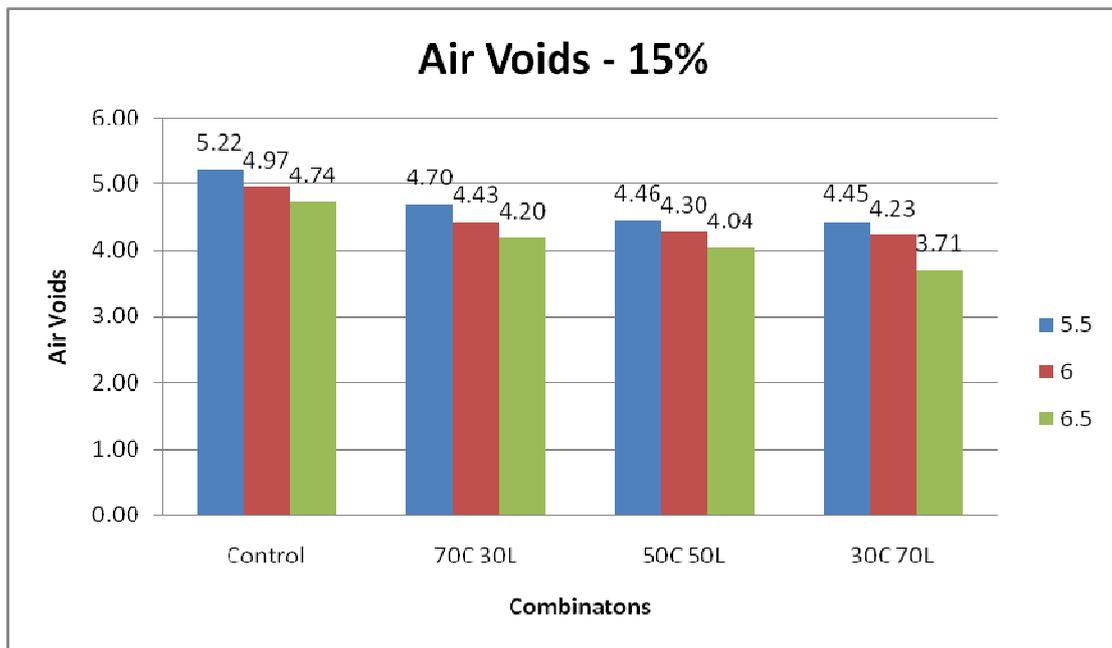


Fig.3(a): Relationship between Air Voids and Binder Content for SMA with 15% Additive

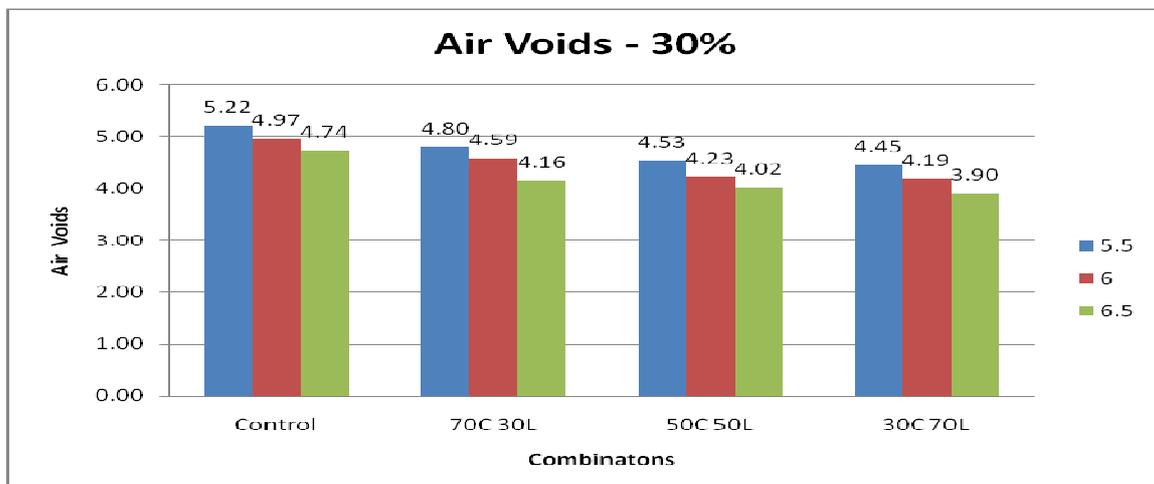


Fig.3(b): Relationship between Air Voids and Binder Content for SMA with 30% Additive

3.3 Voids in Mineral Aggregates

Voids in Mineral Aggregates can be defined as the intergranular space occupied by the asphalt and air in a compacted asphalt mixture. An increase in the dust proportion will generally decrease the VMA. The variation of VMA for the various combinations of the Crumb Rubber and LDPE as additive in the

SMA mixes were shown in the Table 7, Fig. 4(a) and 4(b). The Air voids vary from 17 % to 20 % for the various dosages of the Crumb Rubber and LDPE. As per specification requirement, a minimum of 17 % of Voids in Mineral Aggregates has to be present in the mix as the Mix Design parameters.

Table 7 Relationship between VMA Vs Binder Content

Additive	15%			30%		
	5.5	6	6.5	5.5	6	6.5
Bitumen Content, %	5.5	6	6.5	5.5	6	6.5
Control	17.85	18.68	19.53	17.85	18.68	19.53
70C+ 30L	17.40	18.22	19.07	17.48	18.36	19.04
50C+ 50L	17.19	18.10	18.94	17.25	18.04	18.92
30C+ 70L	17.18	18.05	18.66	17.17	18.02	18.82

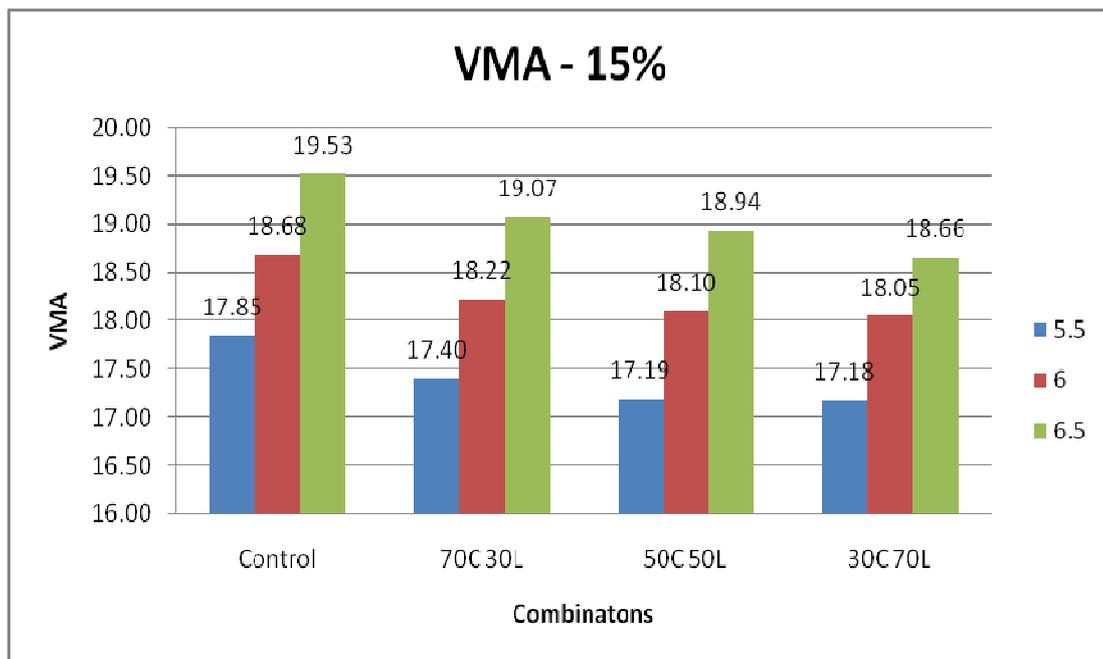


Fig.4(a): Relationship between VMA and Binder Content for SMA with 15% Additive

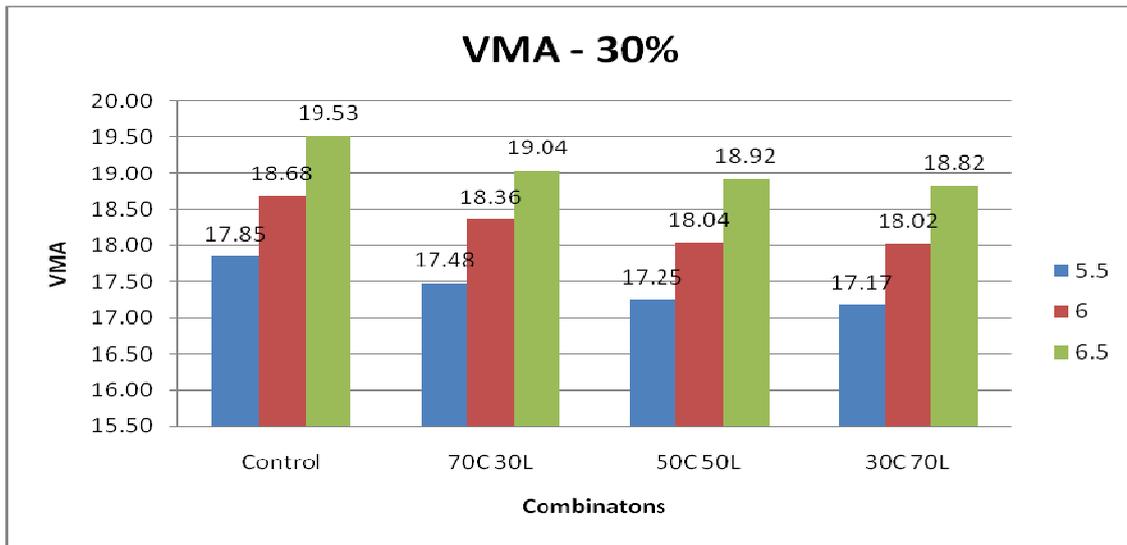


Fig.4(b): Relationship between VMA and Binder Content for SMA with 30% Additive

3.4 Voids in Coarse Aggregates

The variation of Voids in the Coarse Aggregates for Mix with different dosgae of additive in the SMA mixes were shown the Table 8, Figure 5(a) and 5(b). The VCA_{MIX} vary from 34 % to 36 % for the various dosages of the Crumb Rubber and LDPE. The Voids in the Coarse Aggregates under Dry Rodded

Condition is found to be 48%. As per specification requirement, Voids in Mineral Aggregates for Mix is less than the Voids in Mineral Aggregates under Dry Rodded Condition as the Design Parameter. This shows the presence of the better Stone on stone contact in the mix.

Table 8 Relationship between VCA Vs Binder Content

Additive	15%			30%		
	5.5	6	6.5	5.5	6	6.5
Binder Content, %						
Control	35.02	35.37	35.74	35.02	35.37	35.74
70C+ 30L	34.66	35.01	35.38	34.73	35.11	35.35
50C +50L	34.49	34.91	35.27	34.54	34.86	35.26
30C+ 70L	34.49	34.87	35.05	34.48	34.84	35.18

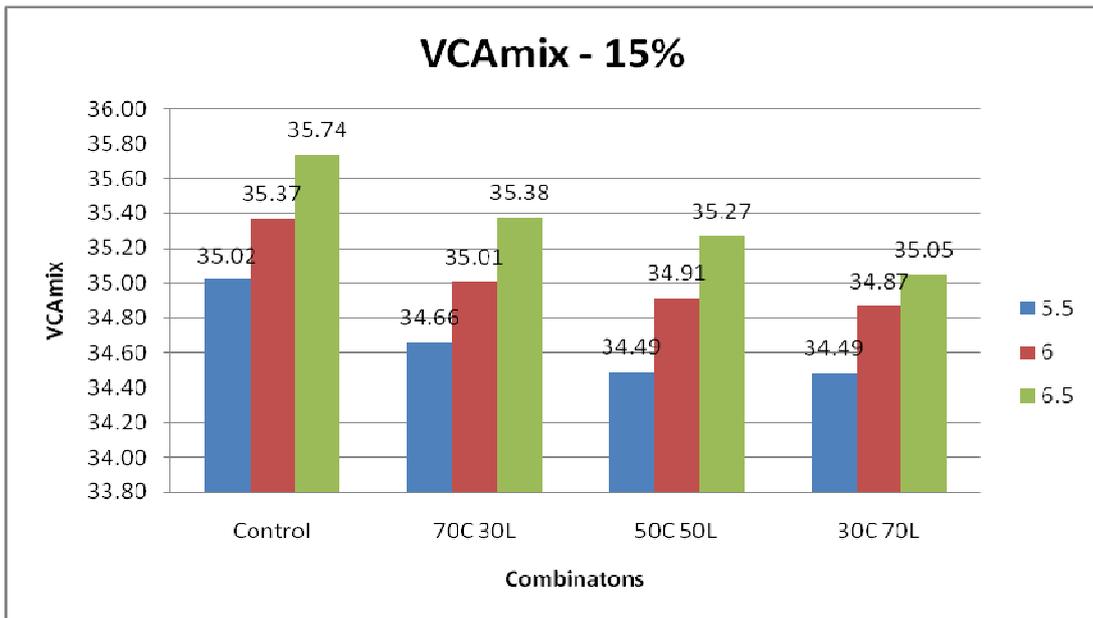


Fig 5(a): Relationship between VCA_{MIX} and Binder Content for SMA with 15% Additive

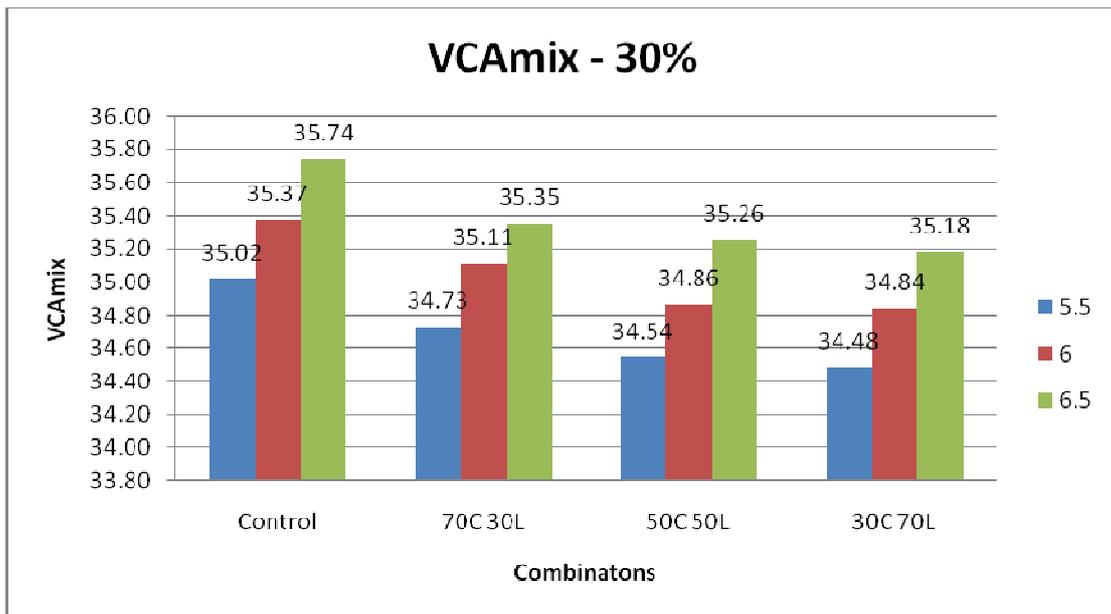


Fig 5(b): Relationship between VCA_{MIX} and Binder Content for SMA with 30% Additive

3.5 Tensile Strength Ratio

The variation of Indirect Tensile Strength Ratio for Mix with different dosgae of the Crumb Rubber and LDPE as additive in the SMA mixes were shown in the Table 9, Fig.6(a) and 6(b). The TSR vary from 85% to 94% for the various dosages of the

Crumb Rubber and LDPE. As per specification requirement, Indirect Tensile Ratio for the Mix should be more than 85% as the Design parameters. This shows the presence of the resistance to cracking and moisture damage.

Table 9 Tensile Strength Ratio (%)

Additive	15%			30%		
	5.5	6	6.5	5.5	6	6.5
Bitumen Content, %	5.5	6	6.5	5.5	6	6.5
Control	85	85	86	85	85	86
70C+ 30L	89	87	90	87	86	90
50C+ 50L	89	90	84	85	92	90
30C+ 70L	89	86	91	88	87	94

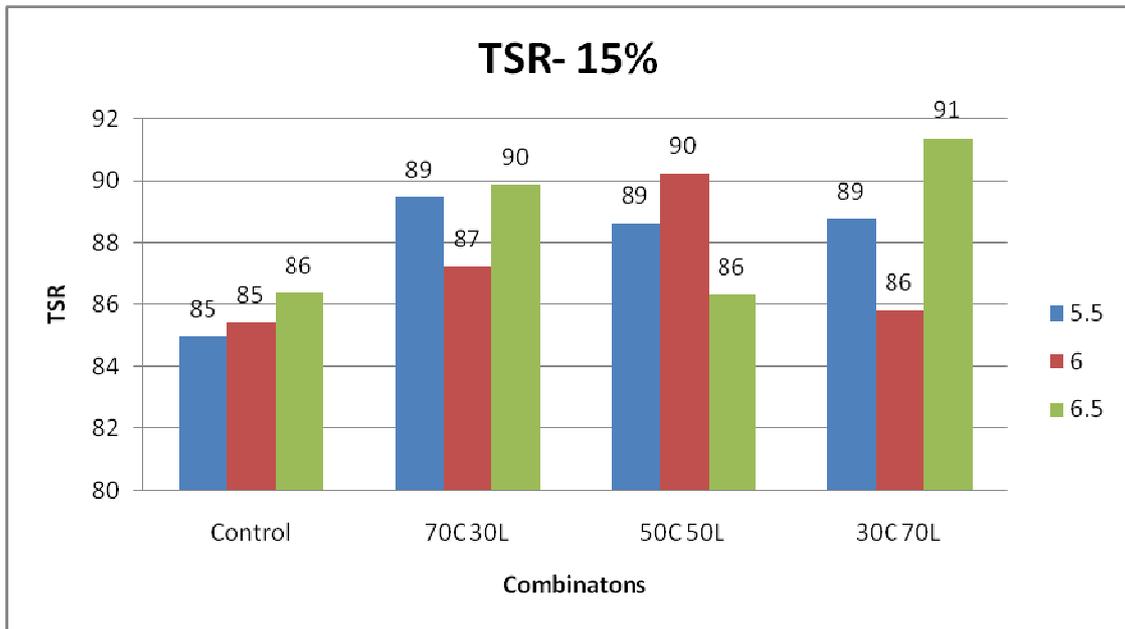


Fig. 6(a): TSR for SMA Mixes with 15% Additive

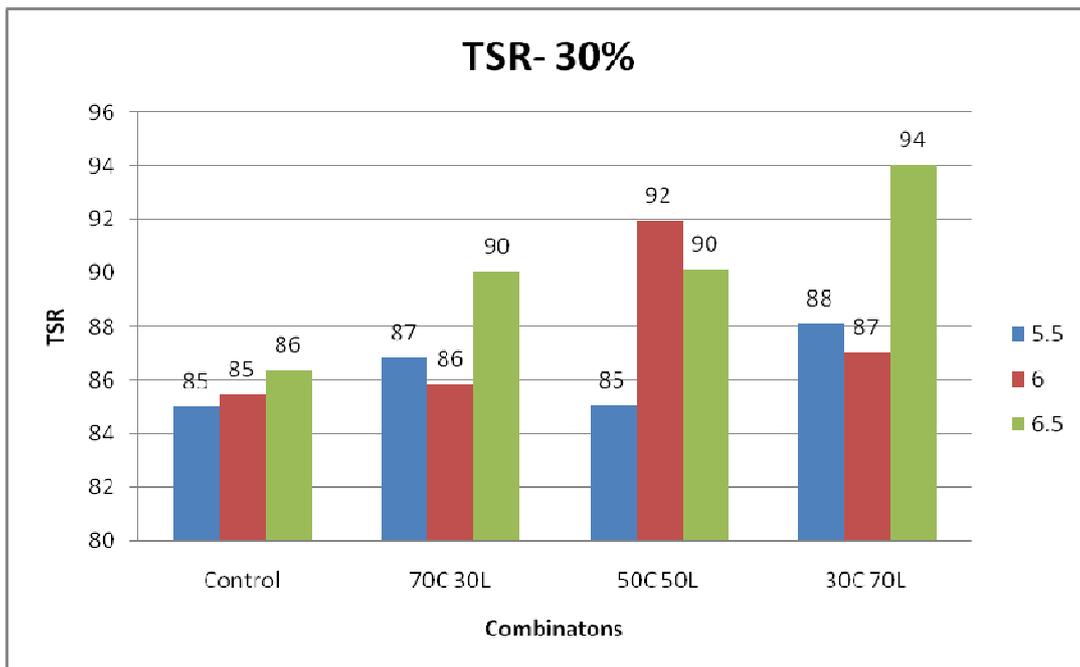


Fig.6(b): TSR for SMA Mixes with 30% Additive

3.6 Drain Down Sensitivity

The variation of Drain down Sensitivity for the sample under uncontrolled condition is given in the Table 10, Fig. 7(a) and 7(b). The Drain down values was in the range of 0.04% to 0.17% by weight of the mix. As per specification requirement,

drain down can be Maximum of 0.3% as the Mix Design parameters. This shows that the Crumb Rubber and LDPE as additive (Combined) sustains the drain down and stabilizes the SMA Mix.

Table 10 Drain Down Sensitivity

Additive	15%			30%		
	5.5	6	6.5	5.5	6	6.5
Binder Content, %	5.5	6	6.5	5.5	6	6.5
Control	0.13	0.16	0.17	0.13	0.16	0.17
70C+ 30L	0.09	0.10	0.07	0.07	0.09	0.09
50C+ 50L	0.11	0.07	0.06	0.09	0.06	0.04
30C +70L	0.07	0.05	0.07	0.09	0.07	0.05

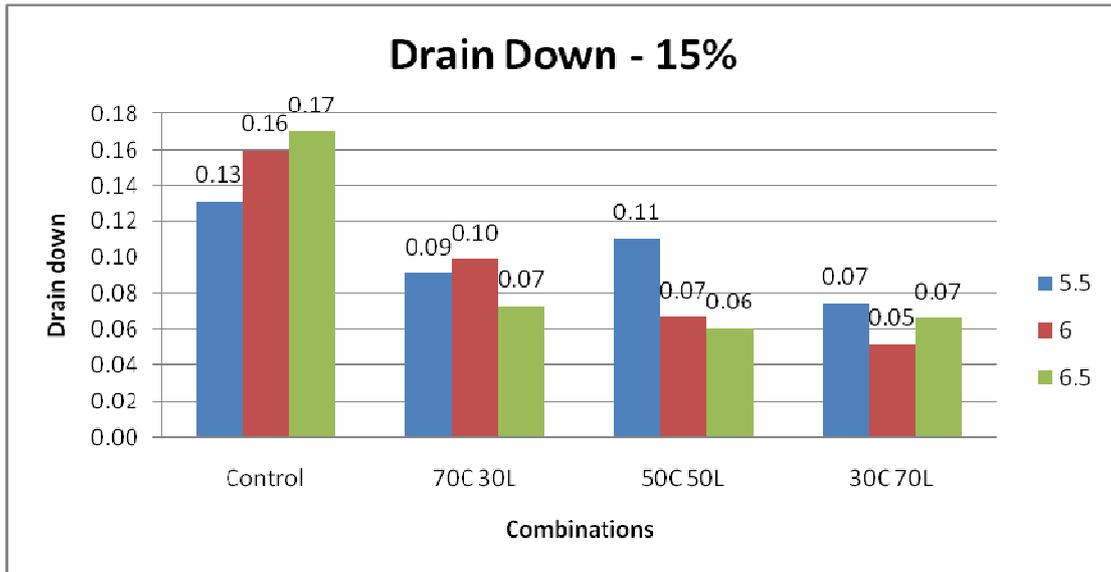


Fig. 7(a): Drain Down for SMA Mixes with 15% Additive

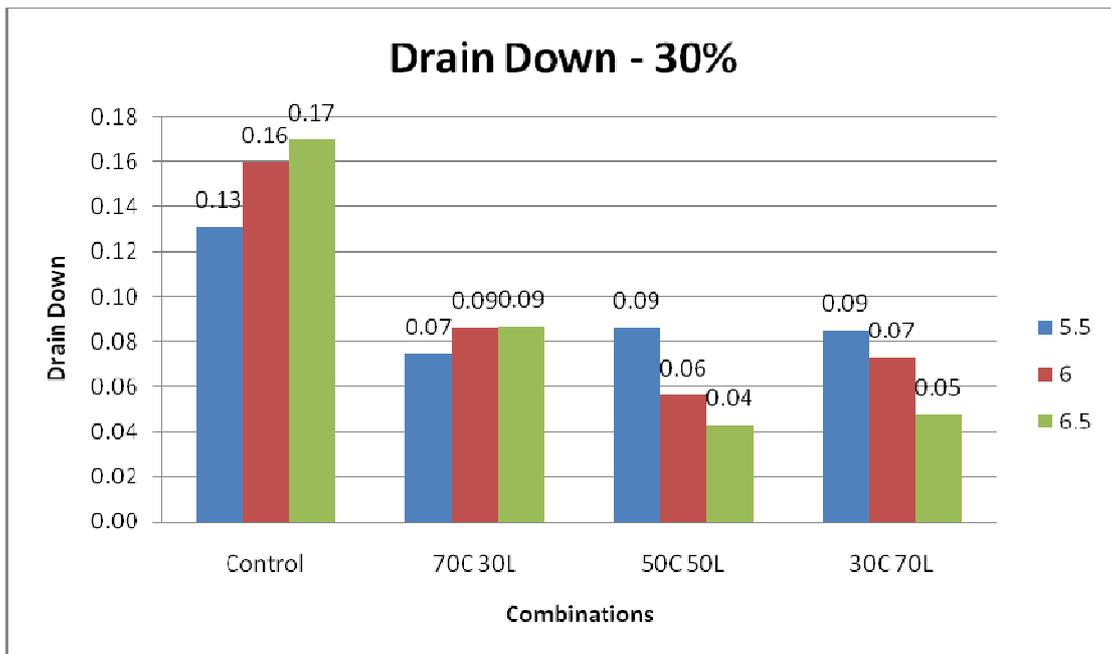


Fig.7(b) : Drain down for SMA Mixes with 30% Additive 3.7 Compressive Strength

The variation of Compressive Strength for Mix with different dosgae of the Crumb Rubber and LDPE as additive in the SMA mixes were shown in the Table 11, Fig. 8(a) and 8(b).

The Compressive Strength for Mix varies from 410 Kg/cm² to 860 Kg/cm² for the various combinations.

Table 11 Unconfined Compressive Strength (kg/cm²)

Additive	15%			30%		
	5.5	6	6.5	5.5	6	6.5
Control	1680	1952	2080	1680	1952	2080
70C+ 30L	2160	2800	2240	2080	2800	2720
50C+ 50L	2000	3040	2880	2720	3040	3520
30C+ 70L	3200	2640	2800	2160	2640	4000

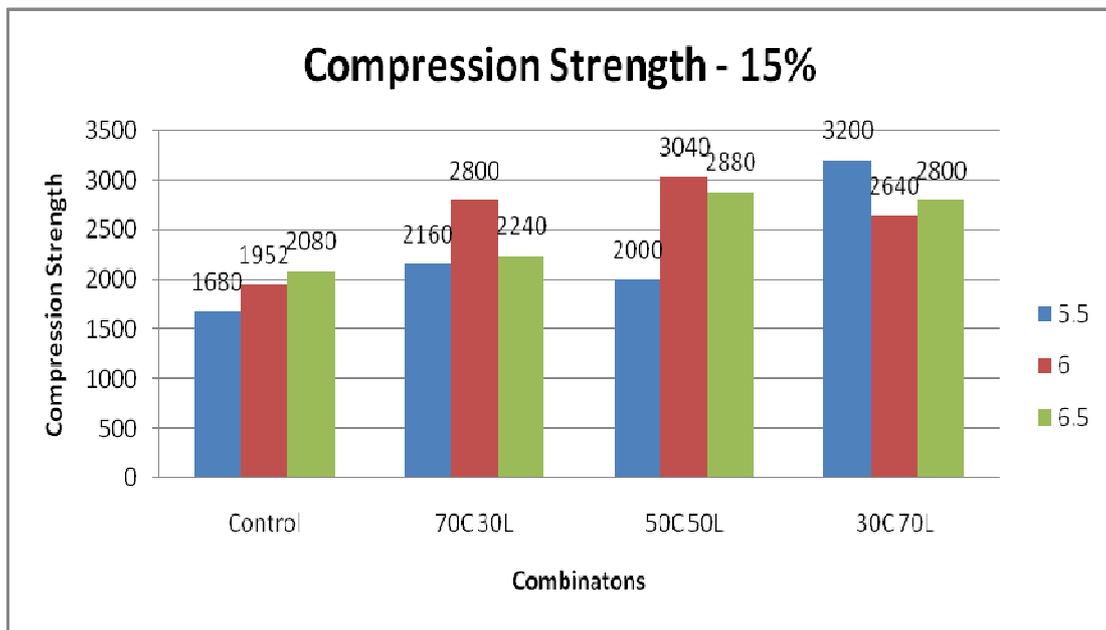


Fig.8(a) Relationship between Compressive Strength Vs Binder content for SMA with 15% Additive

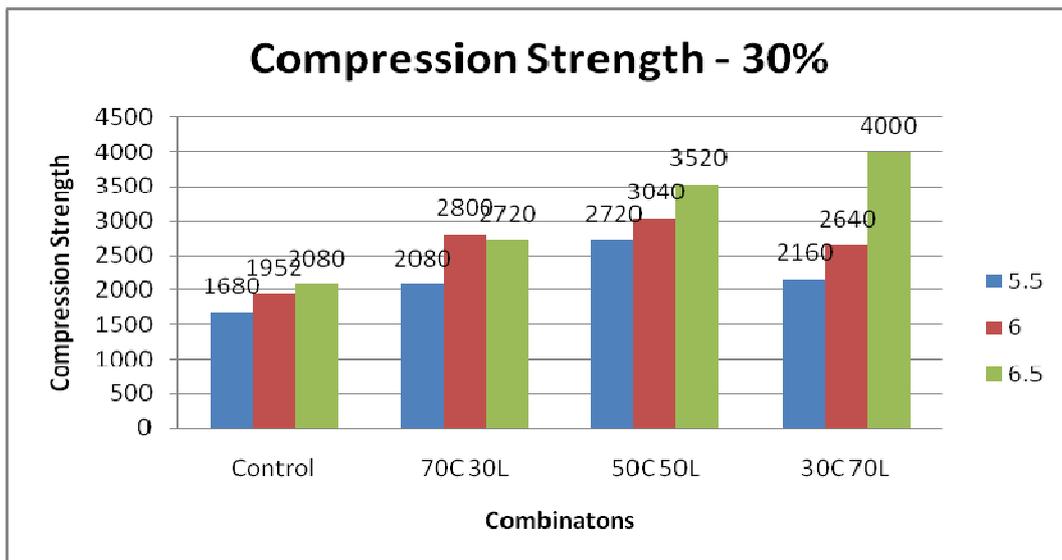


Fig. 8(b) :Relationship between Compressive Strength Vs Binder Content for SMA with 30% Additive

3.8 Properties of SMA Mixture at Optimum Binder Content

OBC for SMA Mix has been estimated considering the Air Voids (V_a), Minimum Voids in Mineral Aggregates (VMA) and

Tensile Strength Ratio (TSR) respectively. Volumetric analyses of SMA mixtures at various binder contents are presented in the Table 12.

Table 12 Volumetric Properties of SMA Mixtures at OBC

Properties	Value Obtained
CR+LDPE Additive by Weight of bitumen, %	30% (30C+ 70L) Combination
Optimum Binder Content by Weight of Aggregate, %	6.50
Optimum Binder Content by Weight of Mix, %	6.10
Bulk Specific Gravity of Compacted Mixture, G_{mb}	2.34
Air Voids, %	3.90
VMA, %	18.82
VCA_{DRC} , %	48
VCA_{MIX} , %	35.18
TSR, %	94
Drain Down, %	0.05
Compressive Strength, kg/cm^2	860

IV. ANOVA ANALYSIS

A NOVA analysis was conducted to determine the effect of CR+LDPE on properties of SMA. In the Single-factor tests of ANOVA, rubber content was chosen as factor and compressive strength were response respectively. The results of ANOVA analysis are summarized in Table 13. It can be seen from Table 13, the case of variance analysis of 15% additive of UCS, value

of $F(1.171950)$ is less than $F_{critical}$ (4.256), it can be concluded that rubber content has no significant effect on the UCS. In case of variance analysis of 30% additive of UCS, value of $F(8.99116)$ is bigger than $F_{critical}$ (4.256), it can be concluded that rubber content has significant effect on the UCS. Therefore, the SMA mixture containing 30% additive has the best performance.

Table 13
Results of ANOVA analysis of Unconfined compressive strength test ($\alpha=0.05$)

	SS	df	MS	F	F _{critical}	p-value
Source of variance (15% additive)						
Between	253824	2	126912	1.17194	4.256	0.8824
Within	974624	9	108292			
Total	1228448	11				
Source of Variance (30% additive)						
Between	1693184	2	846592	8.99116	4.256	0.8856
Within	847424	9	94158			
Total	2540608	11				

V. CONCLUSION AND RECOMMENDATIONS

From the experimental investigations the following conclusions are drawn.

- The Tensile strength Ratio values are found to be in the range 85 - 94 % which is more than 85 % as specified for a SMA mixture.
- The Compressive strength values are found to be in the range 1600 kg/cm² - 4000 kg/cm². The Compressive strength of SMA Mix with Crumb Rubber and LDPE blend as additive improved the longevity from the Compressive strength value.
- The SMA mixes designed with available aggregates showed good stone on stone contact ($VCA_{DRC} < VCA_{MIX}$).
- The 17% Voids in Mineral aggregate and 3 - 5% air voids in the mix were fulfilled as SMA Mix design criteria.
- The Drain down values was in the range of 0.04% to 0.17% by weight of the mix.
- Based on the above performance, Combined Combination of Crumb Rubber and LDPE could be used as stabilizing additive in the form of dry processing showed without affecting the design criteria of SMA mixture.
- The optimum dosage of the Additive was found to be 30 % (Combined Combination with 30% Crumb Rubber and 70 % LDPE) by weight of the bitumen.
- From the results of ANOVA analysis of UCS, 30% rubber content by weight of bitumen has significant effect on best performance.
- The long-term performance of recycled CR+LDPE blend on SMA mixture using dry process will need to be further studied.

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FDI: An Instrument of Economic Growth & Development in Tourism Industry

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Abstract- Foreign direct investment (FDI) is defined as foreign investors stirring their assets into another country where they have control over the management of assets and profits (*Graham & Spaulding, 2005*). It is generally true that the more FDI a country acquires, the more local economic growth and transformation can develop, because foreign companies often bring to the country large sum of funds and new technologies, as well as advanced management skills which allow local industries and regions to gain a lot of experience (*OECD, 2003*).

While talking about Indian scenario, the hotel and tourism industries have been growing rapidly in recent years, bringing in huge revenues through overseas as well as domestic tourists in many parts of India. There was a key rush to inbound tourism in India in 2006 and a double-digit increase in the coming of overseas tourists to India in the same year. Tourism is one of the third largest revenue generators of foreign exchange for India and also employs one of the highest numbers of manpower. *Conde Nast Traveler*, one of the most decorated travel magazines, rated India as one of the hottest destination in the world. According to the World Tourism Organization, India will be the leader in the tourism industry in South Asia with 8.9 million arrivals by 2020. India is gradually emerging as the second most rapidly increasing (8.8 percent) tourism economy in the world over 2005-14 according to the World Travel & Tourism.

Hence, understanding the determinants of FDI is very important for any emerging economy as FDI exerts a larger impact on the economy of country in the short run and a real impact in the long run. The present study examines the foreign direct investment in Indian Tourism Industry, its flow in Indian Tourism Industry and its impact on economy of India.

Index Terms- Tourism Industry, FDI Flow, GDP, Tourism Economy.

I. INTRODUCTION

A Brief Note on Tourism and Hospitality Industry
Hospitality, as an industry segment in itself, is a **US\$ 3.5 trillion service sector within the global economy**.

In India, the tourism and hospitality industries are witnessing a period of exponential growth; the world's leading travel and tourism journal, "*Conde Nast Traveller*", ranked **India as the numero uno travel destination** in the world for 2007, as against fourth position in 2006.

The year 2007 also marked the fifth consecutive year during which India has witnessed **double digit growth in foreign tourist arrivals**.

Along with the rise in foreign tourist arrivals, **foreign exchange earnings** have shown a **robust growth of 25.6%** during January-October 2007 to touch US\$ 6.32 billion as against US\$ 5.03 billion during January-October 2006.

Tourism has now become a significant industry in India, contributing around 5.9 per cent of the Gross Domestic Product (GDP) and providing employment to about 41.8 million people.

As per the World Travel & Tourism Council, the tourism industry in India is likely to generate **US\$ 121.4 billion of economic activity by 2015** and Hospitality sector has the potential to earn US\$ 24 billion in foreign exchange by 2015.

Additionally, India is also likely to become a major hub for **medical tourism**, with revenues from the industry estimated to grow from US\$ 333 million in 2007 to **US\$ 2.2 billion by 2012**, says a study by the Confederation of Indian Industry (CII) and McKinsey.

The booming tourism industry has had a cascading effect on the hospitality sector with an increase in the occupancy ratios and average room rates.

While **occupancy ratio is around 80-85 per cent** – up nearly 10 percent from three years back, the average **increase in room rates** over the last one year has hovered around **22-25%**, *Dewan P.N. Chopra Consultants Private Limited*.

It is pertinent to mention in this context, that according to recent estimates, there are a **total of 110,000 rooms in India, as against a total requirement of approximately 250,000** – demonstrating the untapped potential that continues to exist in this industry.

With a view to **stimulating domestic and international investments** in this sector, the government has implemented the following initiatives:

- **100% FDI** under the automatic route is now permitted in all **construction development projects** including construction of hotels and resorts, recreational facilities and city and regional level infrastructure.
- **100% FDI** is now permitted in all **airport development projects** subject to the condition that FDI for up gradation of existing airports requires FIPB approval beyond 74%.
- A **five year tax holiday** has been extended to Companies that set up hotels, resorts and convention centers at specified destinations, subject to compliance with the prescribed conditions.

- Plans for **substantial up gradation of 28 regional airports** in smaller towns and the privatization and expansion of Delhi and Mumbai airports

The abovementioned initiatives have resulted in **increasing FDI inflows** being witnessed by this industry. For the period April 2000 to November 2007, a total of **US\$ 636 million** in foreign direct investments was channelized towards development of hotels and tourism.

The hospitality industry has also been receiving increasing interest from the Private Equity Sector – investments have tripled from US\$ 60 million in 2004-05 to over US\$ 180 million in 2006-07.

It is estimated that the hospitality sector is likely to see a further **US\$ 11.41 billion in inbound investments** over the next two years.

Several global hospitality majors such as Hilton, Accor, Marriott International, Berggruen Hotels, Cabana Hotels, Premier Travel Inn (PTI) and InterContinental Hotels group have already announced major investment plans in India in recent years.

II. FDI IN TOURISM

With a view to stimulate domestic and international investments in this sector, the government has permitted 100 percent FDI in the automatic route –allowing full FDI into all construction development projects including construction of hotels and resorts, recreational facilities, and city and regional level infrastructure. 100 percent FDI is now allowed in all airport expansion projects subject to the condition that FDI for up gradation of existing airports requires Foreign Investment Promotion Board (FIPB) approval beyond 74 percent. A five year tax holiday has been given to organizations that set up hotels, resorts and convention centers at specific destinations, subject to fulfillment with the agreed conditions. Some international hospitality majors such as Hilton, Accor, Marriott International, Berggruen Hotels, Cabana Hotels, Premier Travel Inn (PTI) and InterContinental Hotels group have already announced major venture plans in India in recent years. It is expected that the hospitality division is expected to see an additional US\$11.41 billion in inbound investments over the next two years.

Table 1: FDI Inflows into India, 1990-2007 (US\$ millions)

YEAR	AMOUNT
1990-91	0
1991-92	0
1995-96	2500
1996-97	3000
2000-01	4000
2001-02	6000
2005-06	7500
2006-07	19000

Source: Reserve Bank of India (RBI)

Note: Data includes acquisition of shares of Indian companies by non-residents.

III. TOURISM INDUSTRY IN INDIA

Tourism sector holds immense potential for Indian economy. It can provide impetus to other industries through backward and forward linkages and can generate huge revenue earnings for the country. In the recent 2007-08 budget, the provision for building tourist infrastructure has been increased from US\$ 95.6 million in 2006-07 to US\$ 117.5 million in 2007-08 (Min. of Tourism, GOI). Tourism is no longer looking at it as a leisure activity, but as a major source of employment. The labor capital ratio per million rupee of investment at 1985-86 prices in the tourism sector is 47.5 jobs as against 44.7 jobs in agriculture and 12.6 jobs in case of manufacturing industries (Market plus Report, Min. of Tourism). Tourism is one of the third largest net earners of foreign exchange for the country and also one of the sectors, which employs the largest number of manpower.

India is rated among the top five travel destinations in the world according to Lonely Planet. ABTA magazine rates India as the most preferred destination on earth. Indian tourism is one of the most diverse products on the global scene. India has 26 world heritage sites. It is divided into 25 bio-geographic zones and has wide ranging eco tourism products. Apart from this it has a 6,000 km coastline and dozens of beaches (WTO 1997). India's great ethnic diversity translates into a wide variety of cuisine and culture. It also has a large number of villages, plantations and adventure locations.

Foreign tourist arrivals are expected to grow to 10 million by 2010-12 and the domestic tourism is expected to increase by 15% to 20% over the next five years as per the Ministry of Tourism expectations basing on the growth in the last one decade. There is a rapid growth in average room rates and is expected to continue until sufficient new supply come on stream (average increase is 21% since 2004-06 in 4& 5 star segment).

Government of India is allowing 100% FDI in Hotels and Tourism, through the automatic route and also identified the investment opportunity of about \$8-10 billion in the next 5 years in tourism sector. India has significant potential for becoming a major global tourist destination. It is estimated that tourism in India could contribute Rs.8,50,000 crores to the GDP by 2020 (approx. 1800 million USD) if you properly plan to develop and invest on Connectivity Infrastructure, Tourism Infrastructure, Tourism Products, Capacity Building and Promotion & Marketing (WTTC report). It is estimated there is a need of around 10 Billion

US \$ required for development of tourism as per the different state tourism estimates for the next five years. When you think about the long term capital requirement of all states, it is estimated around 56 billion US \$ for the next 20 years.

A rapidly growing middle class, the advent of corporate incentive travel and the multinational companies into India has boosted prospects for tourism. India's easy visa rules, public freedoms and its many attractions as an ancient civilization makes tourism development easier than in many other countries. In order to attract more visitors, India needs to increase room supply, open further its skies to increase air capacity, and

upgrade its airports, roads and other infrastructure to global standards. Also tourism development needs to be pursued with a focus on sustainability.

Though the Government of India is allowing 100% FDI in automatic route to India in tourism sector and there is a wide gap between the demand and supply of hotel rooms and other tourism infrastructure projects, we have attracted the FDI for a volume of 660.87 million US \$ which is 1.46 percent of the total FDI inflow into our country from April 2000 to December 2007.

IV. INVESTMENT REGULATIONS

In the Hotel Industry Sector, Foreign Direct Investment (FDI) has been permitted up to 100% under the automatic route. For foreign technology agreements, automatic approval is granted if:

1. Up to 3 % of the capital cost of the project is proposed to be paid for technical consultancy Services.
2. Up to 3 % of the net turnover is payable for franchising and marketing/publicity fees.
3. Up to 10 % of gross operating profit is payable for management fees, including incentives fees.

V. NEED OF FDI IN TOURISM

REASONS TO INVEST IN INDIAN TOURISM

- Economic liberalization has given a new force to the hospitality industry.
- The Indian hospitality industry is increasing at a rate of 15 percent yearly.
- The current gap between supply and demand is predicted to grow as the economy opens and grows.
- The government predicted an additional requirement of 200,000 rooms in the next five years.
- Due to stable political and social conditions in India, there will be an increase in the number of tourist arrivals. India is ranked fourth among the world's must see countries
- The present government in its process has taken a few projects like opening of the partial sky policy. This allows private domestic airline operators to fly on the Indian skies
- An increasingly growing middle class group, the arrival of corporate incentive travel and the multinational companies into India has bright prospects for tourism. India's easy visa rules, public freedoms and its many attractions as an ancient civilization makes tourism development easier than in many other countries
- The 5 star hotel sector has increased the fastest during the last five years at a CAGR of 12 percent. In the coming years, this sector can be divided into three sub-segments Luxury, Business and Leisure. The growth in this segment shows that segment of travelers coming into India. In the last few years India has seen a large inflow of business travelers in the country courtesy to relaxation of the government's stand on FDI for most of the sectors in the country.

- It costs an average of US\$50-80 million to set up 5 star hotels with three hundred rentable rooms in India. The gestation period is generally between 3-5 years.

Table 2: STATISTICAL DATA – Indian Hotel Industry

Size of the Hotel Industry	USD 3.8 Billion
Share of premium segment in the overall hotel market (2008)	USD 2.3 Billion
Expected growth rate from 2008 to 2009	12 percent
Key Players	Indian Hotels, Leela Ventures, ITC Hotels, Oberoi Hotels, Bharat Hotels, ITDC, Kamat Hotels.
Rooms	
Current Supply	About 110,000 hotels rooms
Current Demand	About 150,000 hotels rooms

- According to Economic Survey of 2010-11 the average annual growth rate of hotel and restaurant sector has been 8.8% for the period 2005-06 to 2009-10. However, last two years have not been quite pleasant for the sector as growth faltered badly.
- Till five years ago, the sector was registering a growth of around 15% but slowdown in the economy has affected the growth prospects of the sector badly and the growth rate has dropped to single digit level.
- The sector registered negative growth (-3.41%) in 2008-09 over the year 2007-08, which was due to adverse global economic conditions in this year. But the sector is back in the positive growth territory and clocked a growth of 2.2% in 2009-10.

Table 3: Indian Hotel Industry: Annual growth rate (%)

YEAR	SEGMENT	ANNUAL GROWTH RATE (%)
2005-06	Hotels & Restaurants	17.5
2006-07	Hotels & Restaurants	14.4
2007-08	Hotels & Restaurants	13.1
2008-09	Hotels & Restaurants	-3.4
2009-10	Hotels & Restaurants	2.2

Source : Economic Survey 2010-11

According to the statistics by World Travel and Tourism Council, India ranks 18th in business travel and will be among the top 5 in this decade. With such growth, sources estimate, demand is going to exceed supply by at least 100% in coming years.

Table 4: Number of Hotels — 2010

Hotel categories	No. of Hotels	No. of Rooms
5 star deluxe/5 star	165	43,965
4 Star	770	13,420
3 Star	505	30,100
2 Star	495	22,950
1 Star	260	10,900
Heritage	70	4,200
Uncategorized	7,078	Not available
Total	8,707(Aprox)	1,32,885

Source: FHRAI

VI. INFLUENCE OF FDI IN TOURISM INDUSTRY HOTELS, SUSTAINABLE DEVELOPMENT & FDI

Tourism and Sustainable Development

Tourism is often promoted as a job machine (Cukier, 2002; ILO, 2001; Görg, 2000). According to the ILO, the direct employment in (primarily) hotels and restaurants accounted for around three per cent of total employment worldwide. This share is higher in rural areas with little alternative employment opportunities (e.g. in remote wildlife areas), or in small island economies, such as Mauritius and Barbados, where direct employment in the hospitality sector accounts for approximately 10 per cent of total employment (ILO, 2001, p. 48). At the same time, the quality of jobs and their contribution to economic development is often disputed because of their seasonality, and their servile and low-skilled nature. Also the wages that are paid to especially the lower-ranked employees are sometimes questioned. For example, the ILO established that wages at hotel chains are on average 20 percent below those in other economic sectors (ILO, 2001, p. 121).

Yet advocates of “pro-poor tourism” emphasize that in the context of poverty alleviation, tourism is more relevant than other economic sectors, because it can be labour-intensive, inclusive to marginalized people (e.g. women) and suitable for rural areas with few alternative options for economic development. Even when the numbers of people employed in the sector are relatively low and involve primarily the more skilled persons, the collective income and other livelihood benefits throughout communities can make tourism significant to local poverty reduction (Ashley and Roe, 2002). Other jobs (agriculture, fishing) often pay worse and are physically more demanding, while seasonal or part-time jobs are also attractive in economies where multiple employments prevails (Cukier, 2002). This would explain why almost all employment opportunities associated with tourism in developing countries are highly prized by local residents (Sinclair, 1998, p. 31).

FDI in the Tourism Sector

FDI in the hotel sector towards developing countries has increased substantially in the past decades, reflecting the rising importance of services in total international investments (see e.g. Dunning and Kundu, 1995; UNCTAD, 2007). But despite its substantial international growth, the major hotel chains remain relatively modest in size and their degree of internationalization is also low compared to other industry sectors (Endo, 2006). For example, none of the major hotel multinationals is included in the top 100 of non-financial MNEs, and most employment in the hotel sector is still created at domestically-owned accommodations: foreign-owned firms account for only 10 per cent of worldwide employment in the hotel and restaurants sector in the 1990s – a low proportion compared to most other industry sectors (UNCTAD, 2007).

However, the limited proportion of hotel FDI is slightly misleading since hotels primarily internationalize through non-equity modes, particularly in developing countries (Endo, 2006). The most popular non-equity mode is the management service agreement, under which the business is controlled and managed by a foreign firm, who is not the owner. Management contracts offer a hotel MNE *de facto* control and supervision over day-to-day operations, and secure reasonable proceeds, while avoiding the financial and political risks associated with the sunk costs of ownership. The alternative non-equity mode is the franchising agreement, which awards a local firm the right to do business in a prescribed manner under an existing brand name. This is a less common mode in least developed countries, because of the limited skills and experiences available in these countries (UNCTAD, 2007: pp. 38-39).

Developmental Growth through FDI in Tourism Sector (Opportunity)

In the Financial Year 2008-2009, India’s GDP recorded a growth rate of 6.7 % according to the Central Statistical Organization. The GDP growth in the 2008-2009 can be attributed to a strong service sector, steady foreign direct investment, as well as the government policies that helped to sustained growth rate.

The market size of Hotel industry has more than doubled from about USD 1 billion in 2004 to USD 2.3 billion in 2008. It is estimated that India is likely to have around 40 international hotels brands by 2011.

The growth of the Hotel Industry is largely due to the rising business opportunities, strong economic performance and cross border investments. India has currently base of 110,000 hotels rooms and still face the shortage of 150,000 rooms. There is a mismatch between demand and supply, leading to higher occupancies and average room rates.

Occupancy rates across India have improved from 52 percent in 1999 to 67 percent in 2007-2008. Average Room Rates across cities have improved from USD 51.6 to USD 76.4 in the same period.

Despite the global economic recession, foreign tourist arrival increased to 5.37 million in 2008 from 4.98 million in 2007.

Sports events like IPL and the Commonwealth games have a potential to create demand for both Tourism and Hospitality industry in India.

According to the Indian Tourism ministry, the Indian tourism industry would be the third largest foreign exchange earner in the country in the next three year. Till the end of 2012, foreign tourists will grow at the fastest pace in comparison with the last decade and it is estimated that tourism in India could contribute US\$1.8 billion to India's GDP. These statistics show the seriousness of the Indian government towards tourism. Andhra Pradesh, Uttar Pradesh, Tamil Nadu, Karnataka and Rajasthan are the leading tourism destinations in India in terms of total tourist arrivals. In the next few years, some new states should come into the picture such as Uttaranchal, Madhya Pradesh and a few others. According to the ministry, it is predicted that around US\$10 billion is required for the development of Indian tourism in the next five years. When we think of long term capital requirements for all the states, it would be nearly US\$56 billion in the next 20 years.

VII. INFLUENCE OF FDI IN ECONOMIC GROWTH

Initially, the central government acted as the only source of investment funding for local industries. Foreign investors were not allowed to take part in local economic development. During that time, India's economy suffered from a low development pace and a low growth rate. However, India's national government has opened the economy to investment from outside the country since 1991. Thus, the investment system has been transformed and a series of supportive policies have been proposed to encourage diversification of investment and competition (Economic Analysis, 2007). One of the key elements used to push India's economic reforms is the encouragement of FDI. Since 1991, India's policies toward FDI have undergone various changes in policy priorities. In the late 1991 and early 2000, India's economic policies were characterized by passing new regulations to authorize joint ventures and, setting up Special Economic Zones (SEZs) 1 and "Open Cities" 2. On Joint Ventures using Chinese and Foreign Investment was adopted, granting foreign investment a legal status in India.

The State Council also awarded rights of autonomy in foreign trade to Guangdong and Fujian Provinces and, in 1980, set up four Special Economic Zones (SEZs) in three cities in Guangdong Province (Shenzhen, Zhuhai, Shantou), and one city in Fujian Province (Xiamen). Since 1984, China also has moved to further openness to FDI. In 1984, the concept of SEZs was extended to another fourteen coastal regions. Later, in 1986, in addition to joint ventures, wholly foreign-owned enterprises were also allowed to enter China. In "22 Article Provisions" 3, foreign ventures were granted preferential tax treatment, the freedom to import inputs such as materials and equipment, the right to retain and swap foreign exchange with each other, and simpler licensing procedures.

India's supportive policies toward FDI increased the inflow of FDI in the late 1980s and it became even more frequent in the early 1990s. Since 1992, when India's central authority decided to expand the scale and geographical scope of foreign investment, an increase in the foreign direct investment in India emerged. In the years between 1991 and 2002 the average

foreign direct investment in India was US\$ 2.5 billion. This average increased by seven times to become US\$ 37.5 billion during 2005 ("Low Income Countries in Global FDI Race", n.d.). Subsequently, after India's entry to the WTO, India's investment system entered an expanded internationalization stage and the country has now become one of the top recipients of FDI among developing countries (World Investment Report, 2006).

VIII. CONCLUSION

As we pointed out in the introduction, FDI plays a significant role in expanding the tourism sector in India. This shows that appropriate policy to explore tourism resources and plans to develop new tourist venues and facilities may need to be considered in order to meet the increasing demand of tourism in India expected as a result of continued strong foreign direct investment.

The Travel & Tourism industry provides tremendous opportunity to India in terms of contribution to its GDP and employment generation. According to CII estimates, an additional 1 million visitors can help generate revenues of Rs.4, 300 crore annually. Thus, Government policies, which would focus at increasing tourist arrivals in the country and facilitate investments in tourism infrastructure, would lead to significantly higher multiplier effect on the key economic parameters of the Indian economy.

From the above study following conclusion is recommended as the measures to attract more and more FDI:

- There was need to rationalize the taxation on the hotel industry and adopt a single luxury tax across the country. For provision of single-window clearances at the local, State and Central Government levels to reduce procedural delays.
- Tax holiday would encourage FDI in this sector and more players to set up hotels, to bridge the shortage of rooms which according to Government estimates stood at one lakh rooms.
- Section 72 (A) of the Income Tax Act should be amended such that it is made applicable to the Hospitality sector also by using the word 'undertaking' in lieu of 'industrial undertaking'.
- It is recommended to increase the depreciation rate to 100% in order to incentives hotels to install pollution control equipment and energy generating devices to protect the environment.
- For the calculation of Book profit for the MAT provisions under Sec. 115 JB, Sec 80HHD profits should be allowed as a deduction on par with the deduction available to Sec 80HHC/E/F profits, as under these relevant sections all the assesses deal with foreign Exchange.
- Service Tax should be computed based on the value of service provided, in the nature of VAT; rather than on the gross amount.
- Concessions under Section 10(5) (B) of IT Act should be restored and spa consultants should also be included.
- Inland Air Travel Tax should be applied at the rate of 5% of the basic ticket price.

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Survey of Routing Techniques in Opportunistic Networks

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Abstract- Opportunistic networks are one of the most interesting evolutions of MANETs. In opportunistic networks, route connecting to the mobile nodes never exits, mobile nodes communicate with each other when they got opportunity to communicate. Furthermore, nodes are not supposed to possess or acquire any knowledge about the network topology. Routes are built dynamically, while messages are route between the source and the destination, and any possible node can opportunistically be used as next hop, provided it is likely to bring the message closer to the final destination. These requirements make opportunistic networks a challenging and promising research field.

Index Terms- Opportunistic networks, Routing, Multiple copy routing, Single copy routing

I. INTRODUCTION

In opportunistic networking no assumption is made on the existence of a complete path between two nodes wishing to communicate. Source and destination nodes might never be connected to the same network, at the same time. Nevertheless, opportunistic networking techniques allow such nodes to exchange messages between them. In this scenario messages may have to be buffered for a long time by intermediate nodes, and the mobility of those nodes must be exploited to bring messages closer to their destination by exchanging messages between nodes as they meet[1].

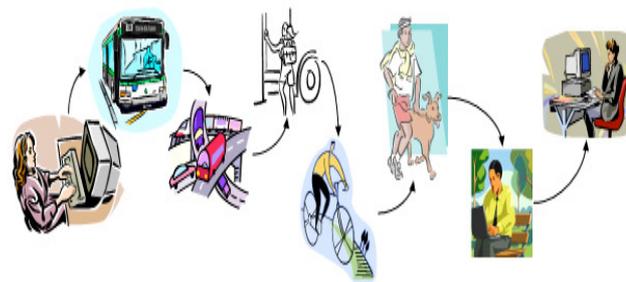


Fig. 1 Opportunistic networking [1].

For example, as is shown in Fig.1, the woman at the desktop opportunistically transfers, via a Wi-Fi link, a message for a friend to a bus crossing the area, “hoping” that the bus will carry

the information closer to the destination. The bus moves through the traffic, then uses its Bluetooth radio to forward the message to the mobile phone of a girl that is getting off at one of the bus stops. The girl walks through a near park to reach the university. Her cellular phone sends the message to a cyclist passing by. By proceeding in the same way some hops further, the message eventually arrives at the receiver. As it is clearly shown in this example, a network connection between the two women never exists but, by opportunistically exploiting contacts among heterogeneous devices, the message is delivered hop-by-hop (hopefully) closer to the destination, and eventually to the destination itself.[1]

II. ROUTING TECHNIQUES IN OPPORTUNISTIC NETWORKS

In opportunistic networks, network resources are constrained. For e.g. node depends on nodes battery power for its working, nodes are subjected to low memory space; also performance of these networks is depends on bandwidth of network. Routing is difficult in opportunistic networks because of no topology defined and frequent disconnections in nodes. In opportunistic networks design of efficient routing scheme is complicated task due to the absence of knowledge about the topology of the network. Routing performance improves when more knowledge about the expected topology of the network can be exploited [2]. Unfortunately, this kind of knowledge is not easily available, and a trade-off must be met between performance and knowledge requirement.

Fig. 2 shows the different routing algorithms in opportunistic networks. At the bottom of Fig.2 we list the examples of each class that we will mention in this paper.

A first classification is based on the number of copies of message are generates while forwarding. Algorithms in which network does not relays the message at all(*single copy based*), and algorithms in which network produces multiple nodes(*multiple copy based*).In the former case, multiple copy based approaches can be further divided in *broad cast based*, in which message floods in networks by each receiver, *history based* algorithms uses previous context information for taking forwarding decision , *network coding based* algorithms codes message before forwarding it and *ferrying based* algorithms relays message between intermediate nodes.

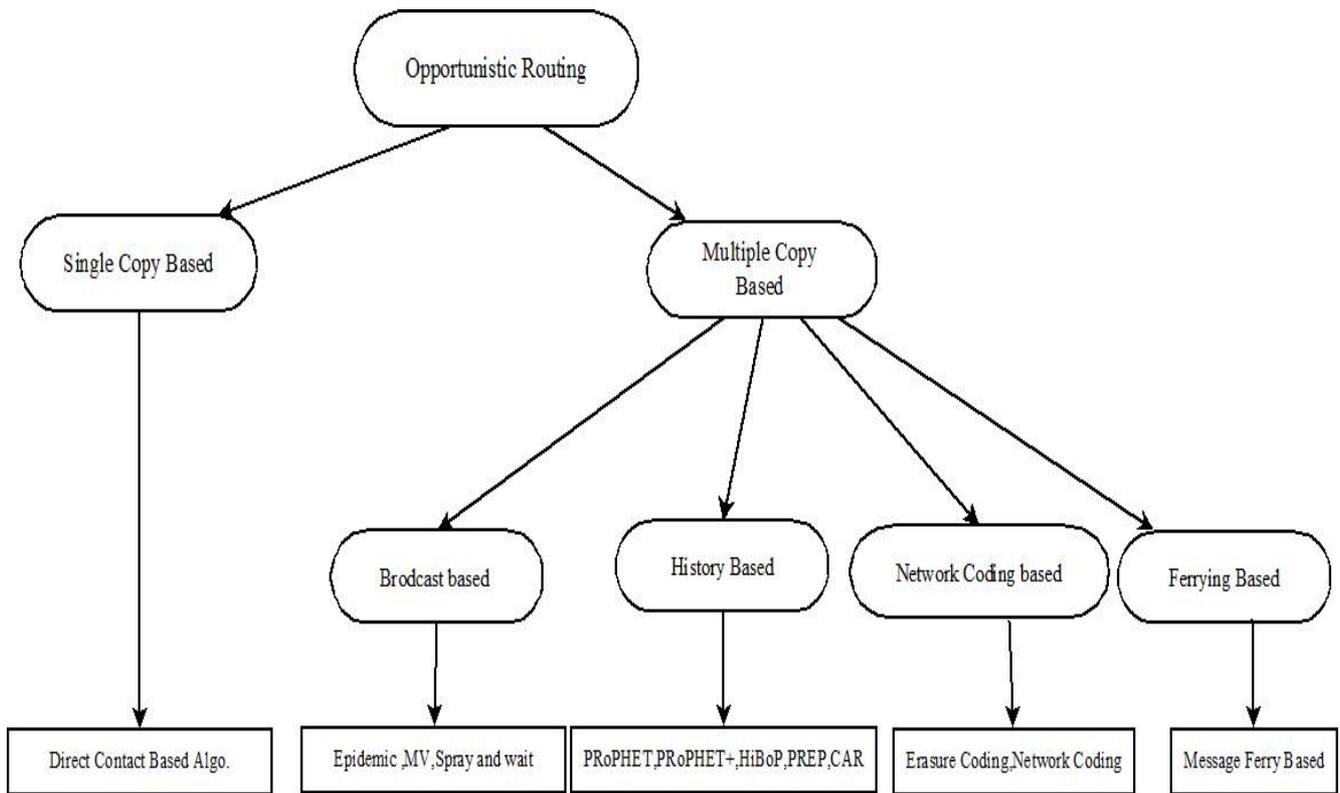


Fig.2 Routing in opportunistic network

dissemination-based techniques suffer from high contention and may potentially lead to network congestion.

III. SINGLE-COPY ROUTING SCHEMES

A. Direct contact based algorithm

Direct contact based algorithm was investigate the problem of efficient routing in intermittently connected mobile networks using single-copy approaches. Spyropoulos [4] proposed a simple single-copy routing called direct transmission routing. In this approach, after the source node generates a message, the message is hold by the source node until it reaches the destination node. The main advantage of this scheme is that it incurs minimum data transfers for message deliveries. On the other hand, although having minimal overhead, this scheme may incur very long delays for message delivery since the delivery delay for this scheme is unbounded [5].

IV. MULTIPLE-COPY ROUTING SCHEMES

A. Broadcast based algorithms

Routing techniques based on message Broadcasting perform delivery of a message to a destination by simply broadcasting it all over the network. This policy is used because, there is no knowledge of a possible path towards the destination nor of an appropriate next-hop node, should a message be sent everywhere. It will eventually reach the destination by passing node by node. Broadcast-based techniques obviously work well in highly mobile networks where contact opportunities, which are needed for data diffusion, are very common. They tend to limit the messages delay, but they are also very resource hungry. Due to the considerable number of transmissions involved,

1. Epidemic routing

Epidemic Routing [6] relies on the theory of epidemic algorithms by doing pair-wise information of messages between nodes as they get contact with each other to eventually deliver messages to the destination. Nodes buffer messages when there is no available path to the destination. An index of these messages called a summary vector is kept by the nodes, and when two nodes meet they exchange them. So doing, each node can determine if the other node has some message that it did not see before and requests it. This means that, as long as there is some available buffer spaces, messages will spread epidemically as a disease, as nodes meet and “infect” each other. Besides the obvious fields of source and destination addresses, messages also contain a hop count field. This field is similar to the TTL field in IP packets and determines the maximum number of hops a message can be sent, and can be used to limit the resource utilization of the protocol.

2. MV routing

The routing protocol *MV* [7] maintains a movement model of the network participants and uses this information to perform routing of messages on the network. It estimates the probability of a particular message being delivered by a given peer, and thus is capable of making informed routing decisions.

The *MV routing* protocol is a further step beyond epidemic routing. Messages are exchanged during pair-wise contacts as in epidemic routing. However, the *MV* protocol introduces a more sophisticated method to select the messages to forward to an

encountered node. Basically, the choice depends on the probability of encountered nodes to successfully deliver messages to their eventual destinations. The delivery probability relies on recent-past observations of both the *meetings* between nodes and the *visits* of nodes to geographical locations. The name *MV* protocol itself comes just from *Meetings* and *Visits*.

3. Spray and wait

Spray and Wait [8] bounds the total number of copies and transmissions per message without compromising performance. Under low load, Spray and Wait results in much fewer transmissions and comparable or smaller delays than flooding-based schemes, under high load, it yields significantly better delays and fewer transmissions than flooding-based schemes, and it is highly scalable, exhibiting good and predictable performance for a large range of network sizes, node densities and connectivity levels; what is more, as the size of the network and the number of nodes increase, the number of transmissions *per node* that Spray and Wait requires in order to achieve the same performance decreases, and it can be easily tuned online to achieve given QoS requirements, even in unknown networks.

b. History data based algorithms

Routing techniques based on history data are uses the information related to the nodes, like number of encounters with destination, movement pattern. These techniques reduce the number of messages forwarded in the network, and consume fewer resources than broadcast based algorithms.

1. HiBOP protocol

HiBOP [9] protocol is based on the concept of using context information for routing decision. Basically forwarding is based on the concept of opportunity to reach a certain destination, measured in term of probability of carrying the message closer to the destination. Messages are forwarded only to nodes with higher probability of getting them closer to the destination. The innovation of HiBOP is how context is exploited to evaluate these probabilities. The main idea behind this is that message sender includes more information about the destination than a simple network address. The sender should include (any subset of) the destination's Identity Table which includes information about the user itself. Delivery probabilities are evaluated based on the match between this information and the context stored at each encountered node High match means high similarity between the node's and the destination's context. Actually, delivery probabilities can be seen as a measure of this similarity. This technique is performs better than the Epidemic and PROPHET in message delivery.

2. PROPHET

In the Probabilistic Routing Protocol using History of Encounters and Transitivity [10], the selection of the best neighbour node is based on how frequently a node encounters another. Prophet uses a probabilistic metric called *delivery predictability* that indicates how likely it is that *A* will meet *B*, and thus that will be able to deliver a message to *B*. When two nodes meet, they exchange their summary vectors, which contain their delivery predictability information. If two nodes do not meet for a while, the delivery predictability reduces. When the sender wants to send a message to the destination *D*, it will look

for the neighbour node that has the highest amount of time encountering *D*, meaning that has the highest *delivery predictability* to *D*. This property is further transitive.

3. Context aware routing

In the *Context-Aware Routing (CAR)* protocol [11] each node in the network is in charge of producing its own delivery probabilities towards each known destination host. Delivery probabilities are exchanged periodically so that, eventually, each node can compute the best carrier for each destination node. The best carriers are computed based on the nodes' context. The context attributes needed to elect the best carrier are, for example, the residual battery level, the rate of change of connectivity, the probability of being within reach of the destination, the degree of mobility. When the best carrier receives a message for forwarding, it stores it in a local buffer and eventually forwards it to the destination node when met, or alternatively to another node with a higher delivery probability. CAR provides a framework for computing next hops in opportunistic networks based on the *multi-attribute utility theory* applied to generic context attributes.

C. Network coding based algorithms

The concept of network coding allows interior nodes of a network to not only forward but also to process information they receive.

1. Erasure based coding

Erasure codes [12] operate by converting a message into a larger set of code blocks such that any sufficiently large subset of the generated code blocks can be used to reconstruct the original message. The basic idea is to erasure code a message and distributes the generated code-blocks over a large number of relays. Instead of sending a full copy of the message over a relay, only a fraction of code-blocks are sent over each relay. This controls the routing overhead in terms of bytes transmitted, and the average delay can be reduced to a small constant. Erasure coding can also help to combat packet loss due to bad channel quality or packet drops due to congestion.

2. Network coding based

Network-coding-based routing [13] is similar to probabilistic routing but is based on network coding. Network coding is a relatively recent field in information theory. In contrast to simply forwarding the information contained in the packets, nodes may send out packets with linear combinations of previously received information.

Network-coding-based routing limits message flooding. Just to give a classical example, let *A*, *B*, and *C*, be the only three nodes of a small network. Let node *A* generate the information "a" and node *C* generate the information "c". Then suppose the information produced needs to be known at all the nodes. Hence, node *A* and node *C* send their information to node *B*. Then node *B*, rather than sending two different packets for "a" and "c", respectively, it broadcasts a single packet containing "a" xor "c". Once received "a" xor "c", both nodes *A* and *C* can finally infer the missing information (i.e., node *A* can infer "c" and node *C* can infer "a"). Network coding-based routing outperforms

flooding, as it is able to deliver the same information with a fewer number of messages injected into the network.

D. Ferrying based algorithms

The Message Ferrying (MF) [14] scheme is a proactive approach for data delivery in sparse networks. It introduces non-randomness to node mobility and exploits such non-randomness to provide physical connectivity among nodes. In an MF scheme, the network devices are classified as message ferries or regular nodes based on their roles in communication. Ferries are devices which take responsibility of carrying messages among other nodes, while regular nodes are devices without such responsibility. There are many different ways to introduce non-randomness in node movement, as in the node-initiated MF scheme ferries move around the deployed area according to known routes, collect messages from regular nodes and deliver messages to their destinations or other ferries. With knowledge about ferry routes, nodes can adapt their trajectories to meet the ferries and transmit or receive messages. By using ferries as relays, nodes can communicate with distant nodes that are out of range.

V. CONCLUSION

Opportunistic network is an emerging technique getting growing interest in networking research community. The opportunistic network places different research challenges in this field. In this paper, we provide a quick overview of the routing schemes uses in opportunistic network for providing solutions to various issues in an opportunistic network. This work is aimed to serve as an introductory material to people who are interested in pursuing research in this area.

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Monitoring and Notifications Solution for Web Server (MANOWS)

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Abstract- At Manows, it is expected that as a result of the increasing complexity of the internet and the intensifying e-competition, web-servers availability and smooth functionality will become an even more important competitive advantage for its users. Manows will check target web-server(s) continuously in a pre-defined interval for availability and send notifications if it finds any exceptional scenario. A very flexible configuration strategy will be adopted in Manows so that the web-servers to be monitored, notification methodology and alert recipients can be configured very easily and efficiently in it. The project will be developed with open standards and J2EE, a platform independent technology; its users therefore need not bother about the operating system where it will be running.

Index Terms- web-server, notifications, Website monitoring

I. INTRODUCTION

Monitoring and notification solutions of web server (MANOWS) refers to automatic detection of changes made to World Wide Web pages and notification to interested users by email or other means. Whereas search engines are designed to find web pages, Change Detection and Notification (CDN) systems are designed to monitor changes to web pages. Before change detection and notification, it was necessary for users to manually check for web page changes, either by revisiting web sites or periodically searching again. Efficient and effective change detection and notification is hampered by the fact that most servers do not accurately track content changes through Last-Modified or ETag headers.

Several web browsers have extensions or options that let people know when e-mail is waiting in one or more of their inboxes. Other e-mail notification programs run independently and display a message or icon when e-mail arrives. E-mail notification programs are very similar to the clients commonly used to send and receive e-mail. The difference is that e-mail notification applications are written specifically to check and report the performance of the web-server. Some programs allow people to read and even answer their mail, and others simply display a link that connects people to a web mail interface. In general, however, e-mail notification programs don't have the ability to save mail to disk or to organize messages into folders.

Web-server monitoring is the process of testing and verifying that end-users can interact with a website or web application. Website monitoring is often used by businesses to ensure that their sites are live and responding.

Website monitoring companies that offer website performance monitoring allow businesses to simulate the actions of thousands of visitors to a website and observe how it responds. They also simulate visitors across multiple geographies and servers Internet connections. Performance monitoring tools send out alerts when pages or parts of a website malfunction, which allows the webmaster to correct issues faster.

Website Security monitoring is also used to verify that a domain (and web site) is not only responding properly, but has not been hacked, blacklisted or hijacked. Website monitoring can be done from both inside and outside of a corporate firewall. Traditional Network Management solutions focus on inside the firewall monitoring, whereas external performance monitoring will test and monitor performance issues across the Internet backbone and in some cases all the way to the end-user.

Inside firewall monitoring is done by special hardware appliances which can help you determine if your internal applications' sluggish performance is caused by: design of applications, internal infrastructure, internal applications or connections to any public internet. External performance monitoring is also known as end-user monitoring or end-to-end performance monitoring.

II. ABOUT XML

XML (eXtensible Markup Language) is a meta-language; that is, it is a language in which other languages are created. In XML, data is "marked up" with tags, similar to HTML tags. In fact, the latest version of HTML, called XHTML, is an XML-based language, which means that XHTML follows the syntax rules of XML.

XML is used to store data or information. This data might be intended to be by read by people or by machines. It can be highly structured data such as data typically stored in databases or spreadsheets, or loosely structured data, such as data stored in letters or manuals.

An XML document is made up of the following parts.

- An optional prolog.
- A document element, usually containing nested elements.
- Optional comments or processing instructions.

III. THE PROLOG

The prolog of an XML document can contain the following items.

- An XML declaration
- Processing instructions
- Comments
- A Document Type Declaration

The XML Declaration

The XML declaration, if it appears at all, must appear on the very first line of the document with no preceding white space. It looks like this.

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
```

Processing Instructions

Processing instructions are used to pass parameters to an application. These parameters tell the application how to process the XML document. For example, the following processing instruction tells the application that it should transform the XML document using the XSL stylesheet `beatles.xsl`.

```
<?xml-stylesheet href="beatles.xsl" type="text/xsl"?>
```

As shown above, processing instructions begin with `<?` and end with `?>`.

Comments

Comments can appear throughout an XML document. Like in HTML, they begin with `<!--` and end with `-->`.

```
<!--This is a comment-->
```

A Document Type Declaration

The Document Type Declaration (or DOCTYPE Declaration) has three roles.

1. It specifies the name of the document element.
2. It may point to an external Document Type Definition (DTD).
3. It may contain an internal DTD.

Empty Elements

Not all elements contain other elements or text. For example, in XHTML, there is an `img` element that is used to display an image. It does not contain any text or elements within it, so it is called an empty element. In XML, empty elements must be closed, but they do not require a separate close tag

IV. ELEMENTS

Every XML document must have at least one element, called the document element. The document element usually contains other elements, which contain other elements, and so on. Elements are denoted with tags.

V. ATTRIBUTES

XML elements can be further defined with attributes, which appear inside of the element's open tag.

VI. CDATA

Sometimes it is necessary to include sections in an XML document that should not be parsed by the XML parser. These sections might contain content that will confuse the XML parser, perhaps because it contains content that appears to be XML, but is not meant to be interpreted as XML. Such content must be nested in CDATA sections

VII. WHITE SPACE

In XML data, there are only four white space characters.

- (1) Tab
- (2) Line-feed
- (3) Carriage-return
- (4) Single space

VIII. XML SYNTAX RULES

XML has relatively straightforward, but very strict, syntax rules. A document that follows these syntax rules is said to be well-formed.

- (1) There must be one and only one document Element.
- (2) Every open tag must be closed.
- (3) If an element is empty, it still must be closed.

Poorly-formed: `<tag>`

Well-formed: `<tag></tag>`

Also well-formed: `<tag />`

- (5) Elements must be properly nested.

Poorly-formed: `<a>`

Well-formed: `<a>`

- (6) Tag and attribute names are case sensitive.
- (7) Attribute values must be enclosed in single or double quotes.

IX. JAVA DOM: THE DOCUMENT OBJECT

The DOM Document object represents an XML document. When you parse an XML file using a Java DOM parser, you get back a Document object.

The two most commonly used features of DOM are:

- (1) Accessing Child Elements of an Element
- (2) Accessing Attributes of an Element

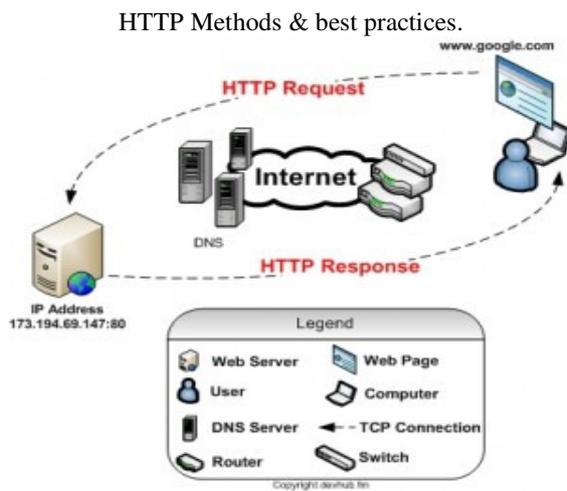
The DOM Document Element

A DOM object contains a lot of different nodes connected in a tree-like structure. At the top is the Document object. The Document object has a single root element, which is returned by calling `getDocumentElement()`.

X. HTTP REQUEST

The following introductory topics will be discussed in this article:

- The life-cycle of an HTTP request & response.
- Anatomy of an HTTP request & response.



The life-cycle of an HTTP request commonly looks like this:

- (1) A user visits the URL of a website.
- (2) This creates a request which is routed to a web server via the internet (a network of DNS's, routers and switches) over HTTP (Hypertext Transfer Protocol).
- (3) The web server receives the HTTP request and responds to the user with the web page (or content) which was requested.

XI. HTTP RESPONSE CODES

OK 200

The request was fulfilled.

Bad request 400

The request had bad syntax or was inherently impossible to be satisfied.

Internal Error 500

The server encountered an unexpected condition which prevented it from fulfilling the request.

Moved 301

The data requested has been assigned a new URI.

Reading from and Writing to a URLConnection

The URLConnection class contains many methods that let you communicate with the URL over the network. URLConnection is an HTTP-centric class; that is, many of its methods are useful only when you are working with HTTP URLs. However, most URL protocols allow you to read from and write to the connection. This section describes both functions.

Reading from a URLConnection

a URL Connection object and gets an input stream from the connection. The connection is opened implicitly by

calling `getInputStream`. Then a `BufferedReader` is created in the input stream which reads the data.

```
import java.net.*;
import java.io.*;
public class URLConnectionReader {
    public static void main(String[] args) throws Exception {
        URL oracle = new URL("http://www.oracle.com/");
        URLConnection yc = oracle.openConnection();
        BufferedReader in = new BufferedReader (new
        InputStreamReader(
            yc.getInputStream ());
        String inputLine;
        while ((inputLine = in.readLine ()) != null)
            System.out.println(inputLine);
        in.close();
    }
}
```

The output from this program is identical to the output from the program that opens a stream directly from the URL. You can use either way to read from a URL. However, reading from a URLConnection instead of reading directly from a URL might be more useful. This is because you can use the URLConnection object for other tasks (like writing to the URL) at the same time.

Writing to a URLConnection

Many HTML pages contain forms — text fields and other GUI objects that let you enter data to send to the server. After you type in the required information and initiate the query by clicking a button, your Web browser writes the data to the URL over the network. At the other end the server receives the data, processes it, and then sends you a response, usually in the form of a new HTML page.

Many of these HTML forms use the HTTP POST METHOD to send data to the server. Thus writing to a URL is often called posting to a URL. The server recognizes the POST request and reads the data sent from the client.

For a Java program to interact with a server-side process it simply must be able to write to a URL, thus providing data to the server. It can do this by following these steps:

1. Create a URL.
2. Retrieve the URLConnection object.
3. Set output capability on the URLConnection.
4. Open a connection to the resource.
5. Get an output stream from the connection.
6. Write to the output stream.
7. Close the output stream.

The anatomy of an HTTP request:

As a web developer, an important area to understand is the method portion of an HTTP request. The method tells the web server what kind of request is being performed on a URI. So if you type in the URL `www.google.com/finance` (for example). You are requesting the `/finance` URI. Within the `/finance` URI the HTTP request has to define an HTTP method. The method portion of an HTTP request contains the following definition options:

```
Method      = "OPTIONS"  
            | "GET"  
            | "HEAD"  
            | "POST"  
            | "PUT"  
            | "DELETE"  
            | "TRACE"  
            | "CONNECT"  
            | extension-method  
extension-method = token
```

XII. SENDING MAIL THROUGH JAVA

The Java Mail API provides support for sending and receiving electronic mail messages. The API provides a plug-in architecture where vendor's implementation for their own proprietary protocols can be dynamically discovered and used at the run time. Sun provides a reference implementation and its supports the following protocols namely,

- Internet Mail Access Protocol (IMAP)
- Simple Mail Transfer Protocol (SMTP)
- Post Office Protocol 3 (POP 3)

The first thing is that a Mail Session has to be established with some properties for sending or receiving a mail. The mandatory property is the server name then, it is optional to provide the port information, and it is needed if it is different from the default port of 25. Then we construct a Message object for the Mail session by populating the information like sender, receiver, subject and text.

Then the message is sent by calling the Transport.send() method.

XIII. COLLECTIONS

Collections (sometimes called containers) are holders that let you store and organize objects in useful ways for efficient access. What will be efficient depends on how you need to use the collection, so collections come in many flavors. Most programming environments provide some collection types, ranging from impoverished up through gargantuan.

In the package java.util you will find interfaces and classes that provide a generic collection framework. This framework gives you a consistent and flexible set of collection interfaces and several useful implementations of these interfaces. You've already been briefly introduced to some of these, such as the interfaces List, Set, Map, and Iterator, and implementations ArrayList and HashMap.

The collection framework is designed to be concise. The principle is to have a core set of valuable collection abstractions and implementations that are broadly useful, rather than an exhaustive set that is complete but conceptually complex and unwieldy.

One way to keep the size down is to represent broad abstractions in the interfaces rather than fine-grained differences. Notions such as immutability and resizable are not represented by different interface types. The core collection interfaces

provide methods that allow all common operations, leaving it to specific implementations to refuse to execute particular improper operations by throwing the unchecked java.lang.UnsupportedOperationException. The collections interfaces are:

- Collection<E> The root interface for collections. Provides such methods as add, remove, size, and toArray.
- Queue<E> A collection with an implied ordering in its elements (extends Collection<E>). Every queue has a head element that is the target of specific operations like peek and poll.
- Map<K,V> A mapping from keys to at most one value each. (Map does not extend Collection, although the concepts meaningful to both maps and collections are represented by methods of the same names, and maps can be viewed as collections.)
- SortedMap<K,V> A map whose keys are sorted (extends Map<K,V>).

The interfaces SortedSet and SortedMap guarantee that iteration through the elements is done in sorted order. The java.util package also provides several useful concrete implementations of these interfaces that will suffice for most of your needs. For example:

- TreeSet<E> A SortedSet implemented as a balanced binary tree. Slower to search or modify than a HashSet, but keeps the elements sorted.
- LinkedList<E> A doubly linked List and Queue implementation. Modification is cheap at any size, but random access is slow.
- HashMap<K,V> A hashtable implementation of Map. A very generally useful collection with relatively cheap lookup and insertion times.
- TreeMap<K,V> An implementation of SortedMap as a balanced binary tree to keep its elements ordered by key. Useful for ordered data sets that require moderately quick lookup by key.

Nearly all the implementation classes in java.util are both Cloneable and Serializable. The exceptions are PriorityQueue which is not Cloneable, and WeakHashMap which is neither.

XIV. STEPS FOR MANOWS

1. Create a XML file which contains the URL to be checked and the messages to be sent for some particular status codes. It also contains the email ID to which the notification email is to be sent.
2. The next step is to validate the XML. If the validation is true then goto the next step otherwise repeat this step until it becomes true.
3. Then the XML is parsed using the DOM parser.
4. In this step, the URL request is made which means the particular URL whose status is to be checked makes the request.

5. The status code which is received after sending the request for that particular URL is checked.
6. The email is sent to the email ID mentioned in the XML document for that particular status code.

XV. MAIN RESULTS

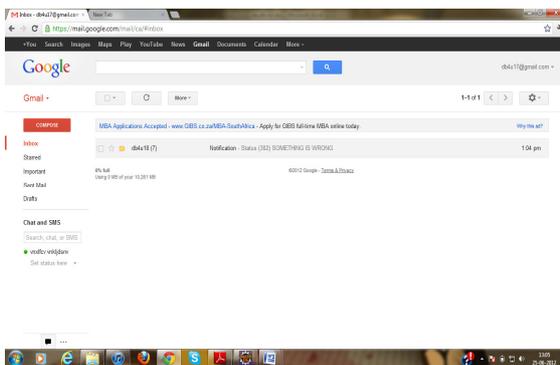


Figure:2

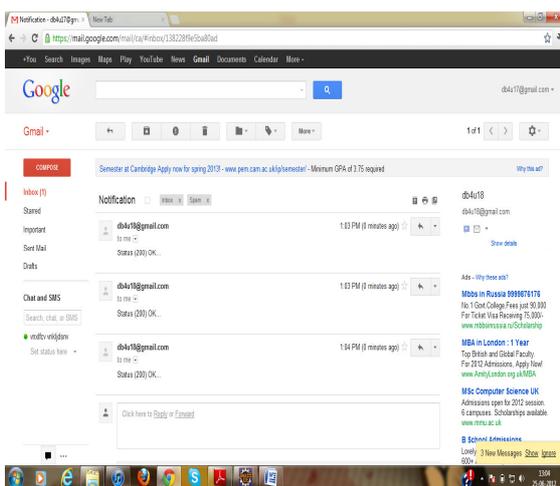


Figure: 3

A typical validation requirement for an application written in code or script is to validate an XML document as the document is parsed. The objective is normally to read the document from a disk file or stream, parse it, then process the data as the application requires. As long as the parsing phase doesn't complain as the XML document is read in, the application can take it for granted that the XML document it is working with is valid.

XVI. III. CONCLUSIONS

In today's information age competition, a smoothly operating Web site provides a distinct competitive advantage. On the Internet, the only hard currency is attention. A Web site that fails to deliver its content, either in a timely manner or at all,

causes visitors to quickly lose interest, wasting the time and money invested in the web site development. Failure of Web site quickly sends your potential customers to the "just a click-away" competitor.

Web monitoring is good for business. The Internet as a productivity tool has wide acceptance but recent changes have brought new distractions costing business some of those productivity gains. The Internet can be controlled but needs to be done in a way that allows for employee buy-in, self monitoring and self enforcement to be successful.

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Architecture of an Automated CBA System Using ERP Model

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Abstract- In this paper , a model is proposed which integrates the database, customer queries, transactions, and all other specifications used in ERP systems, then use enhanced & latest data mining techniques to integrate decision making and forecast flows. The proposal of the paper is based on the data mining effects using ERP framework. By using the various properties of ERP's and background we collect the data from central database in cluster format which is based on the action taken against the queries generated by the customers. Furthermore, the clustered data used by ARM Algorithm to extract new rules and patterns for the enhancement of an organization. This is a complete architecture of data mining applications on ERP framework to find out the answers of upcoming queries. This will make the best association between the customers and organization. It act as a base for a CRM system as it permits the company itself to recommend other products by e-mail. The model is basically consist of three layers 1) CRM 2) ERP 3) KNOWLEDGE DISCOVERY. Here the third layer is the proposed layer, since the Knowledge discovery can be defined as the extraction of contained, hidden and useful information from the large database. So in this presented model this layer also deal with the central database containing data collected from any department of ERP and CRM layers. Since customer's queries contain unlimited attributes and characteristics of data. By utilizing the benefits of third layer in the proposed model we used enhanced variation of Apriori algorithm i.e distributed cba Algorithm for effective and high-quality results.

Index Terms- Association, Classification, Distributed cba algorithm , Data mining, ERP Model .

I. INTRODUCTION

Over the past few years, the capabilities of data generation & collection have increased rapidly. With the rapid growth of Internet, and the advances in data collection tools have provided us with a vast amount of data. These changes have contributed improvement in quality as the essential component systems have been established, but to shape the quality of infrastructure must provide hardware and software and the infrastructure can be associated with conditions. The problem is that we can increase the concurrency and transaction system for high quality we have. We can do this when we create timing and synchronization between tasks use some relationships to merge exist phases to close them together and monitoring action take places between phases. In order to maximize customer satisfaction levels,

synchronization is a new technique that should be used on practical software to create the balance in organizational structure. In order to extend the market competitiveness of enterprises, the structural and functional aspects of ERP system must adapt to the characteristics of the E-commerce times, with the support of internet technology, realize the organic integration of enterprise, partners and customers based on the same Ecommerce platform. Information technology is an attempt to integrate combined methods for providing a suitable solution that increases customer satisfaction level is. In order to present confident and dependable environment we have replaced integrated distributed systems with the integrated central systems. So many comprehensive reviews on the proposed framework and models were used to present new framework. That using these techniques and methods we can solve problems related to repetitive processes using concurrency in the implementation of data mining technique and resolve problems related to it desirable. Within this framework we have proposed distributed cba algorithm

II. EXPERIMENTAL MODEL

The proposed model shown in the Fig.1, described the working of all concerned departments exist in every organization. The traditional structure of an organization is divided into two layers. Each layer has its own departments and officials having specific responsibilities and burden. This is basically the combination of CRM and ERP which are essential part of the enterprise. We extend this layering structure by adding knowledge discovery layer, as a third layer where the association rule generation and classifier generation from the large database will be handled by using data mining technique like distributed cba Algorithm, which is better than Apriori Algorithm.

A. Description of Three Layers:

I. Crm Layer: In our model we presented customer relationship management as an outer view. Whenever a customer contact with the company the customer supporting officer receive customer's request. This layer has much importance because it predicts the customer's behavior having direct communication with the customer. These requests includes queries, complaints, suggestions and orders then forward these requests to the inner view enterprise resource planning. (ERP) through the query generator. After taking action on the perspective request the answer will forward through

the CRM Layer. And result will also be saving in the database for knowledge discovery view.

II. Erp Layer: The important part of the model is ERP Layer. In this view each department have equal access to a single database that holds the customer's data or complaints. In this layer the customer queries ERP's rotating and evaluating by the concern department. For example a customer contact with customer support department (CRM layer) after initial review and statistics this query will throw to the ERP Layer. The department is responsible to find the solution and give proper reply to the customer and forward feedback back to

customer through CRM layer as well as in the central database for future assistance[5].

III. Knowledge Discovery Layer: As per the abstract in the presented model this layer is involved to discover the knowledge from the organization's central database having variety of data deposited from any department of ERP and CRM layers. The datasets collected in database has several attributes and characteristics according to the queried customer. In order to reflect the applicability of this layer we have used data mining techniques for better results. The various techniques are described below-

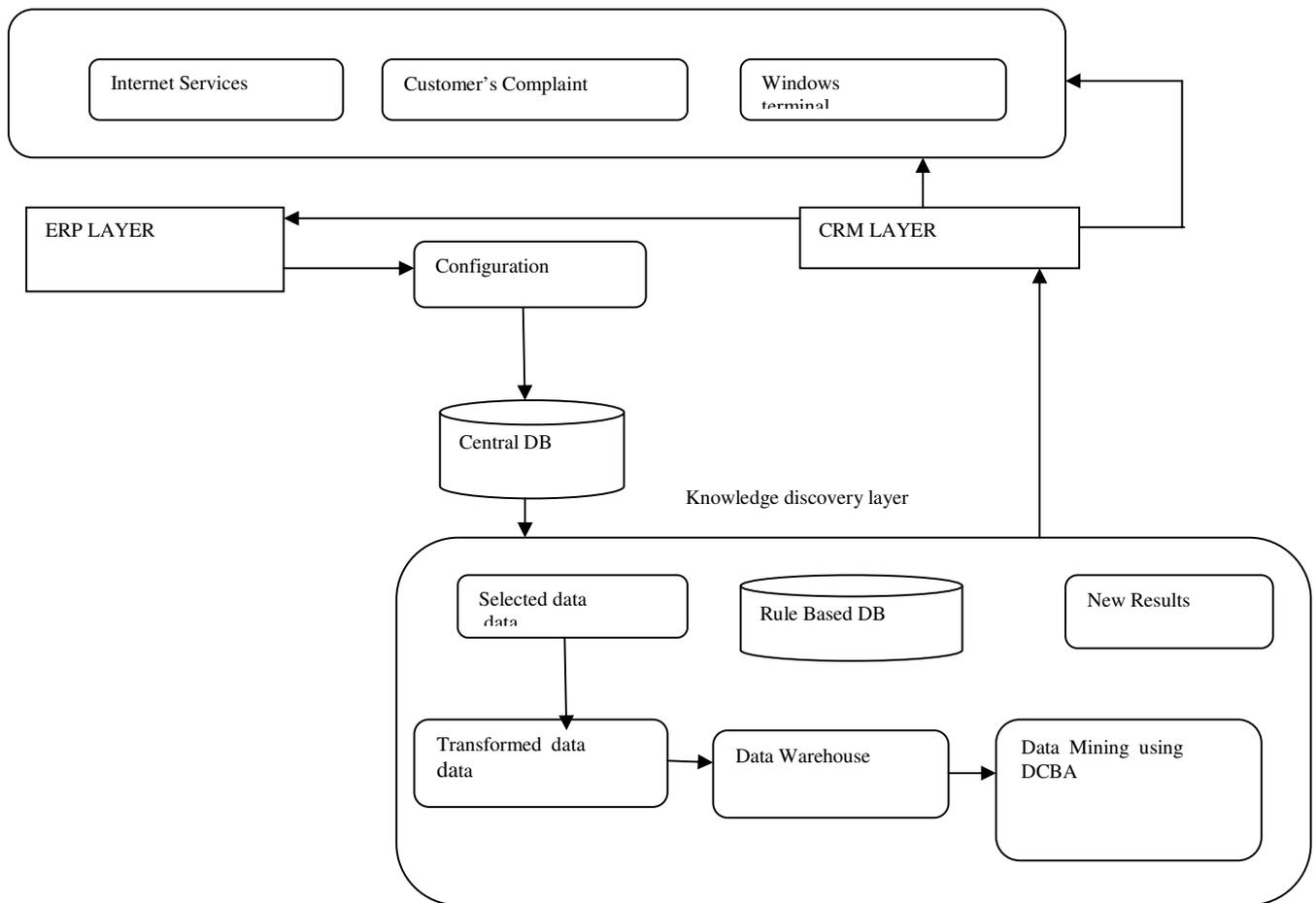


Fig-1 ERP MODEL

b. *Classification*: Classification [Han and Kamber 2000] is to build (automatically) a model that can classify a class of objects so as to predict the classification or missing attribute value of future objects (whose class may not be known). It is a two-step process. In the first process, based on the collection of training data set, a model is constructed to describe the characteristics of a set of data classes or concepts. Since data classes or concepts are predefined, this step is also known as supervised learning (i.e., which class the training sample belongs to is provided). In the second step, the model is used to predict the classes of future objects or data [3].

c. *Association*: Association analysis is the discovery of what are commonly called association rules. It studies the frequency of items occurring together in transactional databases, and based on a threshold called support, identifies the frequent item sets. Data can be used to find association between several attributes, generate rules from data sets, this task is known as association rule mining [12]. Given a set of transactions, find rules that will predict the occurrence of an item based on the occurrences of other items in the transaction. The goal of association rule mining is to find all rules having support \geq minsup (minimum support) threshold and confidence \geq minconf (minimum confidence) threshold [3]. Moreover, association rule mining can be viewed as a two-

step process, first, find all frequent itemsets: items satisfying minimum support. Second, generate strong association rules from the frequent itemsets: these rules must satisfy minimum support and minimum confidence. Furthermore, data mining can be applied in ERP data also where association between the several attributes of customer queries provides the result of future prediction of expected solution of the customer queries and department activities.

D. Distributed Classification based on Association rule (DCBA) Algorithm:

Association-based classification attracts special interests in the past several years. Essentially, association based classification integrates the classification technique with the association technique by building a classification model based on the association rules mined. It differs from other approaches in that it examines different variables in the classification space simultaneously instead of examining only one variable at one time. Association-based classification has been proven effective for very sparse and high-dimensional data.

Reference [7] Bing Liu et al proposed Classification Based on Association rules (CBA) algorithm as an integration of classification rule mining and association rule mining (Bing Liu et al, 1998). The Integration was done by focusing on mining a special subset of association rules called class association rules (CARs).

The Problem for CBA algorithm can be stated as follows:

Assume a relational table D with n attributes. An attribute can be discrete or continuous. (CBA also works with transactional data) There is a discrete class attribute (for classification). For a continuous attribute, it is discretized into intervals.

Item: (attribute, value) Let I be the set of all items in D , and Y be the set of class labels. A class association rule (CAR) is an implication of the form: $X \rightarrow y$, where $X \subseteq I$, and $y \in Y$.

A rule $X \rightarrow y$ holds in D with confidence and support (as in normal association rule mining).

CBA algorithm was carried out in three stages:

- (1) Find the CARs set using CBA-RG algorithm, which is based on Apriori algorithm
- (2) Build Classifier based on CARs set using training data
- (3) Apply the Classifier for data mining (predict which class a new item belongs to)

Therefore, the main focus to improve CBA algorithm is to How can we better choose the CARs set using association rule mining how can we generate more accurate classifier. Bing Liu suggested using multiple s_{min} to solve the above problem using the following algorithm: Bing Liu et al has attacked on both frontiers. As we know, the key parameter in association rule mining is the s_{min} . It controls how many rules and what kinds of rules are generated. Earlier CBA system follows the original association rule model and uses a single s_{min} in its rule generation. However, this is inadequate for mining of CARs since many practical classification datasets have uneven class frequency distributions. Using a single s_{min} will result in one of the following two problems:

If we set the s_{min} value too high, we may not find sufficient rules of infrequent classes.

If we set the s_{min} value too low, we will find many useless and overfitting rules for frequent classes. $s_{min,i}$: For each class c_i , a different minimum class support is assigned. The user only gives a total s_{min} , denoted by t_s_{min} , which is distributed to each class according to their class distributions as follows:

$$s_{min,i} = t_s_{min} \times \text{freqDistr}(c_i)$$

The formula gives frequent classes higher s_{min} and infrequent classes lower s_{min} . This ensures that sufficient rules for infrequent classes will be generated and will not produce too many overfitting rules for frequent classes. Regarding c_{min} , it has less impact on the classifier quality as long as it is not set too high since we always choose the most confident rules. With a sound set of CARs, accurate classifier can be obtained using the high precedent rules on a training data set. Various algorithms are available for fulfilling this job proposed a simplest algorithm [6].

(1) Sort the set of generated rules R according to the relation " $>$ ", which is defined as Given two rules, r_i and r_j , $r_i > r_j$ (also called r_i precedes r_j or r_i has a higher precedence than r_j) if

- i. the confidence of r_i is greater than that of r_j , or
- ii. their confidences are equal, but the support of r_i is greater than that of r_j , or
- iii. both the confidences and supports of r_i and r_j are the same, but r_i is generated earlier than r_j ;

(2) Using the rules in R to cover the training data (in sorted sequence). After each rule, the covered cases by the rule are removed. A set of rules C is selected from R that covers all training data, where, $R = \langle r_1, r_2, \dots, r_n, \text{default_class} \rangle$.

(3) Discard those rules in C that do not improve the accuracy.

III. FUTURE WORK

The proposed layered architecture will be enhanced by using more enhanced data mining techniques and new rules will be generated in future for the enhancement of an organization. Advanced ERP tools will be used to extend the existing work and create convenient method for the customers to avail the organization's facilities with ease. Since CBA is useful to integrate classification and association mining so it is beneficial where there is a need to-

1. mine highly distributed data
2. produce an accurate classifier. (compared with C4.5)
3. produce better quality data necessary for business enterprises.
4. Solve a problems in classification systems.
5. Able to create classifier with data on disk rather than in memory.

IV. CONCLUSION

The layered model in this paper will be able to solve the problems regarding all the customers queries i.e according to the customer need They can easily contact the organization and can purchase the organization products very easily. The knowledge discovery layer utilizing CBA algorithm generates

new rules and classifiers for the betterment of an organization for future correspondence to improve the growth of the customers for an organization. This algorithm performs better than the Apriori algorithm since the strength of CBA is its ability to use the most accurate rules for classification. However, the existing techniques based on exhaustive search face a challenge in the case of huge amount data due to its computation complexity. In today's technological environment, the databases may be scattered over different locations and heterogeneous. We will combine CBA and distributed techniques to develop a distributed CBA algorithm to mine distributed and heterogeneous databases. CBA running decently on top of a meta database layer, which hide the distributed nature of the underlying data sources.

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