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Mini-Bot: a Patrol Robot with Multi Mechanical Joint and Swap Algorithm

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Abstract- The main contribution of this paper is an improved method for charging the patrol robot, without human machine interaction. The robot retains their charging position as per the commands stored in the memory. The other feature in this patrol robot is design of a track wheel, which helps to move in the rough terrain surface with high precision. A single folded mechanical joint is set up with the base for the site surveillance and which is rotated 360 degree. For the real time visuals a camera is mounted on the top of the mechanical joint. All the control commands are exchanged between the base station and robot through zig bee module. A battery monitoring mechanism is also attached with the system. As the battery charge reaches the threshold level, drive the robot to the charging panel with the proper command which is stored in the memory of the microcontroller.

Index Terms- robotics, locomotion, arm, charging

I. Introduction

Robot is a machine to execute different task repeatedly with high precision. Thereby many functions like collecting information and studies about the hazardous sites which is too risky to send human inside. Robots are used to reduce the human interference nearly 50 percent. Robots are mainly in different types like fire fighting robot, metal detecting robot, rescue robots, patrol robots other humanoid robots etc. Mostly used in industrial purpose, military, defense, research and development etc. The focus for the patrol robot applications are on difficult surfaces and simple smooth platforms. Some patrol robots use their small size model, for the easy site assessment. However the small size robots will have a problem while climbing over the steps higher than their height and want to move fast. There are some jumping patrol robots which try to move over the high obstacles by using a pneumatic cylinder, which also having the problem of gravity and stability. For the better surveillance of the vital environment visual sensor must be placed at certain height. Hence a camera is fixed on the tip of the joint. such as the mini bot will equipped with the track wheeled method along with the charging option to overcome this problem.

This paper focuses on the systems of hardware and software which control robot locomotion and mechanical arm movement. It gives the details to the hardware and battery monitoring system as well. Section two and three gives literature survey and limitations and idea of new methodology. In section four, the robot mechanical design and hardware parts are explained. Section five gives the methodological design. And section six gives basic software aspects. Section seven shows the result and discussion last section gives the conclusion and the future work of the robot.

II. Hardware Concept

The main design concept is using the simple method but highly effective and reliable. The block diagram of the patrol robot system is shown in fig 1and fig 1.1. All of controlling commands are sent from the base station computer to robot via zig bee. The controlling commands compose of the locomotion control, robot's navigation path and multi-joint mechanical arm control. In order to monitor video in real time, a wireless surveillance camera is mounted on the mechanical joint. The controlling commands are generated from the base station. The codes are transmitted with the help of terminal window. On the receiver side zig bee is configured as receiving purpose. A separate power station is setup for the independent power delivery to the motors and to the on board. A secondary back up power source is also arranged. All the control commands are received and compared with the help of predetermined program which is loaded in the microcontroller. A battery monitoring mechanism is setup along with the board for the awareness of the current charge level. Whenever the voltage level reaches the threshold value, the driving motors will get the power to drive the robot to the charging station. The movement of the robot is based on the commands stored in the memory during the real time. Commands are executed in last in first out, will be executed by swap algorithm.

A stepper motor is fixed at the base of the mechanical joint. This will help to rotate the arm up to 360 degree. This takes 8 steps to complete one rotation. Thus the surveillance became easier. DC gear motors are also attached to other mechanical joints for several purposes like stretching the arm, tilting the camera and one at the charging terminal for rotating the flap to make the contact with the charging station

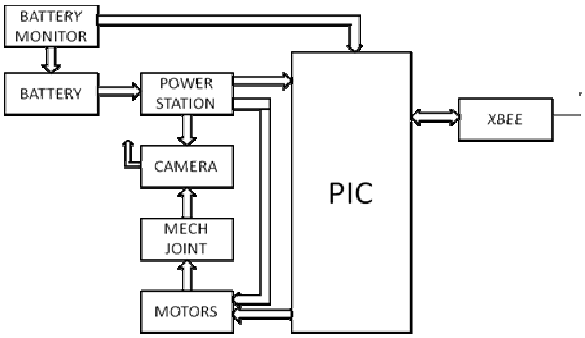

Fig.1 Receiver side

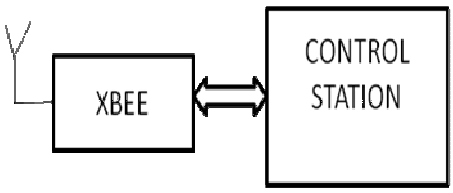

Fig. 1.1 Base station

III. LITERATURE REVIEW AND LIMITATION

The major criteria for the patrol robots are the navigation path. Several methods are implemented for the path following purposes like developing a sensor packages and algorithms [14]. Such a robots designed on these aspects should lack on the simplicity of the hardware. This will also increment the software complexity. Other approaches like stereo vision based obstacle avoidance and visual servings, both follows algorithms and image recognition methods [15]. Hence high end processors and modules are needed to compute the path. In order to overcome this difficulty some map creation as well as artificial route mapping approaches are used [18][20][21][23]. But the mathematical computation becomes much more complex. Especially by locating the position of the robot using the markov localization method, bayes approach. This will take large amount of time to fix the position of the robot and also the next goal positions. All of these executions will drain too much power and it will affect the system performance.

IV. NEW METHODOLOGY

In order to reduce the complexity in both the hardware and software, we are introducing a robot with a swap algorithm along with track wheel. By this we can reduce the power consumption and it will lead to minimize the software as well as hardware complexity. Thereby the cost of the robot should be an economical one. With the usage of swap algorithm the robot can easily driven to the charging panel without any other human machine interactions. Mostly we can reduce the computational time.

V. MECHANICAL DESIGN

Robots are several types wheeled, tracked, and legged, multi robots, vibration types. The simplest are wheeled robots, while tracked wheels are used because of their ability to move in rough terrain surface and their greater stability. The mini bot is tracked wheel vehicle. They are relatively lightweight about 10 kg. They are quite active and fast in unstructured environments and they also perform well on uneven terrain. The whole robot structure is constructed in mild steel and the mechanical joints are effectively works with gears.

A. Body and Driving System

Thick aluminum sheet is folded to be the base frame. The locomotion driving system, all motors and mechanical joint sets and the batteries are placed in this frame in order to have the low level centre of gravity. Two 12V DC motors are used for driving base wheels separately. Both are controlled bi-directionally. Mechanical joint is fitted at the centre of the robot. With suitable commands from the operator the joint moves.

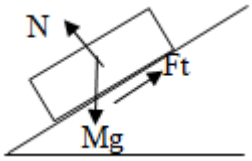

Fig. 2 Free body diagram

When a solid body slides over a rough or smooth stationary surface, a force is exerted at the surface of contact by the moving body. This force is frictional force and is always acting in the opposite direction [25]. Consider a simplified model of the system as shown in Fig. 3. The minimum torque required for climbing a surface with slope of 20° is calculated by second law of Newton. The mini bot can be covers the steps up to 20°, because the height of the wheel is 8cm.

$$F=Ma$$

Assume the linear acceleration and thus the rotational acceleration of the wheels to be zero.

$$a=0$$

$$Ft-mg\sin\theta$$

$$Ft= mg\sin\theta; \quad \text{let } m=10kg$$

$$Ft=33.5N$$

The torque becomes,

$$T=Ft*r\approx 10Nm$$

The locomotion system consists of two separate sides connected to the main body while a motor independently drives the track at each side. So the desired torque is obtained by dividing the T/2 [3].

$$T=5Nm$$

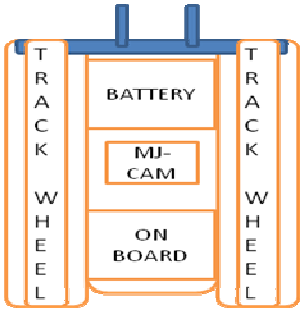

Fig. 3 Hardware model

B. Flipper and Driving System

The flippers (dark color flap) are created in order to raise the charging terminal up for better connectivity, which is shown in the fig 3. Another 12V DC motors and transmission chains are required for flipper driving. Separate commands are generated for this action.

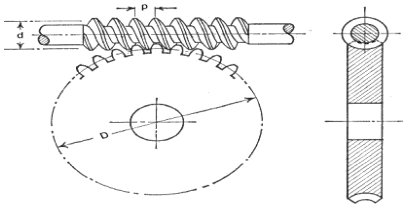

Fig. 4 worm gear

For a large speed reduction worm gear is used as shown in fig.4. It consists of a large diameter worm wheel with a worm screw meshing with teeth on the periphery of the worm wheel. The worm is similar to a screw and worm wheel is similar to a screw and worm wheel is similar to a section of a nut. As the screw wheel rotates leads to rotate the wheel also.

C. Mechanical joint

The mechanical arm does credit to the mini –bot. This enables the robot to expand its tracks whenever it needs to close vision on the obstacles. It helps the robot to explore in many ways such as, from high level and able to get vital signs of victims [12][15][4][17][16]. In Fig. 5 shows the drawing of mechanical arm. Because the pay load at the tip of arm is small and the arm structure weight is not much, DC motor with gear set still can regulate the joint angle quite well. Arm motor is coupled to the planetary gear set with 20:1 worm gear set, which results a maximum speed of 4rpm. Let 'h' be the height from base to the joint. The angle of rotation is determined by θ_1 and θ_2. If two rotational angles could change between 0and 360 degrees, the work-space should be between a spherical surface and a cylinder. Therefore, the work-space is between a semi-spherical surface and a cylinder. A stepper motor is fixed at the bottom of the mechanical joint for the full surveillance. It takes 8 steps instead of 4 to complete one complete rotation.

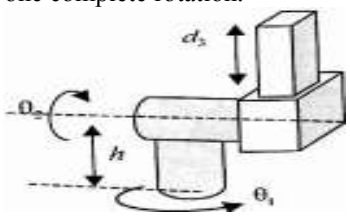

Fig. 5 Mechanical joint

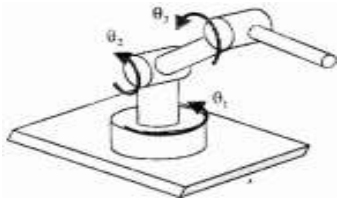

Fig. 6 Mechanical arm

D. Visual sensor

This part is the place to install sensors which are used for searching vital sign of the victims like camera [23]. The second and the third rotary joints cannot freely rotate between 0 and 360 degree in practice. Therefore, the work-space cannot be a complete spherical volume, as shown in Fig.6. A camera is mounted in the top of the mechanical joint, which is used for getting the real time visuals, to have the site study. The data collected by the camera is transmitted to the receiver which is attached to the PC and the data is displayed on the suitable window.

VI. METHODOLOGICAL DESIGN

Here we are implementing the mini bot with two new methodologies like battery monitoring system and is followed by a swap algorithm. Charging the battery is a challenging task in robotics [5]. Robots like automatic charging, solar charging robots having some complexity in the coding. But automatic charging robots will move to the area where the electric field is present. For this high end processors are used. A monolithic integrated circuit LM3914 is used to monitor the battery charge level. This senses the voltage levels of the battery and drives the 10 light emitting diodes based on the voltage level. This IC works in two modes DOT/BAR mode. In BAR mode the current consumption is much more. In order to avoid this we are using the DOT mode, which blinks only the respective LED. When the battery charge reaches the threshold level, this will interrupt the microcontroller. There by the driving wheels get the power and remaining motors are disabled. The movement of the robot depends up on the commands stored on the memory during the running process. These commands are then executed by a swap algorithm. The robot is then driven to the charging panel. This will executed in last in first out manner. The charging of the robot can be held at the charging panel.

For the patrol robot navigation several methods are used like sensing the paths, graphical user interface, map following algorithms and compass, other Kalman filtering methods[1][2][3][14][20]. All these approaches are somehow complex. This can be overcome by using the EEPROM of the microcontroller. PIC16F877A has 256 bytes of EEPROM inside it. So memory can use it to store data that need on a permanent basis and we can read it back from it. There are two functions to accomplish the task. Eeprom_Read and Eeprom_Write. Eeprom_Read function returns an integer and takes a parameter of the address from which the data has to be fetched. Eeprom_Write takes two parameters the first one is the address and the second one is the data.

```
unsigned short Eeprom_Read(unsigned int address);

void Eeprom_Write(unsigned int address, unsigned short data);
```

Most of the robot will navigate with different algorithm.[22][24][18][19]. The robot will navigate with respect to the commands from the user. All the running commands are stored in the memory and also a timer is set to determine how long the commands are executed. Now the current position of the robot is at B after starting from A. Whenever it needs to return, the last stored command will execute first (LIFO). If the last executed command is forward, that swaps it into backward command at the same time the timer starts decrements the value. If the path having the deviation as shown in fig.7, halts and proceeds to the left and move forward. At the time of returning,

initially the command is fetched and checked which command is executed lastly. Let the last executed command is forward. Then it swaps it in to backward command by calling the forward function in the program. Similarly,

Backward ≈ Forward
Left ≈ Left
Right ≈ Right

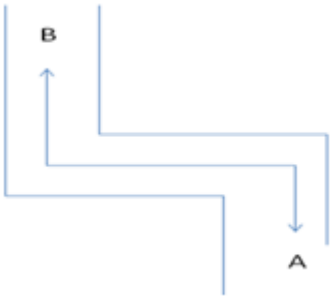

Fig. 7 Navigation path

VII. SOFTWARE ASPECT

Onboard software is mainly developed with micro C. This software interfaces between the operator station software and the robot by receiving operator's command to control all robot functions. Simulations have been executed both in Mat lab and PIC simulator. In Mat lab the approaches were implemented under ideal hypothesis, more realistic settings. The commands are sends through serial communication with the help of terminal window to zig bee module. Zig bee module is configured as a transparent mode for the normal transmission. On recharging and navigation of the robot swap algorithm is executed. Real time visuals can be captured and displayed on the window with the help of surveillance camera. A tunable receiver is connected to the base station for proper reception.

VIII. RESULT AND DISCUSSION

The proposed robot was successfully designed and implemented. With the help of swap algorithm the navigation operation was also effective. Thereby the power consumption is reduced. Battery monitoring system is also worked well. The limitation of this robot is obstacle detection, far objects cannot be detected. Instead of IR we can use ultrasonic sensors.

IX. CONCLUSION AND FUTURE WORK

The mini bot robot was designed and implemented. The patrol robotic system with track wheel type and gearing, driving method has been briefly described. Its performances were observed to be excellent in unstructured environments. The development of this mini-bot robot can be adapted to fit many other applications easily by changing the top part of the robot. Single stretched mechanical arm is designed and implemented. It cannot stretch not much longer. This can solve with the design and implementation of robot with more degree of freedoms mechanical arm which can stretch to 150 cm or more. For better the access of the robot instead of zig bee we can choose WIFI/internet. Instead of using the internal memory, SD card can be implemented. Hence large amount of information can be stored.

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Drivers of Retail Shopping: An Exploratory Study

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Abstract- Over the last few years, retail has become one of the fastest growing sectors in the Indian economy. Traditionally, Indian retail sector has been characterized by the presence of large number of small –unorganized sectors. However, over the last half decade, the Indian consumers' market has seen a significant growth of various retail formats such as supermarkets, department stores, discount stores, hypermarkets etc. The innovations in retail formats brought by retailers have been providing new paradigms in the act of shopping. The shoppers look for a wide range of choices of products, quality and prices. Consumers are now showing preferences for shopping malls, which enable them to shop a variety of products under one roof and offer shopping experience in terms of ambience and entertainment. The present paper aims at evaluating the consumers' attitude towards nearby market, big bazaars and shopping malls and to analyze the related reasons age wise, education wise and income wise. The basic purpose is to find out the reasons of patronizing a store gender wise and to unfold the consumers' preference to shopping malls.

Index Terms- retailing, stores, malls, customer

I. Introduction

India is one of the largest economies in the world. The gradual increase in GDP and the purchasing power of Indians provides an excellent opportunity for organized retailing. The fast and furious pace of growth of the Indian economy is the driving force for Indian consumerism. Projections by analysts suggest that India has the potential to be labeled the fastest-growing economy and outpace the developed economies by 2050. India presents a significant market with its young population just beginning to embrace significant lifestyle changes. The demographic and economic facts widely quoted are undoubtedly impressive but — in order to assess the true nature of retail opportunities, we need to understand the deep transformation that is occurring in Indian consumer behaviour due to changing lifestyles, rising aspirations and the emergence of a dynamic youth culture. Against the backdrop of an accelerating modern retail revolution, India offers to be an attractive destination for global corporations and leading retailers seeking emerging markets overseas.

The increase in double income house hold has also led to change in the spending patterns across urban India. India's swelling middle class is redefining lifestyle pattern with adoption of western values and growing brand consciousness. The analysts have predicted a rising trend of average household disposable income for the next two decades. The economic well-being of the Indian middle class and their growing aspiration for material comforts are responsible for the rising consumerism. The Indian consumer is gradually moving from the local **"kirana"** shopping to **"Mall Hopping".** The Indian consumer is fast embracing modern retail with a number of domestic and international brands available in stores and with a wide range of product offered in the stores. There has been a marked increase in the number of new entrants in the retail sector with player revenues increasing across all the retail segments. The behaviour of retail shoppers is a subject of study across the world. In earlier days, if a consumer wanted to buy, the only option was the local Bania or the fair price shops run by the government. But, today one can buy from the same place and also one has the option of going to Big Bazaar, Super Market etc. Now-a-days the Indian shoppers have become very selective with a number of options open to them. Modern retailing has entered India in the form of extensive malls and huge complexes offering shopping, entertainment, leisure to the consumer. The retailers are now in an experimenting stage with a variety of formats to walk with the demand of the people. The retailers are moving from traditional stores to supermarkets to hypermarkets to speciality chains. However, kiranas still continue to score over modern formats primarily due to the convenience factor.

Some of the traditional and modern retail formats with their value positions are given in table-1 and 2.

Table 1: Traditional Retail Formats

Format	**Value position**	**Indian examples**
Counter stores	High service, Low price	Kirana stores
Kiosks	High service	Paan shops
Street markets	Large selection, Low price	Village haats
Street vendors	High service	Vegetable vendors

Source: Compiled from magazines and news papers

Table 2: Modern Retail Formats

Format	Value Position	Example
Departmental stores	Service and choice	Pantaloons, Shoppers' Stop, Westside, Lifestyle
Supermarket/Convenience stores	Convenience	More, Food Bazaar, Nilgiris, Food World, Apna Bazaar
Hypermarkets/Discount Stores	Price and choice	Big Bazaar, Spencers, Star India Bazaar
Speciality Stores/Category Killers	Service	Planet Sports, Vijay Sales, Planet M, Music world, Crossword

Source: Compiled from magazines and news papers

Understanding the reasons behind consumers patronizing a store over others is important for the retailers. Shoppers choose the stores for several reasons such as: convenience of shopping, range of merchandise, brand and the services offered by the retail store. In effect, merchandising is the important factor of retail. The range of merchandise is the most important reason for the customer to patronize a particular outlet. The initial curiosity of a new store may draw a consumer to that particular retail store, but to convert him into a buyer and to retain him, is largely dependent on the brand and the range of merchandise offered by the store. Store environment and the kind of the services offered by the store also play an important role in attracting the new customers and retaining the old customers. At the same time the importance of convenience cannot be ignored in improving the image of a retail store. The element of convenience became prominent in the world of organized retail. This is especially true in the case of items like grocery, fruits and chemists, for example, for buying medicines, most patients would prefer to buy from the chemist near the doctor's clinic or near the hospital. The main objective of this paper is to evaluate the consumers' attitude towards nearby market, big bazaars and shopping malls age wise, education wise and income wise and to find out the reasons of patronizing a store gender wise.

II. OBJECTIVES OF THE STUDY

Objectives of the study are as follows.

1. To know the consumers attitude towards big bazaars and shopping malls and to analyze the related reasons age wise, education wise and income wise.
2. To access the preference of the customers of retail store to nearby market age wise, education wise and income wise.
3. To analyze the store choice behaviour gender-wise with respect to service, merchandise brand and convenience.

III. HYPOTHESIS

The hypotheses pertaining to objectives are as follows

H1: The consumers prefer to visit the nearby market irrespective of the age, income and education.

H2: The people have accepted the mall culture irrespective of the age, income and education.

H3: Male and female patronize a store equally with respect to service, merchandise brand and convenience.

IV. RESEARCH METHODOLOGY

A simple random sampling method is adopted to select the sample. The sample consists of the visitors of the different retail stores in the cities **Balasore, Cuttack and Bhubaneswar, Puri, Odisha**. A pre-tested questionnaire was administered to the visitors of retail store. Besides, personal observation was done where necessarily applicable. A pilot survey was conducted in the cities and the questionnaire was improved in that light. A structured questionnaire was used as a data collection tool. The survey was conducted during **October, November, 2011** among **530** geographically dispersed retail store visitors spread over the cities. The data were collected age wise, income wise and education wise. In some cases the respondents were requested to rate the different attributes ranging from 1-5 on likert scale. Where 1 indicates the most favourable and 5 indicates the most unfavourable attitude. The statistical tools such as **Chi-square test** and **large sample test** are used to reflect the association between attributes and the retail store customers.

V. ANALYSIS AND INTERPRETATION

1. *Purchase decision making*

Purchase decision making is broadly analyzed with respect to **preference of nearby market** by the consumers and the **acceptance of mall culture**. Further the data are analyzed age wise, income wise and education wise**.** For education wise analysis, the respondents are divided into four groups such as under graduate **(E1),** graduate **(E2),** post graduate **(E3)** and professional **(E4).**The respondents are classified into four groups such as less than 10,0000 p.m **(I1**),10,000-20,000 p.m **(I2),** 20,000-30,000 p.m **(I3)** and more than 30,000 **(I4)** for income wise analysis. Similarly for age wise analysis the respondents are divided into four groups i,e. **A1**(less than 30), **A2** (31-40 years), **A3** (41-50 years), **A4** (more than 50).

i. Preference of nearby market by the consumers.

Most, often in purchase situations, proximity of the market is considered as an influencing factor of choosing a store. Majority of the respondents agreed to the fact that they prefer the nearby market as they can visit the shop at any time they want, it also saves the transportation cost and time. In case of exchanging any item, it is more feasible if the market is nearer to home. To examine the impact of distance in choosing a retail store for the different retail segments, the respondents were asked to express their preference of nearness of the market. The data so collected are analyzed education wise, income wise and age wise as given in Table-3 to 5.

Table 3: Preference of nearby market by the consumers: Education

	E1	%	E2	%	E3	%	E4	%	Total	%
Yes	60	20	113	39	93	32	27	9	293	55
No	46	19	99	42	71	30	21	9	237	45
Total	106	20	212	40	164	31	48	9	530	100

Chi-square test is used to find out the relationship between the education and the preference of nearby market by the consumers on the basis of following hypotheses.

Null hypothesis H_0: There is no significant association between the education and the preference of nearby market by the consumers.

Test statistic: x^2 (Chi-square) = $\sum [(O- E)^2/E] = 0.557$

Tab. Val of $x^2_{(0.05)}$ at 3 d.f is 7.815

As, $x^2_{cal} < x^2_{tab,}$ H_0 is accepted and H_1 is rejected

Interpretation: There is no significant association between the education and the Preference of nearby market by the consumers.

Table 4: Preference of nearby market by the consumers: Income

	I1	%	I2	%	I3	%	I4	%	Total	%
Yes	60	23	73	28	68	26	59	23	260	49
No	62	30	72	27	71	26	65	24	270	51
Total	122	23	145	28	139	26	124	23	530	100

Chi-square test is used to find out the relationship between the income and the preference of nearby market by the consumers on the basis of following hypotheses.

Null hypothesis H_0: There is no significant association between the income and the Preference of nearby market by the consumers in choosing a store.

Test statistic: x^2 (Chi-square) = $\sum [(O- E)^2/E] = 6.5153$

Tab. Val of $x^2_{(0.05)}$ at 3 d.f is 7.815

As, $x^2_{cal} < x^2_{tab,}$ H_0 is accepted and H_1 is rejected

Interpretation: There is no significant association between the education and the Preference of nearby market by the consumers in choosing a store.

Table 5: Preference of nearby market by the consumers: Age

	A1	%	A2	%	A3	%	A4	%	Total
Yes	73	25	70	24	78	27	68	24	289
No	34	14	90	37	74	31	43	18	241
Total	107	20	160	30	152	29	111	21	530

Chi-square test is used to find out the relationship between the age and the preference of nearby market by the consumers on the basis of following hypotheses.

Null hypothesis H_0: There is no significant association between the age and the Preference of nearby market by the consumers in choosing a store.

Test statistic: x^2 (Chi-square) = $\sum [(O- E)^2/E] = 18.2442$

Tab. Val of $x^2_{(0.05)}$ at 3 d.f is 7.815

As, $x^2_{cal} > x^2_{tab,}$ H_0 is rejected and H_1 is accepted

Interpretation: There is an association between the age and the Preference of nearby market by the consumers in choosing a store.

ii. Acceptance of mall culture

Rising consumerism and a youth driven culture has made the new generation more discerning towards mall culture. New shopping activity has evolved from a need-based activity to a leisure time entertainment activity. The consumer today spends to achieve the "feel good" factor from their shopping experiences and so the entire landscape of shopping has changed to the mall concept. All these things have activated the emergence of mall culture in the cities. It is found from the past studies that shopping at malls has become a favourite pass time for the youth customers.

The data have been collected about the acceptance of the mall culture and these are analyzed education wise, income wise and age wise as given in Table-6 to 8.

Table 6: Acceptance of mall culture: Education

	E1	%	E2	%	E3	%	E4	%	Total	%
Yes	56	21	107	39	82	30	26	10	271	51
No	50	19	105	41	82	32	22	8	259	49
Total	106	20	212	40	164	31	48	9	530	100

Chi-square test is used to find out the association between the education and the acceptance of the mall culture on the basis of following hypotheses.

Null hypothesis H_0: There is no significant association between the education and the acceptance of the mall culture.

Test statistic: x^2 (Chi-square) = $\sum[(O- E)^2/E]$= 0.4085

Tab. Val of $x^2_{(0.05)}$ at 3 d.f is 7.815

As, $x^2_{cal} < x^2_{tab}$, H_0 is accepted and H_1 is rejected

Interpretation: There is no significant association between the education and the acceptance of the mall culture.

Table 7: Acceptance of mall culture: Income

	I1	%	I2	%	I3	%	I4	%	Total	%
Yes	63	24	67	25	70	26	65	25	265	50
No	59	22	78	29	69	26	59	22	265	50
Total	122	24	145	27	139	26	124	23	530	100

Chi-square test is used to find out the association between the income and the acceptance of the mall culture on the basis of following hypotheses.

Null hypothesis H_0: There is no significant association between the income and the acceptance of the mal culture.

Test statistic: x^2 (Chi-square) = $\sum [(O- E)^2/E]$ = 1.7611

Tab. Val of $x^2_{(0.05)}$ at 3 d.f is 7.815

As, $x^2_{cal} < x^2_{tab}$, H_0 is accepted and H_1 is rejected

Interpretation: There is no significant association between the income and the acceptance of the mall culture.

Table 8: Acceptance of mall culture: Age

	A1	%	A2	%	A3	%	A4	%	Total	%
Yes	62	25	60	24	85	35	38	16	245	46
No	45	15	100	35	67	24	73	26	285	54

Total	107	20	160	30	152	29	111	21	530	100

Chi-square test is used to find out the association between the age and the acceptance of the mall culture on the basis of following hypotheses.

Null hypothesis H_0: There is no significant association between the income and the acceptance of the mall culture.

Test statistic: x^2 (Chi-square) = $\sum [(O- E)^2/E] = 22.94$

Tab. Val of $x^2_{(0.05)}$ at 3 d.f is 7.815

As, $x^2_{cal} > x^2_{tab}$, H_0 is rejected and H_1 is accepted

Interpretation: The acceptance of the mall culture is dependent on age.

2. *Gender and the reason of choice of a store*

The first step of understanding the retail customers is identifying the customer for the product and the service, the target segment their needs and their buying behaviour. Understanding the reasons behind consumers patronizing a store over others is important for the retailer. Shoppers choose the stores for several reasons such as: convenience of shopping, range of merchandise, brand and the services offered by the retail store. The decision making process that a customer undergoes while buying is also affected by the gender. Different reasons of patronizing a retail store are analyzed gender wise by using large sample test.

The responses collected about the reasons of choosing a store from the respondents along with large sample test from the respondents are given in Table-9.

Gender Wise Analysis

For gender wise analysis, we have performed the large sample test **(Z)** for each of the attributes convenience, merchandise, brand and service.

Table 9: Reason of choice of a store: Gender

Reason	**Male %**	**Female %**	**Null hypothesis**	**Alternative hypothesis**	**Large sample test Z**	**Conclusion**
Convenience	12.3%	30.86%	H_0: $P_1 = P_2$	H_1: $P_1 < P_2$	2.44	Rejected
Merchandise	34%	12.17%	H_0: $P_1 = P_2$	H_1: $P_1 > P_2$	2.66	Rejected
Brand	30.3%	21.73%	H_0: $P_1 = P_2$	H_1: $P_1 \neq P2$	1.020	Accepted
Service	23.33%	35.21%	H_0: $P_1 = P_2$	H_1: $P_1 < P_2$	1.379	Accepted

Test statistic

$$Z_{CAL} = P_1 - P_2 / \sqrt{\{PQ (1/ n_1 + 1/ n_2)\}}$$

P_1 = Population Proportion of male, P_2 = Population Proportion of female.

n_1 = total no. of male respondents in the sample. = 300,

n_2 = total no. of female respondents in the sample = 230

Where, $P = (n_1 p_1 + n_2 p_2) / (n_1 + n_2)$, $Q = 1- P$, Level of significance is 5% = 0.05

p_1= Sample proportion of male, p_2= Sample proportion of female

Interpretation

- Female prefer to convenience more while choosing a store.
- Male and female equally patronize a store for the brand.
- Male prefer to merchandise more while choosing a store.
- Female prefer to the store where the service is good.

VI. FINDINGS AND CONCLUSION

A steadily rising percentage of rich and super rich population and impressive disposable income offer a spectrum of opportunities — spanning from rural retailing to luxury retailing. The impressive retail space availability and growing trend of consumerism in the emerging cities and small towns add to the market attractiveness. The present study is an attempt to look at the various factors which influence the retail store choice behavior particularly in rural area. The main objective is to unfold the complex nature of consumer behaviour, their attitude, perception and motives in the decision making and buying process. The following inferences have been derived from the paper.

1. By performing chi-square test, it is found that, there is no significant association of the preference to nearby market with the education and income of the respondents. However the age is somehow associated with that preference. At the same time the respondents prefer to visit the nearby market irrespective of the education, income and the age.
2. Chi-square test revealed that there is no association of the education level and income level with the acceptance of the mall culture. But, the people with lower age group are more attracted to the mall culture.
3. A large sample test of difference of proportions revealed that males are mostly affected by merchandise and females are affected by convenience and the service quality of the shoppers.

With the growing competition, it is becoming increasingly difficult for retailers to survive in the new economy. A new

revolution is taking place, and for retailers to thrive today, they must possess revolutionary thinking. This type of thinking involves a desire to embrace change within their organization. In order to get a realistic perspective on retailing, we need to comprehend how Indian consumer behaviour is changing; and to understand how retail formats are likely to evolve in a country.

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Malaviya as a Great Visionary for Higher Education: Celebrating his 150th Birthday

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I. Introduction

Malaviya Was born on December 25, 1861 and we are celebrating his 150th birth anniversary in this year. The Government has also constituted a committee under the chairmanship of the Prime Minister to celebrate this occasion. Malaviya, a name almost synonymous with higher education in the country, has been a visionary par excellence. While BHU bears testimony to his vision, his views regarding values are perhaps more relevant today, when corruption threatens to shake up the 64-year-old democracy. Mahamana dreamt of creating an ideal scheme of education which would serve the cause of nation building, rise above narrow sectarian intrests, combine the best in western scientific methods with all that is good and great in our culture and promote a "broad liberation of mind and religious spirit". Every alumnus who passes through the portals of this great institution carries these seeds of the timeless vision of Mahamana with him. Globalization as we now name it is not an alien concept to our culture. Our seers had this vision of the world as a family even when geographical distance was a formidable barrier to communication. The Indian consciousness has always perceived the world as one family (olq/kSo dqVqEcde). The hallmark of the Indian vision of education has been openness and acceptance of noble thoughts from all directions while at the same time sending out its own message to the world. As Swami Vivekananda said "Like the gentle dew that falls unseen and unheard and yet brings into blossom the fairest of roses, has been the contribution of India to the thought of the world. Silent, unperceived, yet omnipotent in its effect, it has revolutionized the thought of the world yet nobody knows when it did so." Malaviya ji who epitomized Indian values gifted the world with a unique model of integrated, harmonious and balanced education in the shape of Banaras Hindu University. The motto of Banaras Hindu University, "fo|;k·e`re'uqrs" (The end of all knowledge is the attainment of immortality) eloquently reflects the premium placed on education in our ancient culture.

The scheme of education proposed by Mahamana assumes renewed significance today when higher education is facing challenges as never before. It is widely accepted that higher education is the basic building block in the creation of an inclusive, equitable and diverse knowledge society.

As the final communiqué adopted at the end of World Conference on Higher Education (2009) emphasizes "higher education must pursue the goals of equity, relevance and quality simultaneously." This is particularly true in today's world where knowledge is gradually emerging as the primary production resource which will determine development or lack of it. The new realities of 21st century have given birth to a host of complex issues and challenges in higher education like internationalization, privatization, quality assurance, governance, fostering of research and innovation, competition for human and financial resources etc. The Indian higher education system cannot afford to insulate itself from these changes. At the same time it should be able to meet the expectations and challenges of an increasingly globalizing world without endangering local culture and values. Every care should be taken to ensure that the objectives of higher education do not become subservient to the forces of the market. The unmet needs of higher education demand a paradigm shift in approach, while keeping in mind the parameters of access, equity, quality, relevance and right values. Thus, it is obvious that higher education policy will have to reconcile diverse objectives- the short term aims with long term goals, the traditional wisdom with modern innovative thinking and scientific rationality with religiousity and faith. Banaras Hindu University is striving in the direction of proposing a model of higher education which would address the challenges of globalization without compromising on national priorities or Indian values. This model of education would conform to the four pillars of education identified by the Delors Commission i.e. learning to know, learning to do, learning to live together and learning to be. Banaras Hindu University is uniquely placed to undertake this exercise because it symbolizes the Indian heritage of acceptance and integration while at the same time preserving our unique identity. As the scientist Sir J.C. Bose observed in his homage on the 70th birth anniversary of Mahamana, "The Hindu University will always be a monument of the faith which inspired Pt. Madan Mohan Malaviya in his lifelong work for founding the great centre of learning at Benaras for the advancement of world's knowledge. To be organic and vital, the university must stand primarily for self expression and winning for India, her true place in the Intellectual Federation of Nations". These immortal words are as true for the Banaras Hindu University in particular and the higher education system in general today as they were more than three quarters of a century ago.

II. How Malviya Ji Ideology Come In Action, An Overview

Malaviya ji was born just after the, so called Indian mutiny of 1857.In next two or three decades following the first world war of freedom the entire country was passing through a national Renaissance in every sphere of life -social, economic, political, religious, and educational. The spirit of many great sons of this land rose in revolt against the British domination. . Malaviya was one of them .He joined the Indian national congress immediately

and made his maiden speech before the great national gathering at its second national session of congress held at Calcutta in 1886 and became an ardent champion of Indian nationalism. During his tours of country in subsequent years while attending the congress session, Malaviya had the opportunity to observe the conditions existing in the country in various spheres. Malaviya therefore came to the conclusion that in order to revitalise India as a nation, it was necessary to feed her youth with the old spiritual and moral food and religion must be the part of education founded on Indian ideals and enriched with the result achieved by science and learning of the west .Modren Indian higher education has its roots in the British rule that began as a speck in 1757.The establishment of three university of Bombay, Calcutta , Madaras done on the basis of Landan university. Lord Curzon, appointed on Indian Universities commission in 1904 to probe into the working of Indian Universities. All the Universities were brought directly under government control-Lord Curzon, by this act, again left a reason for infame and discontents. This errant move of British rule, couldn't restrain the long cherished dream of a great institution from the mind and action of Malaviya jee in 1904, he hold a resolution for establishing a Hindu University {at Kashi} under the president ship of the Maharaja of Banaras; he received first token donation of fifty-one rupees for the University from his father. Debate over the University grew more during Indian National Congress Session {31st December 1905, Banaras} at the Town Hall, under the president ship of Shri B.N. Mahajani-scheme of the Hindu University was placed before the representatives of all religious and renowned educationists. With these exuberant developments, public announcement of Banaras Hindu University was finally enunciated on January1st, 1906-two contemporary moves further exuded confidence in Mahamana, Central Hindu College, after witnessing a great success under the visionary leadership of Mrs. Annie Besant, applied for statuary Royal Charter for the establishment of a "University of India" under the signature of influential personalities-second, The Bharat Dharma Mahamandal of Kashi under the president ship of the Maharaja of Darbhanga, had simultaneously launched a scheme for the establishment of a Sanatan Dharma {universal}University. In the year 1911, the Maharaja of Darbhanga along with Annie Besant incorporated his scheme with that of the Hindu University-he personally too took great intrest and met Lord Harding {then Governor-General} with plan of University and received his consent easily as this top notch British official was comparatively flexible in his demeanour. Albeit his Education Secretary, Sir Harcourt Buttler became alarmed to see, the prominence of Hindi in proposed University-he gave mandate for English, as medium of education in Banaras Hindu University which in equanimity was accepted by Mahamana. He had stout vision for changes and it's tantameunt on entire education system-so, at least for temporary compulsions dropped his plan to use mother tongue. Finally the dream came true on the Vasant Panchami day, February 4, 1916 and foundation stone of Banaras Hindu University was laid by The Lord Harding in the presence of august gathering and thousands of high dwellers. Before the discussion of Mahamana vision about higher education in detail and how he is a great visionary for higher education in present liberalization and globlisation age, firstly researcher discuss what the status of higher education in India.

III. STATUS OF HIGHER EDUCATION

In 1947 there were 27 universities, 500 college, with barely 200,000 student and 15,000 faculty with that limited legacy, the country (India) start the journey of higher education .During the six decades of independence of the country, eleven five year plans were implemented to boost the process of development of the country. Many commission and committees establish by government as university education commission(1948-1949), national education commission (1964-1966), NPE (1986) ,POA (1986),NKC (2005), Yashpal committee (2006), etc New agencies like the UGC(1956), NAAC(1994) etc also were established for specific purpose like maintaining standards and quality in higher education .In these six decades India is becomes a youthful country . The census (2011) has reported a young population of 600,000,000. over the last six decades the expansion of higher education system takes place this number has increased to about 559 university /university level institutions (42 central university 275 state university 129 deemed university 90 private university 47 agriculture university 13 IIMS, 4 IIITS Indian Institute of information technology, 33 institute of national importance, 16 IITS, 20 NITS), 31,324 colleges and 14.63 million students enrollment found in university in academic session 2009-2010. India has third largest education system in the world after United States of America and China. The govt. of India given much more importance for higher education during xi plan by allocating about nine fold increase in its budget to the tune of 44,469 crores as against Rs. 3.900 car ores for x plan. Our prime minister called xi plan as "education plan " the major concern for xi plan are Access, and expansion, equality and inclusion, quality and excellence, relevant education and quality research. Total number of student enrolled in higher education that is GER 10% in 2007 to 15% by 2012 government after wider discussion propose an excellent PPP model University to overcome the problem of higher education .After reading this data which show massive quantitative expansion in higher education the question strike mind, that will this expansion of higher education can achieve the standard maintain by ancient University , such as Nalanda and Takshila which attracting scholars and knowledge seekers from the across the globe? And will they consider as world class University? Today we don't have any international ranking university. Is it possible by follow the great Indian visionary Mahamana Pt. Madan Mohan Malaviya and their philosophy in higher education?

IV. MALAVIYA VISION FOR HIGHER EDUCATION

The vision of Malaviya ji was so perfect and dynamic that every solution regarding the problems of higher education is there .The motive of Malaviyaji was to make higher education answerable in any condition, period or time. The concept of globlisation from the vision of Madan Mohan Malaviya could be seen in the following version "And the creator and benefactor of the world ,the universal soul moving in all , brought together his all children of the east and the west , and induced their mind to that unanimity which meanest good and right understanding directed them to raise this home of universal learning in the

capital town of the lord of universe ." (printed in copper plate, 1916, BHU) again Malaviya pray was "May Saraswati , in earned in the shurti-heart of wisdom , ever bloom and shine with worship from her humane children ,may they ever assiduously imbibe the vital milk of knowledge flowing from her sweet breast of science and philosophy :may all hearts turns to act as good alone :may all hearts be filled with love of supreme."(Printed in copper plate 1916 BHU)so this was the globalised vision and religious thought of Malaviyaji to enhance higher education in global scenario. At that time somebody proposed this university as a sectarian University. they thought that the existing university had been exercising a difference between Hindu and Muslim the reply of this objection Malaviya said in his speech in the imperial legislative council " that University will be a denominational institution but not a sectarian one. It will not promote a narrow sectarian but a broad liberation of mind and a religious sprit which will promote brotherly feeling between man to man. The absence of any religious education in our state university has not prevented the growth of sectarian feeling in the country." I believe instruction in the truths of religion whether it would be Hindus or Muslim, wheather it would be imparted to the student of BHU or Aligarh Muslim University will tend to produce Man, who if they are true to the religion, will be true for their God, their King and their Country. And I look forward to the time when the student of this University, who will pass out such University, will meet each other in a closer embrance as sons of the same motherland then they do at present." Malaviya ji thus visualized that the student trained in the new system of education would be able to spread knowledge throughout the country and world and there by develop the spirit of nationalism and inter nationalism .so he propose the establishment of an all Indian University which is residential university, unlike the other five University that existed in India at that time viz Calcutta, Madaras, Bombay, Lahore, Allahabad. In relation to Global University Malaviyaji said "If the expenses incurred on University education in the west is compared, with what we are expanding on it here, it will be seen that we are far below the standard of other civilized countries and have much be way to make up. Our Universities are like so many powerhouses needed to scatter the darkness of ignorance, poverty and cold misery which is hanging like a pall upon the country. Every lower of India must therefore rejoice at the growth of universities in India." Malaviya believe in globalization, his views on education is above then any creed, caste, race, .He believe in ideals of Veda vyasa-

"May all enjoy happiness, May all the source of happiness to others may all see the auspicious days, may none suffer any injury."He believes in brotherhood that is vasudehev kutumbkam.

V. PARAMETERS DECIDED BY MAHATMA FOR HIGHER EDUCATION

A. Integration of religious education

Malaviya vision was so clear and dynamic , which he said at his time for higher education , are the matter of research now a days. He said "There are some people, I am fully aware, who doubt whether the teaching of faith, side by side science, can be productive of good result. This assumes that, if religion and science are not antagonistic, they are at least incompatible. But happily signs do not want that the attitude of science towards religion is undergoing a great change." (Malaviya speech, 1916) Again he said that "for all true religion is based on the belief in the supreme being, the Almighty God. And the essence of all morality founded upon such a faith of charity and goodwill towards all. This show the spirit of high co, operation in society, so if religion integrated in higher education then musty the problem of corruption , stress, throat cut competition become solved and moral values , ethics, obtained and truely value based society originate. Which is the broad objective of higher education?

B. Amalgemaization of ancient and scientific knowledge in higher education

Malaviya was a firm believer of in ancient Indian culture and tradition and also most modern then ultra modern in his future vision for higher education. He does not believe in Macaulay theory and totally opposing his concept, look the address of Lord Macaulay to the British parliament on 2nd Feb 1835, we get surprised at the objectives of Macaulay. He stated in his address - "I have travelled across the length and breadth of India and I have not seen a person who is beggar, who is thief, such wealth I have seen in this country; such high moral values. People of such caliber, that I do not think we would conquered this country, unless we break the very backbone of this nation which is spiritual and cultural heritage and therefore I propose that we replace her old and ancient education system, her culture, for the Indians think that all that is foreign and English is good and greater than their own, they loss their self esteem, their native culture and they will become what we want them, a truly dominated nation." Malaviya yet born after the Macaulay period but he knows about his views, So he again and again said reshape the education system in all spheres bringing back our ancient education practices and moral as well as spiritual values. His vision is seen in BHU. Malaviya initially formulated the objective of this University is to promote the study of Hindu Shastra's and of Sanskrit literature generally as a means of preserving and popularizing for the benefit of Hindus in particular and of the world at large in general, the best thought and culture of the Hindus, and all that was good and great in the ancient civilization of India. To promote learning and research generally in arts and science in all branches: , To advance and diffuse such scientific, technical & professional knowledge, combined with the necessary practical training as is best calculated to help in promoting indigenous industries & in developing the material resources of the country & to promote the building of the character in youth by religion & ethics as an integral part of education .So these objective shows Malaviya Vision on higher education i.e. on one side reflect Veda, Upanishad, all ancient scriptures & text & on other side reflect science technology & integration of medical engineering agriculture & technical education . How Malaviya viewed the excellence in science and technology in the presence of Bhatnagar and Narlikar in his dream campus is described here. While spotting talent he had heard of V. V.Narlikar who was pursuing his research as an Isaac Newton student at the University of Cambridge under Sir Arthur Eddington, one of the most prominent and important astrophysicists of his time. While on visit to the UK for a round table conference, Malaviya visited him in Cambridge in 1931 and invited him to join BHU as

professor of Mathematics. Narlikar, who was 24 years old at the time, preferred the offer over visiting Caltech and Served the University for 28 years from 1932 to1960. He was also in charge of the University Telescope. In his 'A few recollections and reflections', V. V. Narlikar writes, 'my memories of the Banaras Hindu University (1932–1960) are so many, so rich and so happy that they make the University to me *MadhurManohar Ateev Sundar* [So sweet, serene, infinitely beautiful]'. The BHU Kulgeet was composed by S. S. Bhatnagar, one of the most renowned scientists, who was a Professor in Chemistry at BHU for three years during 1921–1924.Malaviya used to attend popular lectureson science organized by S. S. Josh of Science College and other professors of the university. For the first time in India, he established departments for mechanical and electrical engineering, glass technology, pharmaceutical chemistry, mining and metallurgy, chemical engineering as well as Sanskritand and Ayurveda, apart from many other courses which existed in other institutions in India. He attracted the brilliant scholars such as U. C. Nag, Charles A. King, A. B. Dhruva, Ganesh Prasad, Birbal Sahni, S. S. Bhatnagar, V. V. Narlikar, R. K. Asundi, and many others to guide the students. This reflects his scientific vision for the technological advancement. In service of the nation. Malaviya vision to link the heritage of ancient knowledge with modern development of science and technology. He pleaded for whole-hearted cooperation in building a modern Nalanda and modern Takshashila in Kashi with a blend of the best of the East and with the best of the West. While he was proud of Oxford and Cambridge with their centuries old traditions, he was also proud of his university. In the 20th century, Srinivasa Ramanujan, J. C. Bose, M. N. Saha, S. N. Bose, C. V. Raman and many others asserted their intellectual potential in science. When we attained independence, many new institutions of excellence were established. It is no wonder that the BHU graduates played a pivotal role in shaping modern India – DevendraLal, U. R. Rao, J. V. Narlikar, C. N. R.Rao, T. V. Ramakrishnan, to name a few.C. N. R. Rao's educational and spiritual experiences at BHU in Kashidham (as he calls Kashi or Benaras) are described with warmth in his recently published autobiography, *Climbing the Limitless Ladder: a Life in Chemistry*. His first research paper was on the work he carried out at BHU during Master's. Responding to the honor of D.Sc. (*Honoris Causa*) from his alma mater, C. N. R. Rao said, 'No honor is greater than the one from one's own *alma mater* … When I entered this capital of learning in 1951 to pursue M.Sc. In Chemistry, the first thing I did was to take off my shoes at the main entrance and walked bare-foot to pay my respects to the Mahamana'. Malaviya had a global view with regard to inviting persons of outstanding ability. To achieve his goal, he had correspondence with eminent scientists including Ernest Rutherford, Sir Arthur Eddington and others. In his cherished ambition, Malaviya tried hard during 1935–1936 to persuade the timeless legend in science and society, Albert Einstein to come over to India and BHU for a suitable period, on his own terms in perhaps some joint scheme and cooperation with Sir C. P. Ramaswami Aiyer, Vice Chancellor of the Travancore university (presenty Kerala university) .Sometime in 1940, Einstein probably wrote to Malaviya, expressing his desire to serve this great University. Unfortunately, both Malaviya and Radhakrishnan were away from town and his letter met with the usual bureaucratic procedure. By the time, Malaviya warmly invited him; Einstein was on his way to Settling in America. The eminence of academic pursuit embedded in excellence in every branch of human knowledge in his dream campus. Right up to the day of foundation, this University played a formidable role in strengthening of the national causes-from freedom movement to modern time; its culture blended with modernity and tradition, always prioritized the ethics and humanity along with finest pastime for high standard education in the close "Guru-Shishya" tradition. Many changes have taken place inside the University and its reputation as center of excellence have expanded to all major streams-old hostels and few old nameplates like, "College of Arts", "Bharati Mahavidyalaya", "Mahila Mahavidyalaya" etc are suddenly give a chance to roam in down memory lane. Mahamana through his great humane value never let disoriented the middle nomenclature of the university and truly succeeded to establish an unparalleled institution...It was an auspicious fortune of this university that it was served by a numbers of distinguished scholars and begin human being as-Dr. Amarnath Jha, Dr. Radhakrishnan, Pandit Govind Malaviya, Acharaya Narendra Deo, Dr. C.P.Ramaswamy Aiyer were foremost among them.

VI. MALAVIYA ECONOMIC VISION FOR HIGHER EDUCATION

Today in 12th plan govt. of India think about innovative University with the help of ppp model that is public private partnership. Govt. decided to establish world Class University with the help of foreign finance provider because, for Govt. it is not possible to provide huge finance for infrastructure and other related to higher education. But you realize when Malaviya ji establish this university, is the economic condition is better than at present days? British govt. gives the challenge of 1 crore rupees collection at that time for the permission of establishment of such university in 1915. But Malaviya accept this challenge and start collection from Indian king, Nawab, and poor people also but not from any single foreign providers .He took land of India, money of India but time to time when, he need burrowed knowledge from world in the form lecturer and appointment of professor this vision of Malaviya ji not show his narrow nationalism but how he link national thinking to world level with respect of nation. Many time he shake his hand with British Govt policies but not at the cost of nation he is much indigenous and modern both for economic development of nation .Malaviya ji felt keenly the pain of India poverty and pauperization under British rule. He described the position of the country in the following words in his speech as president, Indian national congress at the Lahore session of 1909:

"The national income is low and therefore the national prosperity is low. People are dying with plague and malaria. Famines are calming a large toll and people are unprosparse and unhappy. That is the condition of the Country. On the other hand you find that this is the Country most richly endowed with natural resources. It's the country whose people are not lacking in intelligence and industry, and living most simple life. They are not addicted to crime as some of the most advanced country are. can there be anything more sad and disappointing than to find the people as still in such unfortunate condition that this country should be lie so low in the scale of nation ?and if this is so what is our duty for the motherland ?"(Zaidi, 1978, p475) Malaviya ji advocated the promotion of technical education and indigenous

industries as a remedy for India poverty. As a result of his efforts the congress urged the establishment of at least one central fully equipped polytechnic institute on par with best engineering institution in the world for the first time in 1904. Under Malaviya ji leadership the Indian industrial conference started meeting regularly as an adjunct of the national congress since 1915 when it first met in Varanasi. Malaviya ji pointed out that India has three economic advantages- an abundance of agriculture and mineral raw materials, great natural facilities for power and transport and vast home market which can absorb the indigenous industries. He suggested "let us organize technical university .college. In large Metropolis and towns respectably ." (Malaviya, 1918, p.65) his vision reflect in BHU as hub of industrial resurrection .Malaviyaji economic philosophy was centered around national interest and the good of the common man was the central theme of of his economic vision .his vision has greater importance into days knowledge based, world economy where the nation are pursuing policies that encourage innovation and access to advanced knowledge. It was his vision to adapt modern technologies along with indigenous methods to our specific needs in order to bring progress and prosperity of the nation so today it is important that Govt make policies for higher education not on the cost of nation.

VII. PRACTICAL APPROACH FOR HIGHER EDUCATION, SYLLABUS (MAHAMANA VISION)

The vision of Mahamana so farsighted that he knew the basic problems of higher education as well as of the student .He knew the problem of his time for what we are crying today. The problem of the unemployment and qualitative higher education is of greater concern today. Yet we are search for the solution. But at that time of Mahamana the sources of the study were to be so fixed that a student of average intelligence: taught on the modern methods may become skilled in some art of producing wealth: and versed in the principle upon which it is based. (History of BHU) Malaviya dreamt of a new kind of curriculum taught by a new kind of school for self reliant society. This made him to provide tentative patterns of vocational studies in which cultivation of initiative and self help are dominant objectives. His realistic attention was very keen to grasp the idea of an appropriate education system which can meet the urgent social and economic needs of a poor country.

VIII. HIGH MORAL VALUE AND BUILDING CHARACTER FIRST NEED OF HIGHER EDUCATION MAHAMANA VISION

Today India, face new movement that is anti corruption movement why? Think about it? Very simple not due to increased literacy rate, but it is due to decline, decorated values. Today student of higher education having many ambitions, aspirations of the prosperity but to get these, they do not believe in Right means but believe in throat cut competition**.** Malaviya read widely the Indian religious texts, and agreed with ancient law- giver Manu, on his five important qualifications which earn for a man the respect of others. Among these five; the first four are wealth, relations, age, good deeds , and the last is succession i.e. education is the highest qualification and the most time honored value as against the wealth which is first in succession yet the lowest the values. He himself has said^^ **foÙka oU/kqoZ; deZ fo+|k Hkofr iPpeh ,ykuh ekU;LFkkukfu xjh;ks ;|nqÙkje** AA**Mahamana wanted his University prepare such literate man, engineers, professor, religious teacher ,conductors of researchers in literacy fields and investigators into the phenomenon of laws of nature, Being be able to earn wealth by hour able means , they will be above temptations to unworthy conduct , and being inspired by high principles imbibed from Sanskrit learning :they will be man of unswerving rectitude and incorruptible integrity. Mahamana laid much emphasis on character building of student always provide Gita lecture on Sunday in BHU malaviya bhavan and told to them a lot of benefit of bramcharya. When he give his sign. On student card write ^^lR;su czºop;sZ.k O;k;kesukFk fo|;kA ns'kHkDR;kReR;kxsu rllEekufglnkHkoS", So if Mahamana vision is followed in higher education institute then mostly the problem of corruption, rape of girls, High suicide tendency of youth, mental stress , psychological disorder in youth ,problem of maladjustment etc. can be handled easily. If high moral values adopted by student of higher education .It is possible when university acquired such culture as given by Mahamana vision.

IX. CONCLUSION WITH SUGGESTION

To conclude, it can be said that there is no difference between Mahayana"s vision and globalization regarding the higher education. Malaviya ji never against any positive change as he use today that for good or evil , we are all her to play the game" so here is the time we should admire the vision of Mahamana Malaviyaji whose main cards to win the life game was "character-industry-integrity "let us accept the challenge of present era. Let prepare ourselves to face the situation through learning information technology for the qualitative higher education. Let us make our institution different from others with value addition of Mahamana Madan Mohan Malaviya vision. So if we want corruption free society, we do not advocated for a lot of act as janlokpal etc, but we try to reform our higher education ,on the basis of our great visionaries ,and not believe in making noise but make voice . Making University not the copy of Landon or USA, but like Nalanda and Takshshila which attract knowledge seekers from all over world, believe in globalization but also believe in indigenous culture of nation. Malaviya ji was a great visionary he could realize the dangers and ill effects of infected education system A few lines of his saying can be quoted here "Formation of character is even more important for the well -being of the individual and of the community than the cultivation of intellect" "A teaching University would but only half perform its function if it does not seek to develop the heart power of its scholars with the same solicitude with which it develops their brain power. Hence it is that the proposed University BHU has placed the formation of character in youth as one of its principal objective. For Malaviya ji, to keep alive the sense of duty towards God and towards our motherland, to serve our fellowmen, to promote public welfare and to be prepared to sacrifice everything for the sake of motherland, was the real purpose of higher education. Through his life he endeavored to serve this cause. So carrying forward Malaviya's mission in higher education would be a tribute to Malaviya while celebrating his 150th birth anniversary.

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The effect of industrial wastewater in seed Growth rate: A Review

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Abstract- Environmental pollution constitutes a great health hazard to human, animals and plants with local, regional and global implications. Pollution has adverse effects on land, water and its biotic and a biotic components. Effluents from industries are normally considered as the main industrial pollutants containing organic and inorganic compounds The increasing agricultural reuse of treated effluent serves goals such as promoting sustainable agriculture, preserving scare water resources, and maintaining environmental quality. Moreover, irrigating with waste water may reduce purification levels and fertilization costs, because soil and crops serve as bio-filters, while waste water contains nutrients. Bio assays can be used to measure putative environmental risks. They are reliable, cost effective, quick and simple. The use of plants offers an advantage over other organisms because they can be more sensitive to environmental stresses. They are also easy to manipulate and store and furthermore, they offer a low-cost and good correlation. Use of industrial effluents for irrigation purposes is a highly warranted utility of water pollutants proposition. The objective of using waste water for irrigating crop plants. The first and foremost of this is the safe disposal of the effluents, which may otherwise have adverse effects on the environment and human health. The other objective is to recycle it as irrigation water, as compost for its possible fertilizer value. The literature relating the influence of industrial waste water on seed and seedling quality characters irrespective of crops.

Index Terms- agriculture, environmental, irrigation, pollution, seed, waste water.

I. Introduction

With increasing global population, the gap between the supply and demand for water is widening and is reaching such alarming levels that in some parts of the world it is posing a threat to human existence. Scientists around the globe are working on new ways of conserving water. It is an suitable time, to refocus on one of the ways to recycle water -through the reuse of urban wastewater, for irrigation and other purposes, Srivastava, 1991 [1].

The disposal of wastewater is a major problem faced by municipalities, particularly in the case of large metropolitan areas, with limited space for land based treatment and disposal. On the other hand, wastewater is also a resource that can be applied for productive uses since wastewater contains nutrients that have the potential for use in agriculture. Thus, wastewater can be considered as both a resource and a problem. Wastewater and its nutrient content can be used extensively for irrigation and other ecosystem services. Its reuse can deliver positive benefits to the farming community, Hari,*et al,*1994 [2].

II. Effect on Horticultural Crops

A. Vegetables

Srivastava, 1991, [1] Evaluated the paper mill and chlor-alkali plant effluent (CAP) on seed germination of healthy seeds of radish and onion in different dilutions of effluents and revealed that the percent germination was further with lesser concentrations of the effluents when seeds treated for one to five days all. In the case of radish, at 10% concentration of the effluents, there was a important reduce in mean root length, shoot length and secondary roots as compared with control, while no secondary root could appear out in 100% concentration of CAP effluent. Low dissolved oxygen linked with high mercury and residual chlorine content in effluent affected negatively the germination and later growth of seedlings. In bhendi the germination per cent age was better by 15% with tap water and 25% with spent wash, Hari,*et al,*1994 [2].

Ramana, *et al,* 2002 [3] To experiment a laboratory to study the effect of different concentrations (0, 5, 10, 15, 20, 25, 50, 75 and 100%) of distillery effluent (raw spent wash) on seed germination (%), speed of germination, acme value and germination value in some vegetable crops viz., tomato, chilli, bottle gourd, cucumber and onion. The distillery effluent did not explain any inhibitory effect on seed germination at low concentration except in tomato, but in onion the germination was much higher (84%) at 10% concentration as beside 63% in the control. Irrespective of the crop species, at highest concentrations (75 and 100%), complete crash of germination was noted. The speed of germination, acme value and germination value too followed a like trend and found that a concentration of 5% was critical for seed germination in tomato and bottle gourd and 25% in the rest of the crops. Based on the easiness to distillery effluent, the crops studied have been arranged in the following order: cucumber>chilli>onion>bottle gourd>tomato. So the effect of the distillery effluent is crop-specific and due care should be taken before using the distillery effluent for pre-sowing irrigation purposes.

Dixit, 2003, [4] Experimented bioassay studies to Evaluation the toxicity of raw and diluted distillery effluent on seed germination, seedling growth and pigment content of sugar beet by collecting effluent samples from the main hole of the Sri Gang an agar Sugar Mill factory, in Rajasthan. Seeds kept moist in different dilutions (1, 5, 10, 20 and 30%) of effluent solution,

the length with double distilled water, which served as the control shown that top concentrations (>5%) of effluent were found to be toxic, however, the effluent be able to be used for irrigation purposes after suitable dilution.

Sharma, *et al,* 2002 [5], Studied the effect of fertilizer factory effluents (0, 1, 2, 5, 10, 25, 50 and 100%) on seed germination of tomato cultivars PED, Pusa Ruby and Rupal-I. The percentage germination step by step decreased with rising concentration of effluents. Germination increased of 25% effluent concentration. Higher concentrations (50 and 100%) showed adverse impact on germination, Soundarrajan, and Pitchai, 2007 [6] found that application of spent wash diluted at higher level (50 times) has increased germination per cent age, growth fruit yield and fruit quality of Bhendi in a pot culture experiment. In a study were held by, Yadav, and Meenakshi, 2007 [7] to assess the toxicity of effluent on seedling germination, seedling growth, biomass and crop yield of *Raphanus sativus* var. Pusa Chetki (Raddish) and *Hibiscus esculentus* versha uphar (Bhendi). The germination per cent decreased with rising of the effluent concentration.

B. Spices and aromatic plants

Found that 100% sewage concentration on *Trigonella foenum* (Fenugrick) decreased the germination, length of root and shoot from 42 to 32%, 2.10 to 1.49 cm and 2.08 to 1.49 cm, respectively. This study has showed that 10% sewage showed maximum germination, shoot length and root length, Muthalagi and Mala, 2007 [8].

III. EFFECT ON AGRICULTURE CROPS

A. Rice

Behera and Misra, 1982 [9] Studied the impact of distillery effluents on growth and advance of rice seedlings and reported that the germination per cent, number of roots, shoot and root length, fresh and dry weight of the seedlings showed an opposite relationship with effluent concentration.

According that rice seeds treated with different concentration of spent wash (0, 5, 10, 25, 50, 75 and 100%). At higher concentration (25% and above) both the speed of germination and seedling growth were retarded. At 5% concentration by and large growth of seedling was better than in control and suggested that by diluting the effluent to 5% the effluent can be used as a alternative for chemical fertilizers. The chlorophyll A and B decreased with raise in the effluent concentration. The carotenoid content continued to raise up to 5% effluent concentration, Sahai, *et al*, 1983 [10].

Pre soaked the rice seeds in varying concentrations of cardboard factory effluent for 15 and 24 h and germinated in distilled water while another set was germinated under continuous application of a variety of concentrations of effluent. They noted an inhibition in germination with rising the concentrations of effluent as well as increasing the pre-soaking time. The seeds germinated in continuous application of effluent exhibited a maximum of 62% germination in 25% concentration and a minimum of 8% germination in pure effluent (100% concentration). The seeds pre soaked for 15 h showed better germination than those pre soaked for 24 h. The germination capacity decreased with increase in concentration of effluent as well as increasing the pre-soaking period. The seeds, which were supplied with 25% of effluent continuously, showed better growth as compare to control. When seeds were pre-soaked in 25% and 100% effluent showed higher cat ion concentration that had adverse effect on seed germination and seedling quality characters. However, when the concentration range is between 2.5 to 5.0%, no significant deviation in the germination per cent age was noted but at 50% effluent only 15% of rice seeds germinated. With more raise in effluent concentration late in primary root emergence was noticed, Dixit, *et al,* 1983 [11].

In this study the effect of distillery effluent on seed germination and early seedling growth of rice and reported that the processed effluents were rich in inorganic constituents like ammonia cal nitrogen, chemicals and traces of heavy metals and these markedly suppressed the germination per cent and early growth of the seedling as the concentration of the effluent increase, Rajaram and Janardhanam, 1988 [12].

Rajannan, *et al,* 1998 [13] also studied the effects of tannery effluent at different concentrations (25, 50, 75 and 100%) on seed germination of *Oryza sativa* and found that the germination was inhibited by 25 and 50% effluent and fully dormant by 75 and 100% effluent. Even the chlorophyll and protein contents of plants were found to reduce with the effluent concentration of 75 and 100%.

Application of spent wash with 50 times dilution in rice (CO43) resulted in normal yield. The maximum grain yield was recorded in rice variety ADT 42 due to 75 times diluted distillery spent wash treatments which was on par with 100 times diluted spent wash application, Karunyal, *et al,* 1994 [14].

Chinnusamy,*et al,* 2001 [15] Studied the effect of treated distillery effluent on two cultivars of *Oryza sativa* L. Cv. Saka-4 and Pusa 44 after diluted with tap water viz., 100, 50 and 25% in Petri plates over the control. It was observed that root length, shoot length fresh weight root and shoot, dry weight of root and shoot germination relative index, vigour index, emergence index and chlorophyll content were higher in 25% than 50% over control. Rani and Alikhan, 2007 [16] Noticed that the per cent age germination and seedling energy of rice and wheat reduced significantly with a raise in spent wash concentration.

B. Wheat

Soaked the Cv. Kalyansona after surface sterilization in different effluent concentrations from simple tannery effluent and shown that up to 5% concentration, germination treatment had stimulating effect, while more raise in concentration of the effluent, a matching reduce in germination per cent occurred due to reduction of dissolved oxygen, both by chemical and biological oxidation of sulphur and organic compounds. They also reported that absorption of higher dissolved solids by the seed also could have affected the germination, Singh, *et al,* 2007 [17].

Mishra and Bera, 1995 [18] Showed that olive Mill waste water had phototoxic influence on wheat Cv. Ofonto due to the polyphenols and other unidentified Material. Aliotta, *et al* 2002 [19] conducted laboratory experiments to study the effect of textile effluents at different concentrations in the range of 0-100% (untreated and treated) on seed germination (%), delay index (DI), plant shoot and root length, plant biomass, chlorophyll content and carotenoid of three different cultivars of wheat. The textile effluent did not note any inhibitory effect on seed germination and other plant characters at low concentration (6.25%). Seeds germinated in unlighted effluents did not continue to exist for longer time. Based on the acceptance to

textile effluent, the wheat classes have been arranged in the subsequent order: PBW-343 < PBW-373 < WH-147. It has also been completed that effect of the textile effluent is cultivar definite and due care should be taken before using the textile effluent for raw purpose.

C. Sorghum

Activist influence of distillery waste water on sorghum yield has also been noted by Kaushik, *et al, 2005* [20]. The shoot and the root length and the number of on the side roots shaped in the case of sorghum reached maximum values when treated with 2.5% distillery spent wash. Zalawadia and Raman, 1994 [21] Too showed that the distillery spent wash did not note any inhibitory effect on seed germination at low concentration. The spent wash at a upper concentration decreased the seed germination. But up to 10% concentration the distillery spent wash noticeably better the seed germination and seedling growth in White sorghum (APK 1) and Red sorghum (Namakkal local).

D. Pearl millet

Kalaiselvi, *et al,* 2009 [22] Reported that soap factory effluent was toxic to seed germination and seedling growth of finger and pearl millet, but when the effluent was diluted to 2.5 to 5.0% it improved the seed germination and seedling growth.

E. Maize

Vijayakumari, 2003. [23] expressed that Olive Vegetable Water (OVW), the liquid by - product obtained from olive processing to extract virgin olive oil by mechanical means (pressure and centrifugation systems) and spread OVW in large quantities on soil cultivated with maize revealed that the use of large quantities of OVW (more than 10 L m^{-1}) gave a 30-40% increase in the total biomass production compared with the control. All the parameters, i.e., germination, stalk, ear and dry kernel per plot in maize were also increased by large quantities of OVW. The grain yield and biomass yield of maize was significantly higher due to spent wash application. The spent wash also increased the N, P, K, Ca, Mg and Na content in all the parts of the maize crop, Giovacchino, *et al,* 2001 [24].

IV. EFFECT ON TREE SPECIES

Gomathi, and Oblisami, 1992 [25] stated that pulp and paper mill effluent could also be used for irrigating tree crops after proper dilution. Germination per cent age decreased from 100 to 75% due to irrigation with paper mill effluent at 100% concentration. The length of the root and shoot and strength index of the tree types viz., neem, pungam and tamarind, reduced considerably. But on application of effluent at concentrations of 25, 50, 75 and 100% at 100 mL day^{-1}. Using 25 and 50% concentrations, the effluent had no inhibitory effect in germination. A 25% effluent was like to that of normal water for raw.

Effects of tannery effluent on seed germination of *Acacia holosericea* and *Leucaena leucocephala* were studied. The effluent was diluted to 25, 50, 75 and 100% concentrations. Twenty five and 50% effluent inhibits seed germination and completely dormant by 75 and 100% effluent. Even the chlorophyll and protein contents decreased with 75 and 100% effluent concentration, Rajannan, *et al,* 1998 [13].

V. CONCLUSION

Review of work done by the various authors revealed that irrespective of the type of effluent, these could be well utilized for betterment of agricultural crops on proper dilution to evade the lethality of the pollutants. This diluted effluent could be used both foe invigorating the seed and for further irrigating the crop or the nursery in case of tree seeds depending up on the availability of the effluent specific to site as the case may be giving way to utilize the waste material for betterment of the mankind without causing ill effects to human and animals. The effluents on proper dilution can be also be materialised as cash by proper sale of the product thus the review fresh up the idea of motility of waste material.

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Mathematical Modeling for Demand and Supply Estimation for Cotton in Maharashtra

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Abstract- The output supply and input demand are closely interlinked to each other. Therefore, any change in input and output prices affect the input demand and output supply simultaneously. The present study used cross sectional cum time series data of Vidarbha region of Maharashtra state for cotton crop for the ten years from 1999-00 to 2008-09 were collected from the Agricultural Prices and costs Scheme, Department of Agricultural Economics and Statistics, Dr. PDKV, Akola by keeping in view to estimate input demand and output supply by using normalized Cobb-Douglas profit function. The analysis of input demand equations has shown that the demand elasticities with respect to own prices have the expected negative signs indicating that the results are in accordance with theory of demand. One per cent increase in own price, holding other prices constant, will reduce human labour employment at 1.296 per cent, bullock labour demand 1.343 per cent, fertilizer demand 2.093 per cent and seed demand 1.665 per cent in cotton crop. The absolute value of own price elasticity of human labour, bullock labour and seed price have been found greater than unity, indicating an elastic response of input utilization to their own price. It can be also observed from the study that own prices had negative Impact on supply of cotton. The profit function for cotton was decreased in prices of Farm yard manure and prices of seed. Among the variable factors, normalized seed price in general had the highest negative impact on variable profit for cotton crop followed by farm yard manure price. The study also shows that assuming no change in fixed factors or the level of technology, the input-output price structure has resulted in an appreciable change in human labour employment, bullock labour employment, fertilizer, farm yard manure and seed demand in the production of cotton.

Index Terms - cotton, input demand, Maharashtra, profit function

I. Introduction

Cotton is a very important fibre crop of global importance with a significant role in Indian Agriculture, Industrial development, employment generation and improving national economy. Cotton known as white gold or king of fibre and plays a prominent role in Indian economy. In India it is grown annually on 9.41 million hectares with 23.16 million bales of an average production. Even though India ranks first in area in the world, it occupies third position in production and low position in productivity. The average productivity of cotton in India was 419 kg lint ha^{-1}, (Anonymous [a] 2009), while in Maharashtra it is grown in an area of 3.14 million hectares with production of 4.94 million bales and productivity is only 267 kg lint ha^{-1}.

Cotton is one of the important cash crops of Vidarbha. In Vidarbha it is grown in an area of 11.24 lakh hectares with production of 18.58 lakh bales of an average production and productivity is 262 kg lint ha^{-1} which is comparatively lower than India's cotton productivity. (Anonymous [b] 2009)

Technological change and positive price policy can play a significant role in stimulating agricultural production through the desired allocation of resources. At these stages, the policy planners face the challenge to formulate suitable agricultural policy by which the desired growth of agricultural output can be achieved. In order to formulate effective price policy, one needs reliable empirical knowledge about the degree of responsiveness of demand for factors and supply of products, to reliable prices and technological changes. The output supply and factor demand are closely interlinked to each other. Therefore, any change in factor and product prices affects the factor demand and output supply simultaneously. Rising cost of inputs discourages the input use and reduces the output supply. The decline in output supply raises food prices. The rapid increase in population and the increase in money income as a result of economic development create a strong pressure on demand which also leads to increase in food grain prices. These cause hardship to the consumers. This can be corrected only by a large and adequate supply of agricultural output and a greater attention is, therefore, required to be focused for matching the demand for foodgrains and agricultural commodities with the supply thereof. The rise in foodgrains prices should be sufficiently high not-only to counteract the rising cost of inputs but also to leave a rate of profit conductive for investment in agriculture and thereby accelerating supply of agricultural output. In this context, one needs detailed knowledge about the net effect of price and non-price factors like factor and product prices, technology, irrigation, capital use, acreage etc. so that required adjustment needed in price and non-price factors could be worked out to attain the specific goals of prices, production and crop income.

II. Methodology

The Agricultural Prices and Costs (APC) scheme under the guidance of government of Maharashtra provides valuable data about Agriculture in Maharashtra. The present study used cross sectional cum time series data of Vidarbha region for the cotton crop for the ten years i.e. from 1999-00 to 2008-09. Every year's 100 farmers were selected purposively for the present study. The scheme is involved in the collection of representative data on

input use and yield and there upon estimation of cost of cultivation of principle crops grown in the region.

Data is collected every year and for all the enterprises. Although, the sample for particular year are selected with respect to specified principle crop. The data were collected for all the crops grown on the sample holdings.

Definitions of variables

A brief description and abbreviation of the variables used in this study are as follows

Q = Physical output of particular crops measured in quintal per hectare. It includes main product as well as by-product. By product were converted into quintals of crop equivalent output by dividing the total value of by-product by the price of the main product.

N = Human labour hours used per hectare for particular crop. It includes both the hired and family labour. Woman hours were converted into man hour's equivalent by treating 1.5 women hours equal to one man hour.

B = Bullock labour in hours of the bullock pairs used per hectare for particular crop. It includes both owned and hired bullock pair labour.

X = Total quantity of plant nutrients ($N + P_2O_5 + K_2O$) measured in kilogram per hectare for particular crop.

F = Farm yard manure per hectare measured in quintals.

S = Total quantity of seed measured in kilogram per hectare for particular crop.

K = A measure of flow of capital services. It includes machinery and depreciation charges, imputed value of interest, seed cost and certain operating expenses not consider else-where.

L = Area planted under the crop measured in hectares.

w.N = Total wage bill in rupees per hectare. It includes actual payment made to hired human labour and the imputed value of service of family labour

b.B = Total bullock labour wage bill in rupees per hectare for particular crop.

r.X = Total fertilizer bill in rupees per hectare for particular crop.

s.S = Total cost of seed per hectare for particular crop

m.F = The Total cost of farm yard manure valued.

w = Wage rate in rupees per man hour. It was obtained by dividing total wage bill (w.N) by total human labour hours.

b = Total bullock labour rate for a bullock labour hour. It was obtained by dividing total wage bill (b B) by total bullock labour hours.

r = Price of plant nutrients in rupees per kilogram. It was obtained by dividing the total cost of fertilizer (r.X) by total quantity of plant nutrients.

s = Total rate of the seed in rupees per kilogram. It was obtained by dividing the total cost of seed (s.S) by total quantity of seed.

m = Price of FYM per quintal in rupees. It was obtained by dividing the total Cost of farm yard manure by the total quantity of (M) used per hectare for particular crop.

A. Mathematical Model

Profit Function Analysis: The theory of profit function, developed to helps in overcoming the problem of simultaneous equation bias, if present. Another distinct advantage of this approach over production function is that with the help of duality theorem (Shephard, 1953), the variable factor demand function and supply function of products can be derived directly from the estimated profit function. Econometric application of this production theory based on duality between production function and variable profit function is a breakthrough in the theory of production. Shepherd's Lemma (1953) applies equally to profit functions, which states that the partial derivative of profit function with respect to output and input prices give the supply and demand function, respectively.

Let the Cobb-Douglas production function with usual neo-classical properties be written as

$$Q = A \; N^{\alpha 1} B^{\alpha 2} \; X^{\alpha 3} F^{\alpha 4} S^{\alpha 5} K^{\beta 1} L^{\beta 2} \; U$$

Where, (Q) is output of crop, human labour (N), Bullock labour (B), chemical plant nutrients (X) , farm yard manure (F) and seed (S) are the variable input and capital input (K) and Land (L) are fixed input, and U is error term.

When working with profit function one has to choose functional forms which are homogenous of degree one in all prices, whereas this is not necessary for normalized profit function. The profit function formulation suggested by Lau and Yotopoulos (1972) enables us to derive factor demand as a function of normalized input rates and the quantities of fixed inputs.

Invoking the theory of profit function, the normalized profit function for the above production function can be written as below.

$$\frac{\pi}{P} = A^* \; (w/P)^{\alpha i} (b/P)^{\alpha i} (r/P)^{\alpha i} (m/P)^{\alpha i} (s/P)^{\alpha i} \; K^{\beta i} L^{\beta i} \; U$$

OR

$$\pi^* = A^* \, w^{*\alpha i} b^{*\alpha i} \, r^{*\alpha i} m^{*\alpha i} \; S^{*\alpha i} K^{\beta i} L^{\beta i} \; U \qquad (1)$$

Where $\pi^* = \pi/p$ =normalized profit or output price (UOP) profit, w* is the normalized wage rate, b* is the normalized bullock labour price, r* is the normalized fertilizer price, m* is the normalized farm yard manure price and s* is the normalized seed price.

From the estimated parameters of normalized profit function, the production elasticities of inputs and intercept were derived.

B. Input Demand Function

Shepherd's Lemma (1953) asserts that the first order negative derivative of the normalized profit equation with respect to normalized wage rate, bullock labour price, fertilizer price, farm yard manure price and seed price respectively, gives the derived factor demand function. The factor demand equation on case of Cobb-Douglas type normalized profit function was given as

i. Human labour demand equation

$$-\frac{\partial \pi^*}{\partial w^*} = -\alpha_1^* \left(\frac{\pi^*}{w^*}\right) = N \text{ or}$$

$$\frac{w^* N}{\pi^*} = -\alpha_1^* \qquad (a)$$

ii. Bullock labour demand equation

$$-\frac{\partial \pi^*}{\partial b^*} = -\alpha_2^* \left(\frac{\pi^*}{b^*}\right) = B \text{ or}$$

$$\frac{b^* B}{\pi^*} = -\alpha_2^* \qquad (b)$$

iii. Fertilizer demand equation

$$-\frac{\partial \pi^*}{\partial r^*} = -\alpha_3^* \left(\frac{\pi^*}{r^*}\right) = X \text{ or}$$

$$\frac{r^* X}{\pi^*} = -\alpha_3^* \qquad (c)$$

iv. Farm yard manure demand equation

$$-\frac{\partial \pi^*}{\partial f^*} = -\alpha_4^* \left(\frac{\pi^*}{f^*}\right) = F \text{ or}$$

$$\frac{f^* F}{\pi^*} = -\alpha_4^* \qquad (d)$$

v. Seed demand equation

$$-\frac{\partial \pi^*}{\partial s^*} = -\alpha_5^* \left(\frac{\pi^*}{s^*}\right) = S \text{ or}$$

$$\frac{s^* S}{\pi^*} = -\alpha_5^* \qquad (e)$$

Substituting π^* from identity (1) into (a) to (e), the demand equation can be written as:

Labour demand equation

$$N = -\alpha_1^* A^* (w^*)^{\alpha_1^*-1} b^{*\alpha_2^*} r^{*\alpha_3^*} m^{*\alpha_4^*} s^{*\alpha_5^*} K^{\beta_1^*} L^{\beta_2^*}$$

Bullock labour demand equation

$$B = -\alpha_2^* A^* w^{*\alpha_1^*} (b^*)^{\alpha_2^*-1} r^{*\alpha_3^*} m^{*\alpha_4^*} s^{*\alpha_5^*} K^{\beta_1^*} L^{\beta_2^*}$$

Fertilizer demand equation

$$X = -\alpha_3^* A^* w^{*\alpha_1^*} b^{*\alpha_2^*} (r^*)^{\alpha_3^*-1} m^{*\alpha_4^*} s^{*\alpha_5^*} K^{\beta_1^*} L^{\beta_2^*}$$

Farm yard manure demand equation

$$F = -\alpha_4^* A^* w^{*\alpha_1^*} b^{*\alpha_2^*} r^{*\alpha_3^*} (m^*)^{\alpha_4^*-1} s^{*\alpha_5^*} K^{\beta_1^*} L^{\beta_2^*}$$

Seed demand equation

$$S = -\alpha_5^* A^* w^{*\alpha_1^*} b^{*\alpha_2^*} r^{*\alpha_3^*} m^{*\alpha_4^*} (s^*)^{\alpha_5^*-1} K^{\beta_1^*} L^{\beta_2^*}$$

C. *Output supply Function*

Shepherd's Lemma (1953) asserts that first order derivative of profit function with respect to output price gives output supply function.

$$\frac{\partial \pi}{\partial P} = \theta \left(\frac{\pi}{P}\right) = Q \quad \text{or} \quad \frac{PQ}{\pi} = \theta$$

The output supply function in the form of Cobb-Douglas production function was written as

$$Q = A_\theta P^{\theta-1} w^{*\alpha_1^*} b^{*\alpha_2^*} r^{*\alpha_3^*} m^{*\alpha_4^*} s^{*\alpha_5^*} K^{\beta_1^*} L^{\beta_2^*}$$

The above equation was giving the output supply with respect to output prices, wage rate, bullock labour price, fertilizer price, farm yard manure price, seed price and price of capital input.

D. *Joint Estimation of Cobb-Douglas profit functions and input demand.*

The normalized profit function and factor demand functions for human labour, bullock labour, fertilizer farmyard manure and seed were jointly estimated using Zellner's method (1962) for estimating 'Seemingly Unrelated Regression Equation (SURE)' by imposing the restriction that α^{1*}, α^{2*}, α^{3*}, α^{4*} and α^{5*} are equal in both the normalized profit function and relevant factor demand equations.

By using SURE method the coefficient were estimated as

$$\hat{\alpha}_{SURE} = (X' V^{-1} X)^{-1} X' V^{-1} Y$$

Where, X is independent variable and Y is dependent variable

$V = \sum \otimes I_N$

Where, $\sum$ representing the covariance of residual between the equations, $\otimes$ is the Kronecker product and I_N is the identity matrix of number of observations.

Impact of observed changes

The theory of profit function provides a set of factor demand and output supply equations. The factor demand of cotton crop for i^{th} variable factor is as:

$X_i = X (P_Q, w, b, r, m, s)$ $\quad$ i = 1, 2, 3, 4, 5.

The output supply equation for cotton is as

$Q = Q (P_Q, w, b, r, m, s)$

Where, P_Q is the output price Suffix i = 1 for human labour, 2 = bullock labour, 3 = Fertilizer, 4 = Farmyard Manure and 5 = Seed.

Taking the total differential of above equations and writing in terms of growth rates.

$$\dot{X}_i = E_{Xi}^{PQ} \cdot \dot{P}Q + E_{Xi}^{W} \cdot \dot{w} + E_{Xi}^{b} \cdot \dot{b} + E_{Xi}^{r} \cdot \dot{r} + E_{Xi}^{f} \cdot \dot{f} + E_{Xi}^{s} \cdot \dot{s} + E_{Xi}^{K} \cdot \dot{K} + E_{Xi}^{L} \cdot \dot{L}$$

$$\dot{Q} = E_{Q}^{PQ} \cdot \dot{P}Q + E_{Q}^{W} \cdot \dot{w} + E_{Q}^{b} \cdot \dot{b} + E_{Q}^{r} \cdot \dot{r} + E_{Q}^{f} \cdot \dot{f} + E_{Xi}^{s} \cdot \dot{s} + E_{Q}^{K} \cdot \dot{K} + E_{Q}^{L} \cdot \dot{L}$$

The dot on the variable indicates the rates of change (growth rate) in the variable. E is the parameters of the elasticities of factor demand and output supply. (i.e. E_X^Z denotes elasticity of X with respect to changes in exogenous variable Z). P. Kumar and Mruthyunjay (1989).

III. RESULTS AND DISCUSSION

A. *Input Demand Function*

A system of factor demand equations were derived from the estimated normalized profit function. The results of human labour, bullock labour, fertilizer, farm yard manure and seed demand equation for cotton are presented below and the degree of responsiveness of input and output price movements on the use of inputs are discussed. This information is of crucial importance in the formulation of effective price policies for crops to reach specified production goals.

Input Demand Function for cotton

Table 1 revealed that demand elasticities with respect to own price had anticipated negative signs indicating that the results were in accordance with the theory of demand.

The absolute value of own price elasticity of human labour, bullock labour, fertilizer and seed were greater than unity indicating there by an elastic response of input utilization to their

own price. One per cent increase in own price, holding other prices constant, will reduce human labour employment at 1.296 per cent, bullock labour demand 1.343 per cent, fertilizer demand 2.093 per cent and seed demand 1.665 per cent in cotton crop.

Table 1: Input demand function for cotton

Variables	Human Labour	Bullock Labour	Fertilizer	F.Y.M.	Seed
Intercept	0.501	0.571	1.838	0.379	-0.625
Output price	1.102	1.557	2.415	0.750	0.847
Wage rate	-1.296	-0.079	-0.602	-0.558	0.260
Bullock labour price	0.134	-1.343	0.005	-0.014	0.057
Fertilizer price	0.018	0.046	-2.093	-0.042	-0.006
F.Y.M. price	-0.019	-0.008	-0.041	-0.155	0.0004
Seed Price	0.034	0.092	0.101	-0.002	-1.665
Capital	0.227	-0.112	0.243	0.218	0.513
Land	-0.167	-0.153	-0.028	-0.196	-0.006

A negative sign of cross price elasticity with respect to the price of other variable inputs shows that the pair is complement and a positive sign is an indicator of substitutive relationship. However, the positive sign of cross price elasticity with respect to quantities of fixed inputs indicates complementarity and negative sign indicates substitutive relationship.

Table 1 shows that the human labour and bullock had a substitutive relationship for cotton (Kumar *etal* 2010 reported that there was a substitutive relationship between human labour and bullock labour for wheat and sugarcane) while there was a complementarity between human labour and farm yard manure.

B. Output supply Function

The output supply equations for cotton in Vidarbha region of Maharashtra state were derived from the estimated profit function. The output supply equation given in Table 2 gives the estimates of the responses of own output price, variable prices and fixed factors on output supply of selected crops.

It can be observed from the study that the own price had negative impact on supply of cotton. However, the output supply response was inelastic to cotton. (i.e. -0.260).

Table 2: Output supply function for cotton

Variables	Elasticity
	Cotton
Intercept	-0.798
Output price	-0.260
Wage rate	0.415
Bullock Labour price	0.174
Fertilizer price	0.009
Farm yard Manure price	-0.001
Seed Prices	0.074
Capital Input	0.291
Land	-0.122

Table 2 reveals that for the cotton, variable inputs responded positively to the output price, except farm yard manure. The input response elasticities were highly inelastic, nearly zero. The elasticity with respect to farm yard manure price was -0.001, resulted that a 1 per cent increase in farm yard manure price were associated with about 0.001 per cent per cent decline in crop output. Among the variable factors, human wage rate, bullock labour price, fertilizer price and seed price had positive impact on the supply of cotton, while among the fixed factor, capital was found to be effective in increasing the supply of cotton. The output supply elasticity with respect to capital was (0.291). Capital input had positive impact on the supply of cotton.

C. Joint estimation of the Normalized profit functions and factor share for variable inputs

Lau and Yotopoulas (1972) pointed out that due to the presence of common parameters in profit and factor demand equation; they should be estimated jointly imposing the restriction that common parameters in both equations are equal. The five equations - UOP profit function, human labour, bullock labour, fertilizer, farm yard manure and seed demand functions were estimated jointly using Zellner's method (1962) for estimating 'Seemingly Unrelated Regression Equation (SURE)' by imposing appropriate restrictions.

Table 3 reveals that for the cotton crop, the profit function was decreased in prices of Farm yard manure and prices of seed. Among the variable factors, normalized seed price in general had the highest negative impact on variable profit for cotton crop followed by farm yard manure price.

Table 3: Joint estimation of the Normalized profit function and factor share for variable inputs

Variables	Parameters	SURE Estimated Values
Normalized profit (dependent variable)	$\ln \frac{\pi}{p}$	
Wage rate	$\ln \frac{w}{p}$ (α_1^*)	0.525
Bullock labour price	$\ln \frac{b}{p}$ (α_2^*)	0.004
Fertilizer price	$\ln \frac{r}{p}$ (α_3^*)	0.089
Farm yard manure price	$\ln \frac{m}{p}$ (α_4^*)	-0.089
Seed	$\ln \frac{s}{p}$ (α_5^*)	-0.119
Capital input	InK (β_1)	0.562
Land	In L (β_2)	-0.198

Impact of Observed Changes

The impacts of observed changes in input-output price structure on factor demand and output supply were presented in Table 4. Under the assumption that the input output prices continue to change in future at the same rate as was observed in the last decade and also there is no change in the endowment of fixed

factors. The partial effects of price changes on the growth of factor demand and output supply were computed.

Table 4 shows that assuming no change in fixed factors or the level of technology, the input-output price structure has resulted in an appreciable change in human labour employment, bullock labour employment, fertilizer, farm yard manure and seed demand in the production of cotton crop.

Table 4: Impact of observed changes in input output price structure on factor demand and output supply

Particulars	**Per cent Growth**
Human Labour	-7.23
Bullock Labour	-3.25
Fertilizer	-9.84
Farm Yard Manure	-4.95
Seed	-34.64
Out put	5.04

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3D Reconstruction from Multiple Images Using Inverse-Mapping IDVR

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Abstract- According to the principle of direct volume rendering (DVR), visualization can be created without using the intermediate geometrical structure of images, such as mesh, grid, silhouettes etc. In-fact the direct volume rendering is a mapping process from volume data (voxels) of points. Inverse volume rendering is not required geometric parameters of cameras and images, only the optical properties of images are more important than others, such as colour, light, opacity, etc. Flexibility of interactive direct volume rendering(IDVR) is depends upon the transfer functions and function points for appropriate operation such as image stitching, blending and warping etc. before describing the inverse mapping approach to find out transfer functions and specifying the basic steps for mapping and reconstruction. This motivates the study of various transfer and mapping functions and requirements of interaction techniques for visualization system, So that the interface can produce the visual effects on various steps and processes of volume rendering.

Index Terms- direct volume rendering, 3D reconstruction, volume visualization, inverse mapping.

I. INTRODUCTION

We want to formulate the imaging process of small images so that a panoramic view of a 3D object can be view as a single image or you can say in the form of volume. Volume rendering is followed by image matting of various images in such form that they can easily formulated together for a single mat using matrix operations. This estimation we are calling inverse mapping for interactive direct volume rendering, can be performed efficiently through maximization method.

In recent years direct volume rendering has proven as a powerful tool for the visual data exploration, which is an interactive process of the field of computer vision. In this paper, we detail our efforts for inverse process of projection that make interactive DVR. In order to the exploration of the power of DVR is an analysis tool of static images representing complex 3D panorama. We present a volume rendering system based on a mapping from 2D to 3D which is inverse procedure of projection, and for stitching it requires integration of matrix.

In this paper, we propose a method of volumetric image reconstruction using the voxels (3D array) based on inverse of projection that creates a synthetic view of an object. Volumetric data is image data having details in terms of X, Y and Z co-ordinates which are related with each others.

II. RELATED WORK

A. Inverse volume rendering

In [1] Shuntaro Yamazaki et al proposed OSEM method to reconstruct object shape by a set of coarse voxels that can model the spatial occupancy inside the each voxel. They implement Expectation Maximization method that can overcome the difficulties of linear system. The EM algorithm in their estimation can be accelerated by dividing the problem into several subsets of images then the linear system is solved using one of the subsets. Once the algorithm has been converged, the linear system is solved using another subset subsequently.

B. Multi view reconstruction:

Interactive Direct Volume Rendering of Time-Varying Data is popular approach to volume visualization proposed by John Clyne et al in [2]. In [3] Seitz et al proposed voxel colouring methodology for photorealistic Scene, which can overcome cost complexity problem with the existing schemes. In [4] Eric B. Lum et al present a method for interactive non-photorealistic volume rendering using hardware accelerated rendering techniques with a PC cluster. In [5] Van Gelder et al proposed a direct volume rendering with shading via 3D textures.

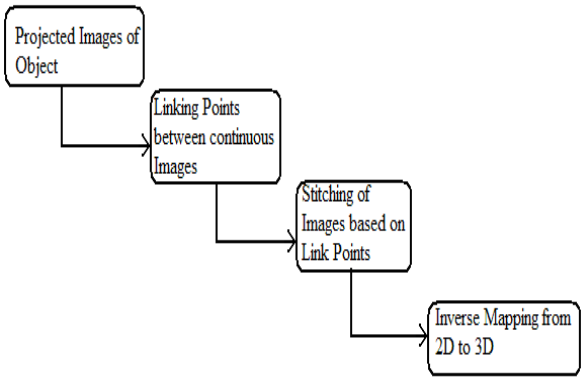
C. Fast volume rendering:

In terms of Direct Volume rendering C.R Johnson et al explained the methodology in [6] for Interactive Simulation and Visualization. In [7] Philippe Lacroute et al propose Shear-Warp Factorization method for viewing transformation. In this approach they construct a scan-line based algorithm that traverses the volume and the intermediate image. In [8] Marc Levoy et al propose an approach for surface reconstruction from volume data which is the part of fast volume rendering.

III. SYSTEM OVERVIEW

In our approach we describe a new procedure which combines the advantages of image-order and object-order algorithms; this method is based on inverse mapping of projection based on image space algorithm. Our procedure is the combination of various schemes like parallel projection, ray tracing in such way that can visualize a 3D object with in single frame work.

Many researchers have proposed methods that reduce rendering cost without affecting image quality but in our approach the image quality may be reduce due to inverse mapping and diversion of link points. This method is used opacity of the images for colouring so possibility of quality reduction is possible.



IV. IMPLEMENTATION

The process describe above is the result of the feature exploration in the form of volumetric dataset. So that boundary calculation of the 3D object can be easily made for object representation. In essence, the feature can be regarded as a segmentation note book, where features, once captured are collected in a common environment. So at the time of practice of 3D visualization first we copy the data for boundary mapping, then for link points. When we get the actual shape of the 3D object, then the inverse mapping for colour is essential for exploration of the object. Original volumetric dataset fetches from featured volume and then perform the segmentation of the images, and then migrate for the stitching in such a way that the density distribution can not change the original shape of the object. The methodology for practical aspect need following steps to follow:

A. Sampling

We suppose the sampling of data is required device and soft tools that can help to collect raw data for further processing, thus we are using high resolution camera and Microsoft SQL server for binary data storage.

B. Pre-processing and Composition

MATLAB 7.0.1.24704 and Microsoft Visual Basic .net are required tools for variables and front designing. But how the assembling process will run, this is an essential procedure. There are the lots of methods available for transferring data from one work space to other space, but co-ordination between them is essential.

C. Parallel Projection Rendering

This is a process of rendering for the related images with in one frame work so that the representation of new image can came into existence.

D. Transformation into Intermediate Images for warping and blending

Due to interactivity, the transformation process would be quite difficult and a little complex. We are utilising the image processing tools provided by MATLAB. When we discuss the whole scenario of image reconstruction, it brings the clear picture of inverse mapping DVR.

E. Surface Mapping using Ray Radiating:

In this surface recovering procedure there is a scheme which is based on the optical light phenomena. The working of surface mapping procedure is used the voxel address and the corresponding light intensity, and after transformation of the corresponding pixel visualization map onto the display device. Due to the mapping between 2D arrays and multiple 3D arrays the visualization effect can be changed, but the reconstruction is surely possible. We are continuously working on the various devices that are of different architecture.

V. CONCLUSION

We have presented a framework that enables an intuitive, feature-centric exploration of volumetric dataset. This approach is work towards the inverse of projection process that can create a complexity problem at the time of colour and opacity mapping from 2D to 3D. Inverse-Mapping IDVR method allows us to implement the methodology in optimized and low computational overhead because its data structure is required mapping function which is very flexible for wide range dataset.

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A Perpetual Study of IFRS towards a True and Fair view of International Accounting System

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Abstract- Globalization is one of the great social processes facing humanity forever. Facing a challenge system, global financial information has called for reliable financial information created by accounting. This leads us to study and implementation of International Financial Reporting Standards (IFRS) for rapid growth of international trade and internationalization of firms, the developments of new communication technologies, and the emergence of international competitive forces is perturbing the financial environment largely. To-date there has been limited research conducted into the effects/implications of IFRS adoption. Thus the present study aims to identify and evaluate the materiality of the impact of IFRS adoption on companies' financial position, performance of the financial year, examine individual standards and its effect on shareholders' equity. This research paper even seeks to contribute to the latest discussions on the financial reporting. It starts out by giving an overview of the IFRS accounting policies, which are currently applied by the majority of participants. We have proposed a model of study to find out the views of Chartered Accountants (CA), Company Secretaries (CS), Post Graduates, Doctorates and ICWA who are mainly concerned with the standards so that their acceptability towards IFRS can be assessed.

Index Terms- IFRS, global reporting standards, IASB, perceptual analysis, convergence

I. Introduction

The rapid growth in international capital markets and cross-border mergers and acquisitions, and other international development and has created pressures for harmonization of accounting standards beyond those covered by only a few decades ago. The business community has admitted that accounting is "the language of business." They are using the accounts to communicate the existence and evolution of the financial position and performance of economic entities. Financial information is a form of language. And if the language of financial reporting should be a putt to use, so that investment decisions and credit may be easier to take, not only must be intelligible, but also must be comparable. Due to the fact that many companies follow the globalization process, so accountants are globalized necessary to continue this process and present the financial position through an accounting procedure that can be understood only by the business community. Due to the fact that this process is following global trends and globalization is above all a political process starting point in creating a unique accounting system needed to pass a difficult process, where the main accounting systems to litigate to enforce their accounting policies and practices. These new environmental factors in the global economy, international monetary system, multinational corporations and foreign direct investment to create an environment in which business transactions, conduct, evaluation and information, making new and different that require specific accounting sub discipline or the harmonization of accounting practices. (Belkaoui 1994)

A number of multi-national companies are establishing their businesses in various countries with emerging economies and vice versa. Thus we can say that sound financial reporting structure is imperative for economic well-being and effective functioning. Adopting a single global accounting language will ensure relevance, completeness, understandability, reliability, timeliness, neutrality, verifiability, consistency, comparability and transparency of financial statements and these bring about a qualitative change in the accounting information reports which will strengthen the confidence and empower investors and other users of accounting information around the world. It will also help acquirers to assess the actual worth of the target companies in cross border deals and thereby furthering the economic growth and business expansion globally. India Incorporation has long recognized the need to use globally acceptable standards for financial reporting. [1]

The introduction of IFRS represents a fundamental change in financial reporting. It is not something that can be handled in a few weeks prior to adoption. Planning for it, generating the necessary awareness, educating stakeholders and managing the required changes will take considerable commitment and time to achieve a successful transition. IFRS brings groups and collective working to achieve profits, brings about fair value in the business. [2] Now, as the world globalizes, it has become imperative for India also to make a formal strategy for convergence with IFRSs with the objective to harmonies with globally accepted accounting standards. Presently, the Accounting Standards Board (ASB) of the Institute of Chartered Accountants of India (ICAI) formulates Accounting Standards (ASs) based on the IFRSs keeping in view the local conditions including legal and economic environment, which have recently been notified by the Central Government under the Companies Act, 1956.[4]

A. Review of Literature

A number of studies related to the objectives of this paper have been published in recent years, which we shall consider in two groups

Nigel Masters, Eric Dupont (2002) the authors assess that International Accounting Standards are steadily becoming the

norm. The European Union agreement that all listed companies in Europe must comply by the year 2005 has hastened the process further. This brings particular challenges for all organizations in the financial services world but for insurance companies in particular. What changes will be required in insurance company reporting and lay particular stress on risk management. [3]

Glenn Boyle, Stefan Clyne, Helen Roberts (2006) employee stock options (ESO) showed that cost can be extremely sensitive to employee characteristics of risk aversion and under diversification. This result casts doubt on the usefulness of any market-based model for pricing ESOs, since such models, by definition, produce option values that are independent of employee characteristics. By limiting employee discretion over the choice of exercise date, vesting restrictions help reduce the magnitude of this problem. [5]

Tokar (2005) focuses on the impact of convergence on auditing firms and concludes that achieving true convergence of accounting standards is a costly and time-consuming objective, and will require a huge investment of money and a significant change in the training of accounting students in the near future.

John Goodwin, Kamran Ahmed (2006) examined the impact of Australian equivalents to international financial reporting standards (A-IFRS) on the accounts of small-, medium- and large sized firms.

Barth, M. E., Landsman, W. R., Lang, M (2006) focused on the comparison of reporting of the derivatives using International Financial Reporting Standards (IFRS) in comparison with the Czech accounting legislature by the companies listed on the Prague Stock Exchange (PSE). Study draws the attention to check the differences in reporting of derivatives and also compares their qualitative advantages. Results of this study are based on the analysis of annual reports of the companies listed on the PSE. Any of analyzed companies didn't allow all of the requirements of IFRS on reporting of the financial derivatives.

Graeme Wines, Ron Dagwell, Carolyn Windsor (2007) critically examined the change in accounting treatment for goodwill pursuant to international financial reporting standards (IFRSs) by reference to the Australian reporting regime.

Stella Fearnley, Tony Hines (2007) traced the development of attitudes towards financial reporting solutions for entities not subject to the European Union (EU) Regulation. This Regulation mandated application of IFRS for the group accounts of listed companies for financial years beginning 1 January 2005. It seeks to evaluate the alternatives in the light of changing attitudes to IFRS, and the accounting model being adopted, particularly focusing on the problems facing smaller companies.

Armstrong C. (2008) analyzed the development of reporting standards for both financial reporting and for corporate social responsibility (CSR) reporting. It aims to argue that both International Financial Reporting Standards and US Generally Accepted Accounting Principles are vehicles of colonial exploitation and cannot be sustainable. This can be contrasted with the voluntary approach to the development of CSR reporting standards.[4]

Ilse Maria Beuren, Nelson Hein, Roberto Carlos Klann (2008) analyzed the impact of differences between the International Financial Reporting Standards (IFRS) and Generally Accepted Accounting Principles in the United States (US GAAP) in the economic-financial indicators of English companies.

Alfred Wagenhofer (2009) analyzed the challenges that arise from political influences and from the pressure to sustain a successful path in the development of standards. It considers two strategies for future growth which the International Accounting Standards Board (IASB) follows: the work on fundamental issues and diversification to private entities.

Dennis W. Taylor (2009) compared the costs to financial statement prepares of making the transition to International Financial Reporting Standards (IFRSs) relative to the benefits to financial statement users from receiving "higher quality" IFRS-based information (measured as incremental value-relevance for listed companies in the UK, Hong Kong and Singapore). These countries had different approaches to harmonization leading up to IFRS adoption.

Rudy A. Jacob, Christian N. Madu (2009) examined the academic literature on the quality of International Financial Reporting Standards (IFRS), formerly International Accounting Standards (IAS), which are poised to be the universal accounting language to be adopted by all companies regardless of their place of domicile**.**

Robyn Pilcher, Graeme Dean (2009) determined the impact financial reporting obligations and, in particular, the International Financial Reporting Standards (IFRS) have on local government management decision making. In turn, this will lead to observations and conclusions regarding the research question: "Does reporting under the IFRS regime add value to the management of local government?"

Susana Callao, Cristina Ferrer, Jose I. Jarne, Jose A. Lainez (2009) discovered the quantitative impact of International Financial Reporting Standards (IFRS) on financial reporting of European countries and evaluate if this impact is connected with the traditional accounting system in which each country is classified, either the Anglo-Saxon or the continental-European accounting system.

II. RESEARCH METHODOLOGY

The validity of any research depends on the systematic method of collecting the data, and analyzing the same in appropriate order. In the present study, both primary and secondary data were collected.

Objectives of the Study

The present research work has been undertaken keeping in view the following objectives:

1. To develop an insight about the global financial reporting language i.e. IFRS.
2. To know about the likely beneficiaries of convergence.
3. To study the challenges and risks specific to India in adoption of IFRS.
4. To compare the perception of academicians, industrialists and professionals.
5. To understand the implications of changing importance of IFRS in the present situation and the process of migration in adopting IFRS.

A. Sample Design

Sampling is the use of a subset of the population to represent the whole population. For collecting primary data, field survey technique was employed in the study. First-hand information was

collected from the professional and academicians of Rajkot and Ahmadabad city. The respondents were chosen from the entire cities, based on the members listed in the Rajkot Accounting Association. The respondents were selected through Probability method of Random Sampling technique for survey and non-probability convenience sampling technique was adopted for collecting data from the professional and academicians.

The study was exploratory in nature where survey method was used to collect the required data. The population included academicians and professionals of Gujarat (Ahmadabad and Rajkot). In all 50 questionnaires were distributed for the study. Out of 50 respondents 42% respondents are Chartered Accounts, 34% are Post Graduates 12% are Doctorate and 6% are Company Secretary and ICWA.

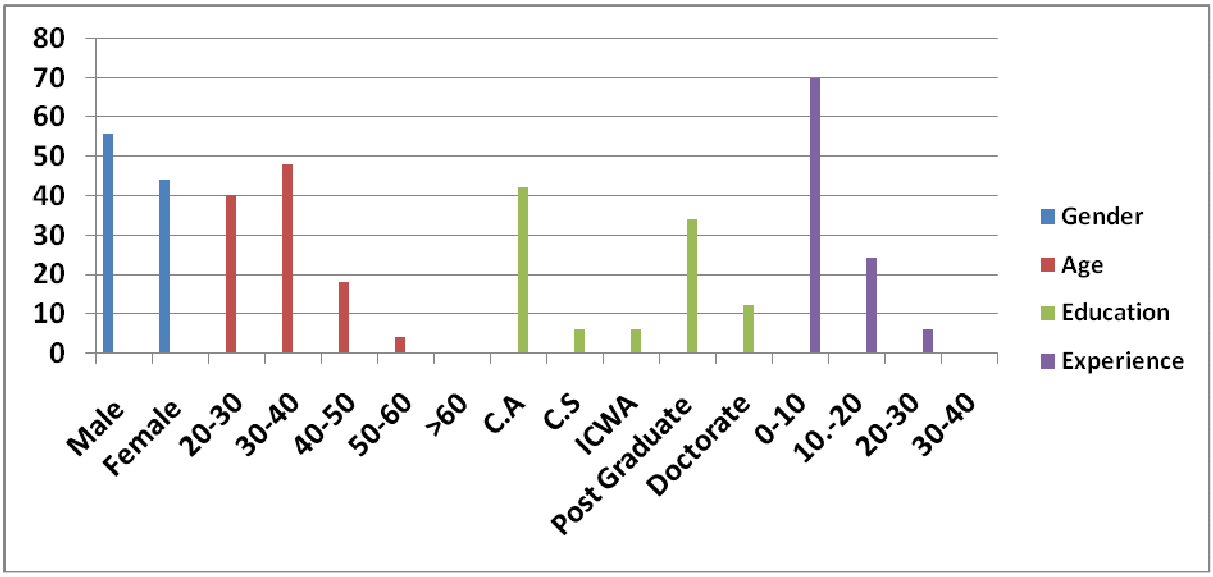

Fig. 1 Respondent profile Classification

All the questionnaires used were closed-form questions, i.e. questions concerning relevance and reliability were stated as propositions, and adopted a five-point Likert scale. To find out whether respondents agreed or disagreed with each survey question, the mean responses were compared and f-tests was used to test whether the mean responses differ significantly from there.

III. RESULT AND OUTCOMES

The analysis is completely based on primary information from the sampled respondents identified according to sampling design. The researcher has sent questionnaires to 50 respondents, which are classified into 5 Age groups. Of them, Group 1 (G – 1) : 20 to 30 years , Group – 2 (G – 2) : 30 to 40 years , Group – 3 (G – 3) : 40 to 50 years , Group – 4 (G – 4) : 50 to 60 years, Group – 5 (G – 5) : Above 60 years . The total number of respondents is 50, out of which there are 21 respondents are under the age group of 20 to 30 years, 3 respondents are under the age group of 30 to 40 years, 3 ICWA, 17 Post Graduates and 6 Doctorates.

A. Classification of Respondents' on the Basis of Age.

Average level of satisfaction of respondent's classified into different age groups are given bellow:

Table 1: Computation of average level of satisfaction of respondent's different age groups

No. of Respondents	ALL RES.	G-1	G-2	G-3	G-4	G-5	TOTAL
1	**4.62**	4.45	**10.00**	**4.67**	**5.00**	0	**24.12**
2	**4.16**	4.00	9.22	4.22	3.50	0	**20.94**
3	3.52	3.30	7.33	4.11	3.50	0	**18.24**
4	3.84	3.95	7.67	4.00	4.00	0	**19.62**
5	3.84	3.65	8.33	4.00	4.00	0	**19.98**
6	**4.36**	**4.50**	9.22	4.00	4.50	0	**22.22**
7	3.22	3.40	6.89	2.78	3.00	0	**16.07**
8	3.66	3.70	7.22	4.00	4.00	0	**18.92**
9	3.12	2.95	6.44	3.22	**5.00**	0	**17.62**

10	3.24	3.30	6.00	3.89	3.50	0	**16.69**
11	3.5	3.45	7.33	3.78	3.00	0	**17.56**
12	2.92	3.20	5.44	3.11	2.50	0	**14.26**
13	3.08	3.20	5.67	3.67	3.00	0	**15.53**
14	4.04	4.15	7.89	4.22	**5.00**	0	**21.26**
15	4.1	4.10	8.78	4.11	3.50	0	**20.49**
16	3.92	3.95	8.11	4.33	2.50	0	**18.89**
17	3.46	3.65	6.89	3.67	2.50	0	**16.71**
18	3.36	3.30	6.78	3.67	4.00	0	**17.74**
19	3.36	3.30	6.78	3.67	4.00	0	**17.74**
20	3.08	3.25	6.33	2.56	4.50	0	**16.64**
21	3.04	3.05	6.67	2.67	3.50	0	**15.88**
22	4	4.15	7.89	4.11	4.50	0	**20.65**
23	3.2	3.30	6.44	3.11	4.00	0	**16.86**
24	3.84	3.80	7.67	4.33	4.00	0	**19.80**
25	4.02	3.95	8.33	4.56	3.00	0	**19.84**
TOTAL	**90.5**	**91**	**185.33**	**94.44**	**93.5**	**0**	**464.28**

Above table 1shows there are 50 respondents classified into 5 group's viz. G -1 to G – 5. The total average value of all respondents is 90.5 and the serial number is 1 to 25, in which serial number 1 represents that adoption of IFRS is going to be challenging stands with the highest score of 4.62. While serial number 6 represents that there would be a unified platform and that too transparent in the global scale stands with the second highest score of 4.36. Accordingly serial number 2 represents that the Indian Corporate is going to reap significant benefits from adopting IFRS stands third with the average of 4.16.

In the above table G – 1 is the age group between 20 to 30 years. In G – 1 the total average of respondents is 91, in which serial number 6 represents that there would be a unified platform and that too transparent in the global scale stands with highest the score of 450.

In the above table G – 2 is the age group between 30 to 40 years. In G – 2 the total average of respondents is 185.33, in which serial number 1 represents that the adoption of IFRS is going to be challenging stands with the highest score of 10.

In the above table G – 3 is the age group between 40 to 50 years. In G – 3 the total average of respondents is 94.44, in which serial number 1 represents that the adoption of IFRS is going to be challenging stands with the highest score of 4.67.

In the above table G – 4 is the age group between 50 to 60 years. In G – 4 the total average of respondents is 93.5, in which serial number 1, 9 and 14 stands highest with the score of 5. Thus we can conclude that respondents believe that IFRS adoption is going to be challenging, the main effect of IFRS is on how a company recognizes measures and discloses items, and that the global accounting would move towards a fair value accounting.

In the above table G -5 is the age group above 60 and there is no respondent in the same age group. Keeping in view the above table we can say that there was very less similarity between all the five groups. While the grand total of the whole table is 464.28.

However, whether level of satisfaction about the opinion of the respondents with reference to age group are significant or not is tested at 5% level of significance with the help of "F" test.

Hypothesis

- H0: There is no significance difference between in the opinion of the respondents with reference to age group.
- H1: There is significance difference between in the opinion of the respondents with reference to age group

Table 1.1: Analysis of ANOVA according to respondents view with reference to age group

Source of Variation	**S.S**	**d. f.**	**MS**	**F (c)**	**F (t)**
S. S between groups	25.97	24	1.08	3.20	1.63

S. S between Respondents view	687.22	4	171.81	508.76	2.47
S. S Error	32.42	96	0.34		
Total	**745.6136**	**124**			

The above table 1.1 expresses that the statistical analysis of respondents point of view about IFRS adoption with reference to age group. The calculated value of S.S between Groups is 3.20 and the table value at 5% level of significance is 1.63. The calculated value of "F" is higher than the table value of "F". Hence the null hypothesis (H0) is rejected and alternate hypothesis (H1) is accepted. Thus there is significance difference between in the opinion of respondents with reference to age group.

As per the Sum of Squares between respondents view the calculated value at 5% level of significance is 508.76 and the tabulated value is 2.47. Hence the calculated value of "F" is higher than the table value of "F". Thus the null hypothesis (H0) is rejected and alternate hypothesis (H1) is accepted. Thus there is significance difference between the opinions of respondents with reference to age group. This shows that the above results are as per expectation.

From the above results we can conclude that there is significant level of difference between the different age groups and the perception or opinion of people in the context of IFRS.

B. Classification of Respondents' On The Basis of Education.

The analysis is completely based on primary information from the sampled respondents identified according to sampling design. The researcher has sent questionnaires to 50 respondents, which are classified into 5 various groups. Of them, Group 1 (G – 1) : Chartered Accountants , Group – 2 (G – 2) : Company Secretary, Group – 3 (G – 3) : ICWA , Group – 4 (G 4) : Post Graduate, Group – 5 (G – 5) : Doctorate of Rajkot City. The total number of respondents is 50, out of which there are 21 Chartered Accountants, 3 Company Secretaries, 3 ICWA, 17 Post Graduates and 6 Doctorates.

Below table 2 shows there are 50 respondents classified into 5 group's viz. G -1 to G – 5. The total average value of all respondents is **90.86** and the serial number is 1 to 25, in which serial number 1 represents that adoption of IFRS is going to be challenging stands with the highest score of **4.6**. While serial number 6 represents that there would be a unified platform and that too transparent in the global scale stands with the second highest score of **4.34**. Accordingly serial number 2 represents that the Indian Corporate is going to reap significant benefits from adopting IFRS stands third with the average of **4.24**.

In the above table G – 1 represents the group of Chartered Accountants. In G – 1 the total average of respondents is **90.05**, in which serial number 6 represents that there would be a unified platform and that too transparent in the global scale stands with highest the score of **4.45**.

In the above table G – 2 represents the group of Company Secretary. In G – 2 the total average of respondents is **60.67**, in which serial number 16 represents that Convergence of global accounting can improve investment decisions stands with the highest score of **3.33**.

In the above table G – 3 represents the group of ICWA. In G – 3 the total average of respondents is **89.00**, in which apart from the above statements, serial number 14 and 15 are highly accepted which represents that the global accounting would move towards Fair Value accounting and convergence of global accounting can easily be used to compare the financial information to other companies. Thus the educated group of ICWA has supported the above statements with the highest score of **5**.

In the above table G – 4 represents the group of Post Graduates. In G – 4 the total average of respondents is **91.24**, in which serial number 1 stands highest with the score of 5. Thus we can conclude that respondents believe that IFRS adoption is going to be challenging.

In the above table G -5 represents the age group of Doctorates. In the same group the total average of respondent is 93.10**,** in which serial number 1 stands highest with the score of **4.83.** Thus we can conclude that majority Doctorates believe that IFRS adoption is going to be challenging.

Keeping in view the above table we can say that there was very less similarity between all the five groups. While the grand total of the whole table is **424.04**. However, whether level of satisfaction about the opinion of the respondents with reference to Education Level are significant or not is tested at 5% level of significance with the help of "F" test.

Average level of satisfaction of respondent's classified into different educational groups are given bellow:

Table: 2 Average level of satisfaction of respondent's classified into education groups

No. of Respondents	ALL Respondents	G-1	G-2	G-3	G-4	G-5	TOTAL
1	**4.64**	4.32	2.67	**5.00**	**5.00**	**4.83**	21.82
2	**4.24**	4.05	2.33	**5.00**	4.53	4.00	19.91
3	3.54	3.27	2.33	4.33	3.71	3.67	17.31

4	3.94	4.05	2.67	4.33	3.59	4.33	18.97
5	3.84	3.77	3.00	3.33	3.88	4.00	17.99
6	**4.34**	**4.45**	2.00	**5.00**	4.18	4.50	20.13
7	3.22	3.45	1.67	3.67	2.82	3.50	15.11
8	3.68	3.59	2.33	3.33	3.82	3.83	16.91
9	3.18	3.09	3.00	2.33	3.00	3.43	14.85
10	3.16	3.00	3.00	1.67	3.35	3.50	14.52
11	3.54	3.14	2.33	4.00	4.00	3.50	16.97
12	2.94	3.36	1.67	2.33	2.53	3.00	12.89
13	3.06	3.23	2.00	3.00	2.88	3.00	14.11
14	4.02	3.91	2.33	**5.00**	4.00	4.17	19.41
15	4.12	4.14	2.00	**5.00**	4.06	4.17	19.36
16	4	3.82	**3.33**	4.33	4.00	4.17	19.65
17	3.46	3.64	2.00	2.67	3.47	3.33	15.11
18	3.36	3.55	3.00	3.00	2.88	3.83	16.26
19	3.44	3.27	2.33	3.67	3.71	3.17	16.15
20	3.08	3.05	2.00	1.67	3.41	3.00	13.12
21	3.06	2.95	2.67	3.33	3.12	2.83	14.91
22	3.98	4.00	1.67	4.33	4.00	4.17	18.17
23	3.24	3.64	3.00	1.67	2.71	3.67	14.68
24	3.78	3.68	2.67	3.00	3.88	4.17	17.40
25	4	3.64	2.67	4.00	4.71	3.33	18.34
TOTAL	**90.86**	**90.05**	**60.67**	**89.00**	**91.24**	**93.10**	**424.04**

Hypothesis

- H0: There is no significance difference between in the opinion of the respondents with reference to Education Level.
- H1: There is significance difference between in the opinion of the respondents with reference to Education Level.

Table 2.1: Analysis of ANOVA according to respondents view with reference to Education Level

Source of Variation	***S.S***	***d.f.***	***MS***	***F (c)***	***F (t)***
S. S between groups	27.47	24	1.14	4.01	1.14
S. S between Respondents view	29.52	4	7.38	25.90	7.38
S. S Error	27.34	96	0.28		
Total	**84.32**	**124**			

The above table 2.1 expresses that the statistical analysis of respondents point of view about IFRS adoption with reference to Education Level. The calculated value of S.S Between Groups are 4.01 and the table value at 5% level of significance is 1.14. The calculated value of "F" is higher than the table value of "F". Hence the null hypothesis (H0) is rejected and alternate hypothesis (H1) is accepted. Thus there is significance difference between in the opinion of respondents with reference to Education Level.

As per the Sum of Squares between respondents view the calculated value at 5% level of significance is 25.90 and the tabulated value is 7.38. Hence the calculated value of "F" is higher than the table value of "F". Thus the null hypothesis (H0) is rejected and alternate hypothesis (H1) is accepted. Thus there is significance difference between in the opinion of respondents with reference to Education Level. This shows that the above results are as per expectation. From the above results we can conclude that there is significant level of difference between the different Education Level and the perception or opinion of people in the context of IFRS.

C. Classification of Respondents' on the Basis of Experience

Below table 3 shows there are 50 respondents classified into 5 group's viz. G -1 to G – 5. The total average value of all respondents is **61.00** and the serial number is 1 to 25, in which serial number 1 represents that adoption of IFRS is going to be challenging stands with the highest score of **4.42**. While serial number 6 represents that there would be a unified platform and that too transparent in the global scale stands with the second highest score of **4.34**. Accordingly serial number 2 represents that the Indian Corporate is going to reap significant benefits from adopting IFRS stands third with the average of **4.24**.

In the above table G – 1 represents the group having experience of 0 to 10 years. In G – 1 the total average of respondents is **91.08**, in which serial number 1 represents that adoption of IFRS is going to be challenging stands with the highest score of **4.67**.

In the above table G – 2 represents the group having experience of 10 to 20 years. In G – 2 the total average of respondents is **1166**, in which serial number 2 represents that Indian Corporate is going to reap significant benefits from the adoption of IFRS stands with the highest score of **56**.

In the above table G – 3 represents the group having experience of 20 to 30 years. In G – 3 the total average of respondents is **101**, in which apart from the above statements, serial number 9, 11, 14, 16, 21 and 24 are highly accepted with the highest score of **5**.

In the above table G – 4 represents the group having experience of 30 to 40 years. There is no respondent in the same experience and hence the total average is 0.

Keeping in view the above table we can say that there was very less similarity between all the five groups. While the grand total of the whole table is **424.04**. However, whether level of satisfaction about the opinion of the respondents with reference to Experience Level are significant or not is tested at 5% level of significance with the help of "F" test.

Table 3: Average level of satisfaction of respondent's classified into different experience level

No. of Respondents	All Respondents	G-1	G-2	G-3	G-4	TOTAL
1	**4.42**	**4.67**	48.00	**5.00**	0	57.67
2	**4.24**	4.25	**56.00**	3.00	0	63.25
3	3.54	3.39	51.00	4.00	0	58.39
4	3.96	3.94	52.00	4.00	0	59.94
5	3.8	3.81	49.00	4.00	0	56.81
6	**4.34**	4.39	54.00	**5.00**	0	63.39
7	3.3	3.33	40.00	**5.00**	0	48.34
8	3.64	3.56	50.00	4.00	0	57.56
9	3.18	3.11	42.00	**5.00**	0	50.11
10	3.2	3.14	43.00	4.00	0	50.14
11	3.66	3.58	49.00	**5.00**	0	57.58
12	2.92	2.92	38.00	3.00	0	43.92
13	3.12	3.08	42.00	3.00	0	48.08
14	4.02	4.06	50.00	**5.00**	0	59.06
15	4.1	4.11	53.00	4.00	0	61.11
16	4	3.94	53.00	**5.00**	0	61.94
17	3.44	3.56	41.00	3.00	0	47.56
18	3.36	3.33	45.00	3.00	0	51.33
19	3.44	3.39	48.00	2.00	0	53.39
20	3.08	3.19	36.00	3.00	0	42.19
21	3.06	3.14	36.00	4.00	0	43.14
22	4.02	4.06	50.00	**5.00**	0	59.06
23	3.24	3.31	39.00	4.00	0	46.31
24	3.82	3.83	48.00	**5.00**	0	56.83

25	4.02	4.00	53.00	4.00	0	61.00
TOTAL	**90.92**	**91.08**	**1166**	**101**	**0**	**1358.08**

Hypothesis

- H0: There is no significance difference between in the opinion of the respondents with reference to Experience.
- H1: There is significance difference between in the opinion of the respondents with reference to Experience.

Table 3.1: Analysis of ANOVA according to respondents view with reference to Experience Level

Source of Variation	**S.S**	**d.f.**	**MS**	**F (c)**	**F (t)**
S. S between groups	264.68	24	11.03	1.29	1.67
S. S between Respondents view	36678.22	3	12226.07	1430.80	2.73
S. S Error	615.24	72	8.54		
Total	37558.13	99			

The above table 3.1 expresses that the statistical analysis of respondents point of view about IFRS adoption with reference to Experience level. The calculated values of S.S between Groups are 1.29 and the table value at 5% level of significance is 1.67. The calculated value of "F" is lower than the table value of "F". Hence the null hypothesis (H0) is accepted and alternate hypothesis (H1) is rejected. Thus there is no significance difference between the opinions of respondents with reference to Experience.

As per the Sum of Squares between respondents view the calculated value at 5% level of significance is 1430.80 and the tabulated value is 2.73. Hence the calculated value of "F" is higher than the table value of "F". Thus the null hypothesis (H0) is rejected and alternate hypothesis (H1) is accepted. Thus there is significance difference between in the opinion of respondents with reference to Experience. This shows that the above results are as per expectation.

From the above results we can conclude that there is significant level of difference between the different age groups and the perception or opinion of people in the context of IFRS.

IV. CONCLUSION

Now, it is increasingly felt that IFRSs would be the right choice for a single global standard, since it has been prepared with much considerations and consultations. Bearing in mind the pace of the current global development on convergence, substantial convergence is targeted for 2011 across global capital markets.

IFRS has become the financial reporting standard for a significant amount of countries around the world. However, out of all the countries, only a particular handful actually fully adopts IFRS as issued by the IASB. Most importantly, we all need to remember that convergence to a single set of globally accepted high quality standards is ultimately in the best interests of the public, contributing to efficient capital flows within countries and across borders. In the views of the majority of participants, international convergence is vital to economic growth. Thus, while the challenges are great, the rewards are potentially even greater. The ultimate goal of comparability is probably something that all the countries in the world strive to achieve. However, it should be important to note that quality should not be sacrificed in the process. It is something that needs to be considered carefully at every step to make sure that in the end, everybody will benefit from the adoption of a global set of accounting standards.

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Study on the Prevalence of Thyroid Diseases in Ernakulam City and Cherthala Town of Kerala State, India

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Abstract- Two study groups were surveyed for the study of the prevalence of thyroid diseases. One study group is from Ernakulam city and the other from Cherthala town, both situated in Kerala, India. Families of five hundred college students from each of the above said regions were selected as the study group which in effect forms a random sample from the area. A total of 1000 subjects (adults) were surveyed. Questionnaires were prepared and distributed to conduct the survey. 53% and 37% of the total surveyed subjects of Ernakulam and Cherthala are affected with thyroid disease respectively. The incidence of thyroid diseases is more in Ernakulam city which represents an urban metro area with people following a metro life style. People following non-vegetarian food habit are most heavily affected. Health problems such as high cholesterol level, obesity, diabetics, cardiac problems are also found in the diseased subjects, the highest being diabetics.

Index Terms- thyroxin, thyroid disease, ernakulam city, cherthala town.

I. Introduction

Thyroid disease is being increasingly diagnosed with greater awareness and is one of the chronic non-communicable disease affecting women more, though male population is not spared of the ailment. Thyroid is a butterfly-shaped gland in the neck region, just above collarbone. It is one of the endocrine glands, which make hormones. The thyroid hormones, thyroxin (T_4) and triiodothyronine (T_3) are tyrosine-based hormones produced by the thyroid gland primarily responsible for regulation of metabolism. An important component in the synthesis of thyroid hormones is iodine. The major form of thyroid hormone in the blood is thyroxin (T_4). The thyroid also produces the hormone calcitonin, which plays a role in calcium homeostasis. Thyroxin increases cardiac output, increases heart rate, increases basal metabolic rate, Increases ventilation rate, potentiates brain development, potentiates the effects of catecholamines (i.e. increases sympathetic activity), thickens endometrium in females. These hormones also regulate protein, fat, and carbohydrate metabolism, affecting how human cells use energetic compounds. They also stimulate vitamin metabolism. Numerous physiological and pathological stimuli influence thyroid hormone synthesis. Both excess (hyperthyroidism) and deficiency (hypothyroidism) of thyroxine can cause disorders. Hyperthyroidism is the clinical syndrome caused by an excess of circulating free thyroxin, free triiodothyronine, or both. It is a common disorder that affects approximately 2% of women and 0.2% of men. The symptoms of Hyperthyroidism are fast heart rate, nervousness, increased perspiration, muscle weakness, trembling hands, weight loss, hair loss, skin changes, increased frequency of bowel movements, decreased menstrual flow and less frequent menstrual flow, goiter, eyes that seem to be popping out of their sockets. Hypothyroidism is the case where there is a deficiency of thyroxin, triiodiothyronine, or both. The symptoms of hypothyroidism are Feeling slow or tired, Feeling cold, Drowsy, Slow heart rate, Poor memory, Difficulty concentrating, Muscle cramps, Weight gain, Husky voice, Thinning hair, Dry and coarse skin, Feeling depressed, Heavy menstrual flow, Milky discharge from the breasts, Infertility, Goiter. Clinical depression can sometimes be caused by hypothyroidism. Some research has shown that T_3 is found in the junctions of synapses, and regulates the amounts and activity of serotonin, norepinephrine, and Gamma-aminobutyric acid (GABA) in the brain. Thyroiditis is an inflammation of the thyroid gland and the most common cause of hypothyroidism. About 20 million Americans have some form of thyroid disease and most of them are women. It is estimated that there are at least forty million individuals with thyroid disease in India. Most of them are women, and most hypothyroidism occurs after the birth of a baby, called postpartum hypothyroidism. Thyroid diseases are most common among women and if not treated in time it can lead to severe health problems. Hashimoto's thyroiditis affects about 5% of the adult population, increasing particularly in women as they age. Another form of thyroiditis affects women of childbearing age. Postpartum thyroiditis occurs in 5%-9% of women soon after giving birth and is usually a temporary condition. While thyroid diseases are increasing, there is a notion that it is prevalent in certain areas than others. Objective of this work is to study the prevalence of thyroid diseases in two different areas in Kerala state. To attain this objective a survey is done by taking a random sample from the areas under study. The outcome of the result may give an idea about the prevalence of thyroid diseases and this data may be useful for the further study of thyroid diseases whose reasons can be the particular food habits of the area, type of foods that are distributed in that area, or the presence of some harmful compounds in the water that is being distributed in that area or the type of salt that is distributed in that area etc. The prevalence and pattern of thyroid disorders depends on sex, age, ethnic and geographical factors and especially on iodine intake [1]. A high iodine intake is associated

with lower prevalence of goiter and higher prevalence of hypothyroidism. Low intake is associated with a higher prevalence of hyperthyroidism [2]. Hypothyroidism is more common in older women and 10 times more common in women than men [2]. The prevalence of hyperthyroidism is also reported as more common in women than men [4]. The profile of thyroid disorders encountered in pediatric and adolescent age groups in India is similar to that seen in most parts of the world. Of 800 children referred for thyroid problems, 79% had hypothyroidism, 19% had euthyroid goiters and 2% had hyperthyroidism. Hypothyroidism was due to thyroid dysgenesis in 75%, thyroiditis in nearly 5% and dyshormonogenes in 20%. The incidence of congenital hypothyroidism in screening 40,000 newborns is about 1 in 2,640, which is much higher than the worldwide average of 1 in 3,800. Of the 200 schools children surveyed for goiter prevalence, 8% in high socio-economic groups and about 21% in the low income group, had goiters. Female predominance was marked [5]. The results from the study of fifteen districts from ten states of India in 2004 suggested a significant decline in the prevalence of goitre in most parts of the country [6]. A study by British researchers found that people with high levels of the chemical perfluorooctonoic acid (PFOA) in their blood have higher rates of thyroid diseases with conditions which affects the body's metabolism. PFOA is a common chemical, used in industrial and consumer products including non-stick cooking pans, stain-proof carpet coatings and waterproofing for fabrics. British researchers studied 3966 American adults aged 20 and above whose blood serum was sampled between 1999 and 2006 for PFOA. Those with the highest PFOA concentrations (above 5.7 nanograms per milliliter) were more than twice as likely to report current thyroid disease as individuals with the lowest levels (below 4.0ng/ml) [7].

II. MATERIALS AND METHODS

A city and a town in Kerala state, Ernakulam and Cherthala respectively, was selected to conduct the survey. Cherthala is a town located in the district of Alappuzha, in the state of Kerala, India. It is located 30 km south of the city of Kochi and 22 km north of Alappuzha town. Ernakulam is the western part of the mainland of Kochi city in Kerala, India. Ernakulam is the commercial capital of the state of Kerala. Five hundred students from two colleges, NSS College, Cherthala and St. Albert's College, Ernakulam, located in the above said regions of Kerala were selected for the survey. The selected students in effect constitute a random sample from the area. Questionnaires were prepared and distributed among five hundred students randomly selected from each college. The questionnaires asked for the presence, and hence the details of a thyroid patient in the students' families.

III. OBSERVATIONS AND RESULTS

53% and 37% of the total surveyed subjects of Ernakulam city and Cherthala town are affected with thyroid disease respectively (Fig.1). Of the 500 subjects surveyed in Ernakulam area, 53% have thyroid disease. Among them 15.09% follows a vegetarian food habit, 54.71% are non-vegetarians and 30.18% prefer both type of food. 7.54% of them have cholesterol level higher than normal, 28.30% are diabetic, 13.20% are obese and 7.54% are affected with cardiac problems. 61.53% of the affected subjects are prescribed with life long medication. The rest, 38.46% subjects are following a short term medication. 19.23% of the diseased persons are following ayurvedic medicine, 46.15% homeopathic medicine and 34.61% allopathic medicine. 37% of the subjects surveyed in Cherthala region are affected with thyroid disease. Among them 27.02% follows a vegetarian food habit, 51.35% are non-vegetarians and 21.62% prefer both type of food. 10.81% of them have cholesterol level higher than normal, 40.54% are diabetic, 16.21% are obese and 8.10% are affected with cardiac problems. 76.66% of the affected subjects are prescribed with life long medication. The rest, 23.33% subjects are following a short term medication. 27.02% of the diseased persons are following ayurvedic medicine, 37.83% homeopathic medicine and 35.15% allopathic medicine.

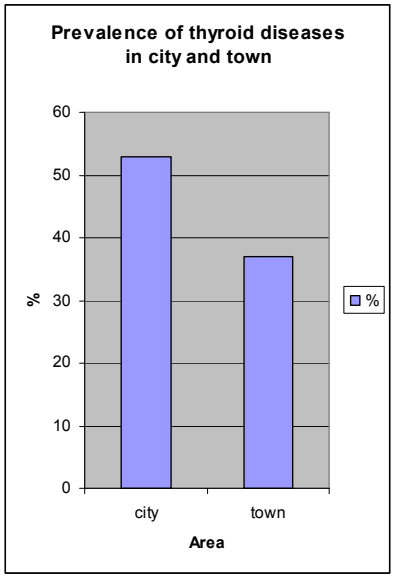

Fig. 1 Bar diagram showing the prevalence of thyroid diseases in Ernakulam city and Cherthala town

IV. DISCUSSION

Survey shows that Ernakulam city has a high incidence of thyroid diseases. More than half, i.e. 53% of the total surveyed subjects were affected with thyroid disease. Only 37% of the study group of Cherthala area shows thyroid disease. This difference in thyroid disease incidence may be due to the difference in food and life style of the people of Ernakulam city, which is the part of an urban metro city. There may be variety of reasons such as the particular type of food being distributed in the various shops of this area, harmful compounds that may be leaking into the water from the various factories and industries of the area, toxic compounds that find their way into human body through contact with fabrics, paints, non stick pans., etc. More than half of the subjects with thyroid disease in both the study group are following non-vegetarian food habit. Most of them are diabetics, 28.30% of Ernakulam city and 40.54% of Cherthala town. The second most ill health shown by the affected persons in both area is obesity, the first being diabetics. 7.54% of the Ernakulam city and 10.81% of the Cherthala town shows high cholesterol level. 8% of the thyroid diseased persons show cardiac problems. This is because the peculiar feature of thyroid

hormones which have a variety of functions whose elevation can cause various health problems. Among the diseased persons only few are following life long medications, 38.46% in Ernakulam and 23.33% in Cherthala. Rest of the subjects is following short term medication. In both the study groups, most people are following homeopathic medicine, the next being allopathy. Few subjects are following ayurvedic medicine.

V. CONCLUSION

The incidence of thyroid diseases is more in Ernakulam city which represents an urban metro area. People following non-vegetarian food habit are most heavily affected. Health problems such as high cholesterol level, obesity, diabetics, cardiac problems are also found in the diseased subjects, the highest being diabetics.

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Effect of Capacitive loading on slot loaded Dual Band Microstrip antenna

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Abstract- A novel technique for obtaining a single-layer single-feed dual-band microstrip antenna loaded with narrow slots having capacitive loading has been studied which shows tuning and reconfigurability at the two frequencies 1.72 GHz and 2.885 GHz respectively. By embedding a pair of slots of proper lengths close to the radiating edges, the rectangular patch has been shown to realize dual-band broadside directions. More freedom for tuning the resonant frequencies, the frequency ratio, and the input impedance are available because of more design parameters such as slot length and width and its position from radiating edges. The range of the frequency ratio (FR) that can be obtained is between 1.6 to 2. By varying the capacitance value (0.1 pF to 1pF), a tuning of around 100-160 MHz is achieved at both the frequencies. New empirical formulas are designed by modifying the formulas for reactively loaded patch with slot loading. Broadband antennas provide higher bandwidth at the expense of their high thickness. Dual band microstrip antenna with capacitive loading can be an alternative to large bandwidth antennas, especially when a large bandwidth is required for encompassing several narrowband channels. A FR4 substrate is used as a dielectric substrate. Simulations are performed using IE3D™.

Index Terms- Capacitive loading, Dual band, Microstrip antenna, Slot loading

I. Introduction

Patch antennas are popular for their well-known attractive features, such as a low profile, light weight, and compatibility with monolithic microwave integrated circuits (MMICs) [1]. Their main disadvantage is an intrinsic limitation in bandwidth, which is due to the resonant nature of the patch structure. In applications in which the increased bandwidth is needed for operating at two separate sub-bands, a valid alternative to the broadening of total bandwidth is represented by dual-frequency patch antennas. Indeed, the optimal antenna for a specific application is one that ensures the matching of the bandwidth of the transmitted and/or the received signal. Dual-frequency antennas exhibit a dual-resonant behavior in a single radiating structure. The trend of Synthetic Aperture Radar antennas of the future generation is to cover at least two of the three bands with a dual-band antenna. This would reduce the weight and surface area.

In this paper we study the effect of capacitive loading on the resonant frequencies with respect to variable tuning & frequency reconfiguration. Section 2 explains about slot loading. Section 3 describes capacitive loading and its effect on resonant frequency. Based on the results obtained empirical formulas for calculating two resonant frequencies f100 and f300 are devised. Section 4 explains the current distribution for TM100 and TM300 mode. Section 5 provides the results and Section 6 conclusion.

II. Slot Loading

Slots can be represented as the lumped circuit inductor, placed in series with the transmission line model for the patch antenna as in fig1. As the slots are moved away from the center of the patch, in either direction, the resonant frequency rises symmetrically (independent of which direction the slots are moved). In fact, the resonant frequency tuning curve maps out the cosine current distribution that develops on the patch with respect to length, except as an inverted cosine, since the lowest frequency tuning is at the current maximum, and the highest frequency tunings are where the lowest levels of current are i.e near the edges of the patch.

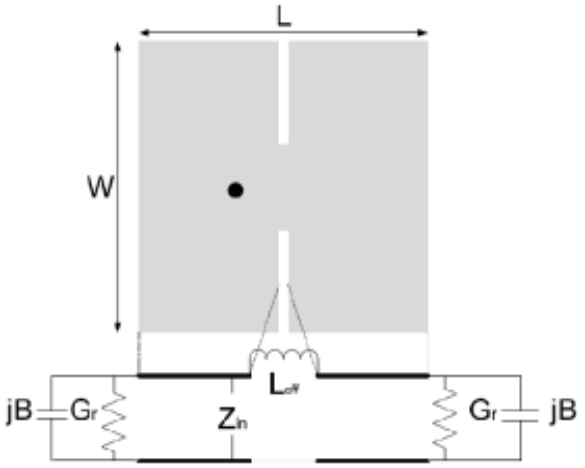

Fig1 Transmission line equivalent

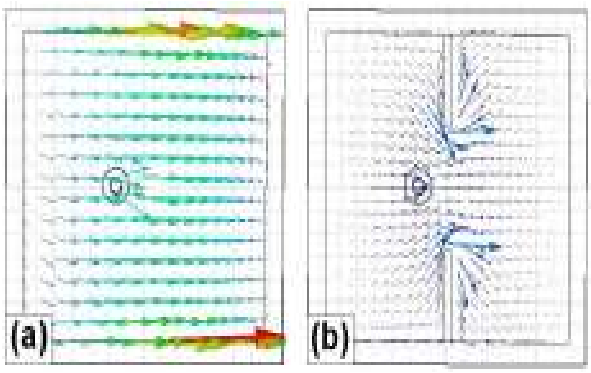

Fig. 2 Current distributions for TM100 mode (a) without slots & (b) with slots.

Figure 2 shows the current distribution on a patch surface with no slots, exciting the TM100 mode where the antenna is operating at resonant frequency of 1.72 GHz (in fig 2a). The patch without slots allows a straight path across the patch, whereas the slots force currents to take a longer path, as in Figure 2b. This longer path corresponds to a longer resonant length, thereby tuning the patch to 1.357GHz, a reduction in the resonant frequency of 363 MHz. Here the slots are placed at the midpoint of the patch, but they can be located anywhere along the patch if they change the current paths. One important consideration in placement of the slots is the polarization desired, as asymmetric slot placement can potentially cause cross-polarization levels to rise. For asymmetric slots, resonant current paths can develop off the main axes of the patch, such as along a diagonal axis, producing radiation components along both of the main axes instead of only one axis. Increased cross-polarization will result in poor axial ratio for circular polarization, and coupling between the two orthogonal feeds will increase.

A kind of reactive loading can be introduced by etching slots on the patch. The slot loading allows for a strong modification of the resonant mode of a rectangular patch, particularly when the slots are oriented to cut the current lines of the unperturbed mode [5].

The basic geometry is a slotted rectangular-patch antenna, in which two narrow slots, with dimensions Ls, and Ws, are etched on the patch close to and parallel to the radiating edges. The location of the slots with respect to the patch is defined by the quantities w and l which are very small with respect to the dimensions L and W of the patch. The antenna may be fed with either an aperture or a probe feed [1].

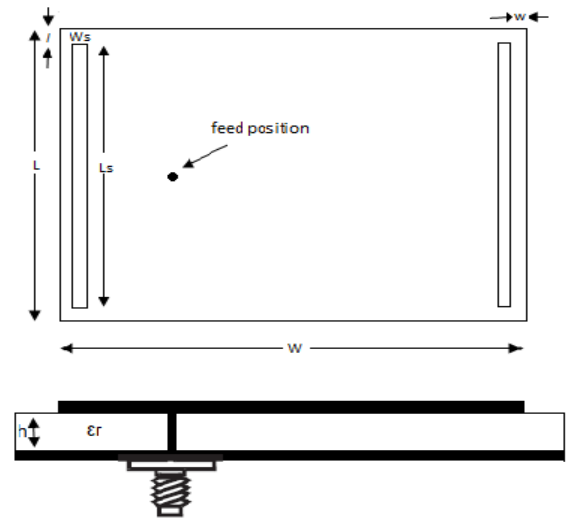

Fig 3 top & side view of designed antenna with parallel slots Authors have c probe feeding.

Further with slot loading, there is an increase in reactance at the radiating edges with slots etched parrallel to the radiating edge (see fig 1). It results in an increase in electrical length of the patch. Initially using the empirical formula for unslotted rectangular patch antenna [1] the width and length dimensions for an antenna operating at 1.72 GHz on FR4 substrate are
W= 53.25 mm & L= 41.5 mm.
For an antenna working at 1.72 GHz and 2.89 GHz, calculated patch dimensions [1] are
Type of feed- Coaxial feed at (-10, 0) from center.
W= 40 mm L=30 mm
h=1.575 mm
L/W= 0.75
Ls= 28 mm Ws= 1 mm
w= 1 mm l= 1 mm
Freq ratio= 1.68.

Table below gives the comparison for slotted and unslotted antenna with respect to their dimensions.

Sr no	Patch dimensions at 1.72 GHz	
	Unslotted patch	Slot loaded patch
1	W= 53.25 mm L= 41.5 mm	W= 40mm L= 30mm

Slot loading makes antenna look electrically larger in length, thus it helps in tuning a lower frequency on much reduced antenna size as compared to the unslotted antenna. thus the effective aperture of the antenna becomes lower due to reduction in antenna size which affects antenna directivity.
The TM100 mode that develops on the patch has a resonant frequency dependant on the length of the patch. While a high permittivity substrate will make the metal patch look electrically larger [10] by changing the wave propagation speed, another method used in tuning a microstrip antenna is loading the patch with slots. For a visual, intuitive explanation, the slots can be viewed as obstructions to the path of the current, forcing a longer physical distance for the current to travel.

When the two narrow slots are etched close to the radiating edges (small values of l and w); minor perturbations of TM100 are expected because the slots are located close to the current minima. The radiative mechanism associated with this first mode is essentially the same as that of a patch without slots. As a consequence, its resonant frequency is only slightly different from that of a standard patch. On the other hand, the slots are located where the current of the unperturbed TM300 should be significant, so that this current is strongly modified and it becomes similar to TM100. The two slots should not be too short or too displaced from the edges to avoid the deformation of the pattern associated with the upper frequency. These restrictions impose a limitation to the Frequency ratio (FR) that has to be lower than 2 and greater than 1.6.

The first resonance due to TM100 mode is not much affected by slot loading so that its frequencies can be obtained by slightly modifying the well established formula for rectangular unslotted patches [7]

$$f100 = \frac{c}{2(W + \Delta W' + \Delta W'')\sqrt{\varepsilon e\left(\frac{L}{h}, \varepsilon r\right)}} \qquad (1)$$

It is worth noting that the equivalent overlength ΔW" is that suggested in [1] for standard rectangular patches. The loading effect of the slot is effectively modelled by the term ΔW' that depends on l and w. The upper resonant frequency was predicted according to a simple transmission line model, which is derived by a direct inspection of the current distribution at the modified TM300 mode.The second frequency is predicted according to,

$$f300 = \frac{c}{2(L - 2l + Ls)\sqrt{\varepsilon e\left(\frac{W}{h}, \varepsilon r\right)}} \qquad (2)$$

The antenna is designed & simulated using IE3D^{TM} electromagnetic simulation software which allows to solving for radio and microwave application. It works based on method of moment (MOM). The simulator tool computes most of the useful quantities of interest such as radiation pattern, input impedance and gain etc.

Fig 4 shows the graph for return loss v/s frequency obtained using IE3D^{TM}. With 10 dB as the reference for calculating Banwidth, the Bandwidth with center frequency as 1.721 GHz is 32 MHz and with center frequency as 2.885 GHz it was found to be 42 MHz. Fig 4 shows a plot showing a return loss of -16.9 dB and -35.9 dB at 1.72 GHz and 2.885 GHz respectively.

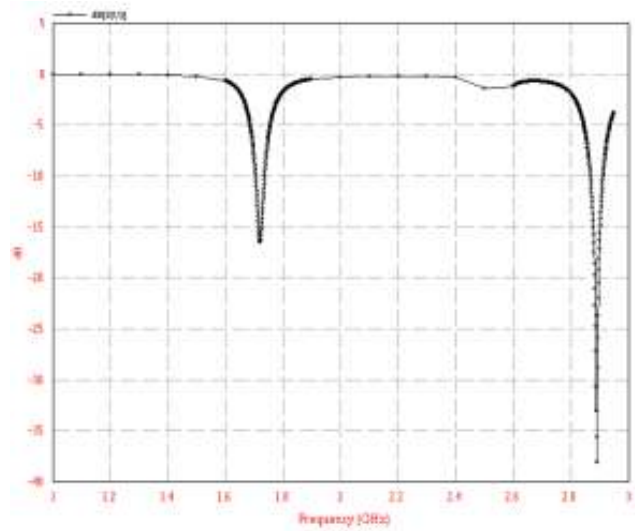

Fig 4 Return loss (dB) v/s frequency (Simulated)

Fig 5 shows a plot of return loss v/s frequency for the fabricated antenna. Results are obtained using Vector Network analyaser. Fabricated antenna shows a resonance at 1.709 GHz and 2.86 GHz with a bandwidth of 50 MHz and 32 MHz at the respective frequencies.

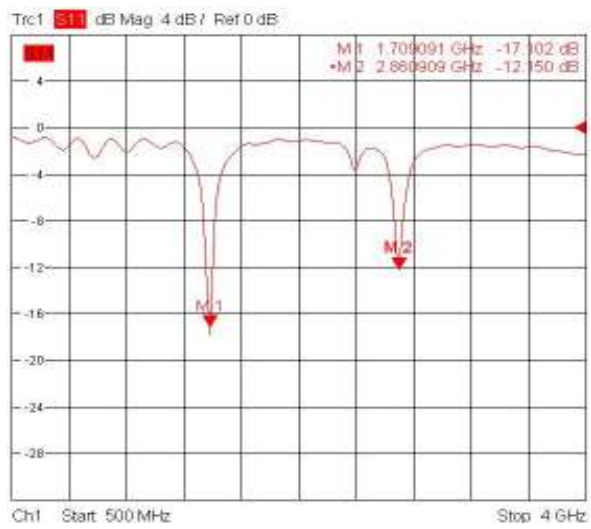

Fig 5 Return loss (dB) v/s frequency (Fabricated Antenna)

A Microstrip patch antenna radiates normal to its patch surface. The elevation pattern for Φ=0 and Φ=90 degrees would be important. Figure 6 & 7 show the 2D radiation pattern of the antenna at the designed frequency of 1.72 GHZ & 2.885GHz for Φ=0 and Φ=90 degrees in polar plot.

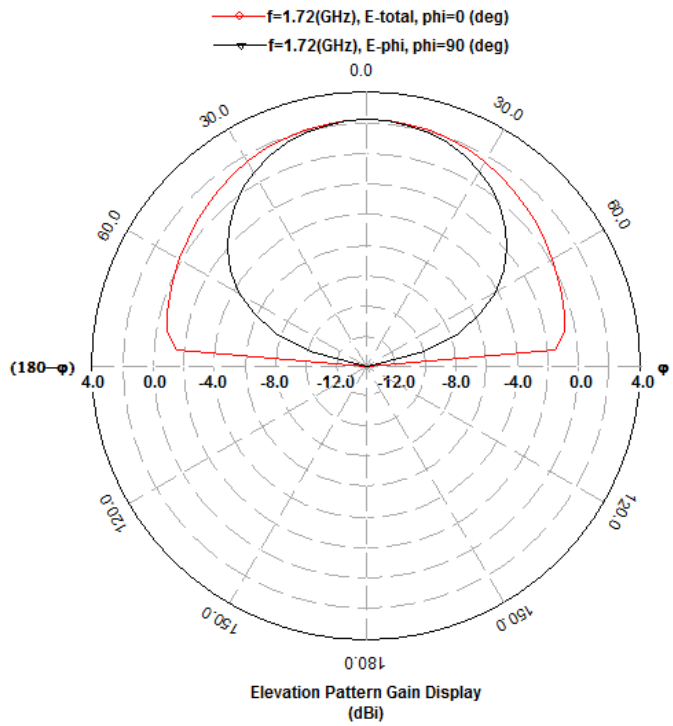

Fig 6 Elevation pattern gain display (dBi) at 1.72 GHz

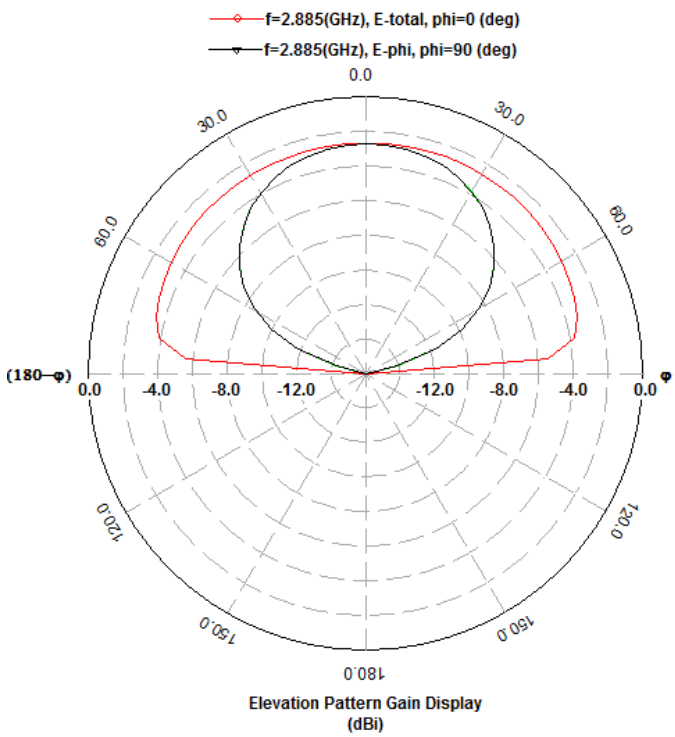

Fig 7 Elevation pattern gain display (dBi) at 2.885 GHz

Gain provided by the antenna is between 0-2 dBi. The low gains can be traced to the loss tangent of the FR4 substrate, which is 0.019.

III. CAPACITIVE LOADING

Slot loaded patch is subjected to capacitive loading by chip capacitor loading. The capacitance value can be also realised using varactor diodes with reverse bias voltage. Pair of chip-capacitors are attached across the slots centred on the y-axis to provide the required tuning. Capacitance value is varied from 0.1 pF to 1 pF and change in the two resonant frequencies is observed.

The configuration of the proposed single-feed dual-band rectangular microstrip antenna loaded with two narrow slots and two chip capacitors is depicted in Fig 8. The rectangular patch of size LxW is printed on a substrate of thickness h and relative permittivity εr. A pair of slots, length Ls and width Ws, are placed close to the radiating edges of the rectangular patch at a distance d. Pair of chip-capacitors are attached across the slots centred on the y-axis. Dual-frequency operation with the same polarisation planes and broadside radiation patterns can be obtained by using a single probe feed along the centreline between the two slots.

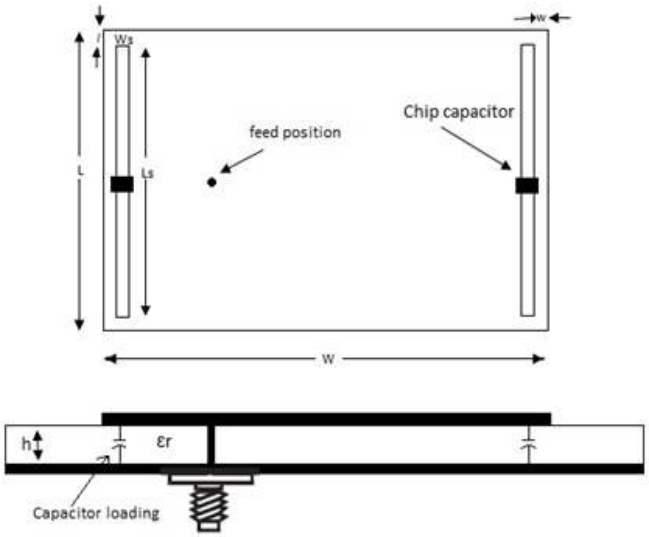

Fig 8- topview & sideview of designed antenna with parallel slots & capacitor loading

Frequency tuning can be obtained by varying the capacitance value. It is found that the resonance of the first (lower) operating mode (the perturbed TM100 mode) was slightly affected by the variation in the capacitance. However, the resonant frequency of the second (higher) operating mode (the perturbed TM300 mode) was decreased with increasing capacitance. However it's hard to obtain both frequency band and impedance matching with loaded capacitance larger than 1 pF (capacitance measured at 1 kHz) so frequency tuning is limited to capacitance value from 0.1 pF to 1 pF.

IV. CURRENT DISTRIBUTION

Simulated current distributions (for TM100 & TM300 mode) for the proposed design with capacitor loading are sketched in Fig. 9 using simulation software IE3D. With capacitor loading, the current has a similar distribution in TM100 mode and the frequency varies slightly from that of a patch without chip

capacitors. However, loading capacitors strongly modify the current distribution in TM300 mode. The perturbed current around the slots is larger with loading capacitors and broadens the central venter of the current distribution.

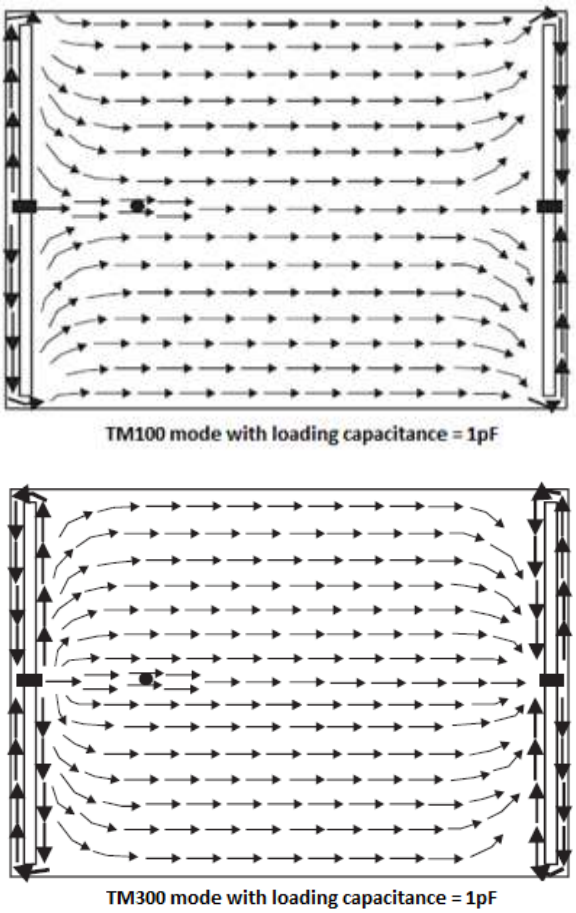

Fig 9 Simulated current distributions for slotted patch with capacitor loading

V. Results

Fig 10 shows a plot of return loss v/s frequency for various capacitance values. Capacitance is varied from 0 to 1.0 pF to provide tuning and reconfigurability to the antenna. From the graph below it is observed that the capacitive loading provides a tuning over 100 MHz at first resonance and over 156 MHz at the second resonance. It's hard to obtain both frequency band and impedance matching with loaded capacitance larger than 1.0 pF (capacitance measured at 1 kHz) so frequency tuning is limited to capacitance value 1.0 pF.

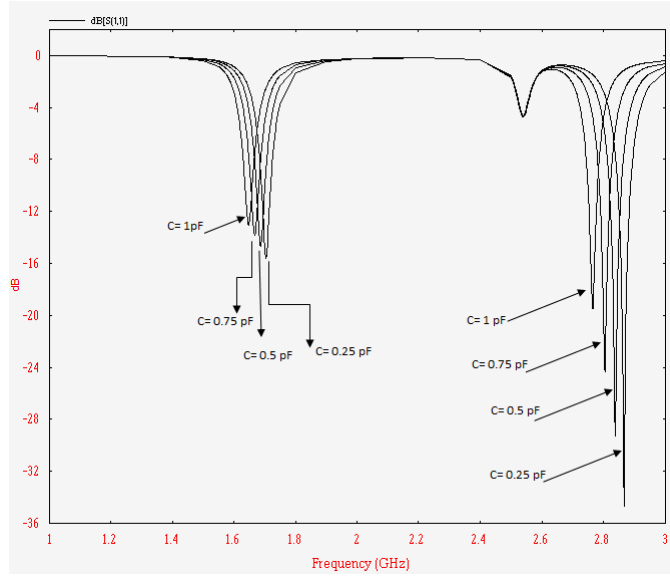

Fig 10 Return loss with varying capacitances

Figure 11 shows the measured input impedance on a Smith chart for C= 1.0 pF. Simulation results show good impedance matching at both the resonating frequencies for various capacitive loading (0 to 1.0 pF).

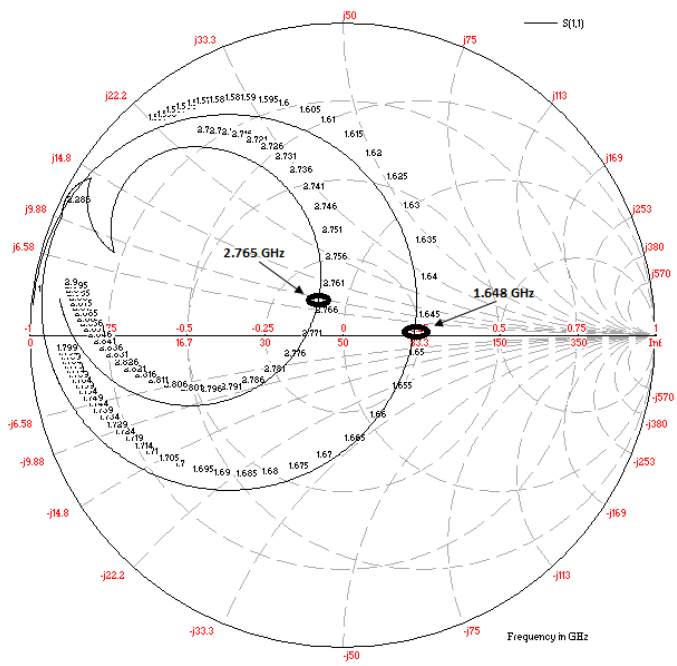

Fig 11 Measured input impedance on a Smith chart for proposed antenna with capacitive loading (C= 1pF)

By observing the results for different capacitive loads we can modify the equation (1) to calculate new resonant frequency (due to TM100 mode) with chip capacitor loading as

$$f100 = \frac{c}{2(W + \Delta W' + \Delta W'')\sqrt{\varepsilon e\left(\frac{L}{h}, \varepsilon r\right)} + x1Cap} \quad (3)$$

where Cap is the loaded capacitance value (between 0 to 1.0) defined in pF and x1= 7.7127.
c = free space velocity of light with length, width of the patch defined in mm. similarly the second resonant frequency with capacitive loading is obtained by curve fitting method. The approximate equation is obtained from equation (2) and is given as,

$$f300 = \frac{c}{2(L - 2l + Ls)\sqrt{\varepsilon e\left(\frac{w}{h}, \varepsilon r\right)} + x2Cap} \quad (4)$$

where Cap is loaded capacitance value (between 0 to 1) defined in pF and x2= 4.73. x1, x2 are the correction factor.
Similarly an approximate equation can be modelled by having capacitance as dependent variable and resonant frequency as independent variable as

Cap = -13.784*f100 + 23.729 (5)

Above equation is obtained by curve fitting method. Thus provides an alternative to user to set the antenna at preselected frequency and calculate the required capacitive load. The frequency ratio obtained is nearly same for all capacitive loads which is 1.681448. From this the second resonant frequency (f300) can be obtained which matches with the simulated results.

VI. Design Tools

The goal of this reactively loaded patch antenna is to have dual frequency response at preselected frequencies. The slotted patch is realised using IE3DTM Electromagnetic simulation software. Vector network analyser is used to calculate the parameters (Return loss, VSWR, Bandwidth etc) of the fabricated antenna.

VII. Conclusion

A new dual-frequency antenna has been studied that consists of a single layer patch with two narrow slots close to the radiating edges. The lower operating frequency is almost the same as that of a rectangular patch without slots; the upper frequency is well controlled by changing the slots length. Capacitive loading provides a tuning over 100 MHz at first resonance and over 156 MHz at second resonance thus can be an alternative to broadband antenna. New empirical formulas for calculating the resonance frequencies with capacitive loading are designed.

Gain provided by the antenna is between 0-1 dBi. The lower gains can be traced to the loss tangent of the FR4 substrate, which is 0.019. Higher gains are possible if lower-loss substrate materials are used, with gains of more than 4 dBi possible.

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Conclusion

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Debt and Fiscal Sustainability in Sri Lanka

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Abstract- Fiscal policy plays a central role in the economy in order to achieve its economic and social objectives through macroeconomic stability. Especially, developing countries are suffering from higher rate of debt and budget deficit. Consequently, the fiscal policies of these countries are not in a sustainable position. Therefore, it is timely important to examine the sustainability of the fiscal policy in term of Sri Lanka. Hence in this study, I attempt to examine the debt and fiscal sustainability of Sri Lanka by using Inter-temporal Budget Constraint Approach. In this regards, Dickey Fuller, Augmented Dickey Fuller and Phillip Paron tests have been employed. Further, the study applied Ordinary Least Squares method to analyze the determinants of factors that affect to increase the net total debt in Sri Lanka. Time series data set from 1990 to 2009 has been used on this regard. The results reveal the stance of the fiscal policy is unsustainable during the considered time duration. Moreover, the results pointed out that growth rate of GDP, budget deficit, political instability and time trend positively affect to increase the net total debt. Thus, it is necessary to expand government revenue while reducing the expenditure in order to achieve the debt and fiscal sustainability. Further, the study strongly recommends improving the tax administration, introducing broad based new taxes, minimizing welfare expenditure, defense expenditure and reduction of transfers to corporations in order to reach the mentioned achievements.

Index Terms- inter-temporal budget constraint, fiscal sustainability, budget deficit, ordinary least squares

I. Introduction

Background of the Study

In recent years, several developing countries have been facing dramatically high fiscal deficits. The government's ability to cope with the fiscal deficit has been receiving the increasing attention from economists. A high and accelerated level of economic growth is a must to achieve fiscal sustainability. Hence, the effect should be made to follow the "Golden Rule" of public finance, which emphasizes that public sector borrowings should be undertaken exclusively for the purpose to financing growth enhancing investment activities. It should be also ensure that economic growth and fiscal consolidation efforts should not be in conflict with each others, consequently that both objectives are achieved.

The notion of fiscal sustainability has been defined in several ways. As Blanchard et al (1990) sustainability is essentially an analysis of whether (based on current policy stance) a government is headed towards excessive debt accumulation. Therefore, fiscal policy has to maintain level of deficit and that a country can afford without excessive increase. Wilcox (1989) notes that a sustainable fiscal policy is one that would be expected to generate a sequence of debt and deficits such that the present value condition would hold. If this condition is violated, perpetual deficit will be impossible and changes in fiscal policy will be inevitable.

Sri Lanka and other developing countries, endured persistent budget deficit for several decades. Especially, after 1977 there was a rapid increase budget deficit and debt level. This situation is more developed with political instability of Sri Lanka after 1983. The continued deficits increased borrowings resulting in accumulation of the county's debt stock. All in all, a prudent fiscal policy is needed without further delay and/or reveals in order to turn around the increasing debt/GDP ratio of the country and ensure fiscal sustainability in the medium term.

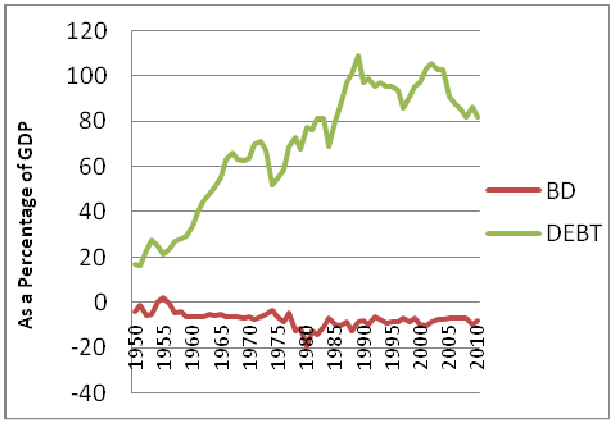
According to the background fiscal policy system is more important in Sri Lanka's development process. Therefore, this study analyses the long run fiscal sustainability concerning the joint behavior of debt and budget deficit using Inter-Temporal Budget Constraint (IBC) approach. Furthermore, this study attempts to determine factors that affect to increase net total debt in Sri Lanka using time series data for 52 years. The paper has been organized as follows. This section describes the overall fiscal policy and accumulation of debt and budget deficit in Sri Lanka. Further, this section provides the details about objectives of the research. In the next section, the conceptual framework of fiscal sustainability can be seen followed by the theoretical background of the study. After that, IBC approach and derived the IBC approach to Sri Lanka has been included. Further, the model for determining the factors that are affecting to net total debt in Sri Lanka also enclosed. Afterward, I have indicated the results of the study and ultimately conclusion and policy implication as well.

B. Budget Deficit and accumulation of debt in Sri Lanka

After gaining the independence in 1948, Sri Lanka has come almost full circle with respect to economic policy regimes. In the early 1950s, the country followed by pro-enterprise liberal economic policies with little direct government involvement in economic activity and with minimum intervention in foreign trade and exchange controls. However, direct government intervention and control over economic activities commenced in the late 1950s and increased in 1960s, transforming Sri Lanka basically in to semi-planned mixed economy. By the early 1970s, the economy had become highly regulated and controlled. In 1977, a complete turnaround in the co untry's economic policy was initiated with the introduction of market-oriented policy package featuring the deregulation of market activities and the reduction of direct government participation in the economy. The liberalization programme was continued in the 1980s, making the economy the most liberalized in the South Asian region. The balance of payment deficit after the late 1950s led to a large foreign debt and the most of that was accumulated after 1978.

The rapid increase in external debt, by comparison with the domestic debt, presented a double burden. The following graph illustrates the changes of the budget deficit and debt as a percentage of GDP from 1950 to 2010.

Fig. 1 Budget Deficit and Debt as a Percentage of GDP from 1950 to 2010.



Source: Central Bank Annual Report 2010

According to the graph, Sri Lanka generally has a considerable budget deficit and higher rate of debt. There were only two years specifically; in 1954 and 1955 Sri Lanka had very little budget surpluses. During the period of 1960-1977, budget deficit was around 8% and after 1977, increases in expenditures were not recovered by corresponding increase in revenue, and the results was rapid increase in the public debt. The average budget deficit was 15% as percentage of GDP from 1978 to 1986. The highest budget deficit recorded in 1980 which was 23% of GDP. As a remedy for dramatic budget deficit, government had addressed the balance of payments deficit in the 1960s by imposing direct controls that restricted imports. However, they were unable to avoid increase in the foreign debt, which rose from around 62 US$ millions in 1960 to 231 US$ millions in 1969 and 380 US$ millions in 1974. After liberalization of the economy in 1977, import restrictions were loosened and foreign credit became much more readily available. The accumulated foreign debt tended to increase annually in rupee terms in the 1980s because of the steady depreciation of the rupee in relation to the currencies of the lending nations. The total external debt, including short-term loans and credits, was estimated to be approximately 4 US$ billions at the end of 1986.

Considering the overall situation, the shock of outstanding public debt increased progressively from Rs. 24,752 million in 1977 to Rs. 907,426 million in 1998 showing an annual average growth rate of 11%. The public debt/GDP ratio was 69% in 1977 and it had increased to 89% by 1998. The sharp growth of government debt can be attributed to the budget deficit which increased sharply in relation to GDP requiring more and more borrowings. The average budget deficit as a ratio of GDP is 9.1% from 1996 to 2002 due to rapid increase in government debt. In 2002 it recorded the highest total debt Rs 1,669,282 millions. During this period, the national debt as a ratio of GDP was 105.3%; which consists 59.8% domestic debt and 45.5% foreign debt.

The achievement of fiscal sustainability of Sri Lanka has also been linked to the recently introduce Fiscal Management Responsibility Act (FMRA). FMRA requires the government debt to be a level of 5% and 85% of GDP respectively by 2006. It also requires that the outstanding government debt to be reduced 60% of GDP by 2013.

C. *Statement of problem*

The issue of debt sustainability is often discussed in the context of fiscal sustainability as the government debt is the final outcome of a fiscal policy of a country. The issue of fiscal sustainability generally revolves around the question of whether the present and prospective fiscal stance is heading towards an excessive and persistent accumulation of debt levels. Hence, in order to maintain fiscal sustainability, fiscal policy should be planed to stabilize the debt/GDP ratio within a feasible range rather than the allowing it to increase to an unsustainable level.

A higher and increasing level of debt has several implications. The government will have to pay a significant amount of its revenue receipts as interest payments on outstanding debt which will increase pressure on the government's ability to meet its other commitments, leaving little room for other essential and development oriented expenditure. It also tends to reduce resources availability to the private sector. Apart from that it also results to increase the interest rates in domestic market. This will increase the cost of borrowing by the private sector occurring crowding out effect heavily that adversely affects to the economic growth of country. High government debt also increases the need for frequent rollover of existing debt making fiscal management more difficult. Furthermore, it limits the maneuvering ability of fiscal policy emphasizing the need for bringing down the level of government debt to more desirable levels in the medium to long run, there by restoring fiscal sustainability.

The persistently high fiscal deficits and associated high level of outstanding government debt stock have raised the questions regarding debt sustainability in Sri Lanka. As a percentage of GDP, the overall budget deficit and the outstanding government debt stock have averaged around 10% and 97% respectively during the period of 1990-2002. Interest payments on outstanding debt have also averaged to 6.3% of GDP during the same period. In particular, there has been a significant increase of outstanding debt from 1997 a year in which the lowest debt/GDP ratio (85.8%) was recorded in the recent past, to 2002 where the debt/GDP ratio rose to 105.3%.

The high level of deficits and debt are the combined outcome of various factors. The slowdown of the government revenue collection and relatively high government expenditure are the major factors that affected the increase in the overall deficit. In addition, the slippage in fiscal consolidation efforts in recent years, the reduction of financial repression with increased liberalization of financial markets and the resulting increase in the average interest rate on government borrowings and the gradual decline in extreme concessional loans, which had helped to keep the average cost of foreign borrowing at a relatively high level, also contributed the worsening of the fiscal position.

The gradual shift in deficit financing process towards more domestic borrowings and the consequent structural change in the outstanding debt stock (towards more domestic debt) and increased debt service payments have further aggravated and

situation. The interest rate on foreign loans has been 9% of total interest payments although foreign loans amount to about 45% of total government debt. The main reason is about 97% of foreign loans have been obtained at highly concessional interest rates. However, the continuous depreciation of Sri Lanka rupee, particularly against currencies in which a large portion of the outstanding foreign debt stock is dominated, such as the Japanese yen and Special Drawing Rights (SDR), has resulted in a significant expansion in the outstanding value of external debt, although net new foreign financing in the budget is very small. The average economic growth rate has also remained below the potential level is recent past. These developments indicate that debt dynamics are likely to worsen in the future in the absence of comprehensive and prolonged fiscal consolidation process and economic growth accelerating efforts.

Therefore, this fiscal policy background has provided more attention to analyze fiscal sustainability and factors affecting to the national debt in Sri Lanka.

D. Objectives of the Study

There are two objectives involve with this study.

1. Analyze the fiscal policy sustainability concerning the joint behavior of debt and budget deficit.
2. Determine the factors affecting to the national debt in Sri Lanka

II. CONCEPTUAL FRAME WORK

A. Government Budget Constraint

Any discussion of fiscal sustainability starts with the dynamic government budget constraint. The change in nominal value of the debt is given by;

$$dB/dS = G + H - T + iB \qquad (1)$$

B – Nominal debt
i – Nominal interest rate on debt
G – Nominal government spending on goods and services
H – Transfers
T - Taxes

The value of spending plus transfer, minus taxes is referred as the primary deficit. It will play an important role below, and it is denoted by D. The right side of the equation (1) corresponds to usual definition of the deficit.

As economies are growing over the time, it is more useful to rewrite the budget constraint in term of ratio to GNP. Then equation (1) can be written as;

$$dB/dS = g + h + t + (r-\theta)b = d + (r-\theta)b \qquad (2)$$

b – Ratio of real debt to real GNP
g, h, t – Ratio of the primary deficit to GNP
θ – Real rate of growth
r – ex-post real rate of interest (I-JI, where JI is the rate of inflation)

Equation (2) is central to any discussion of sustainability. It says that the evolution of the ratio of debt to GNP depends on two sets of factors. The first, which reflects current spending, transfer and tax rules, is the primary deficit. The second reflects the inheritance from the past, is product of the ratio of the accumulated debt to GNP times the difference between the real interest rate and the growth rate. If this difference is positive, a primary surplus is needed to maintain a constant ratio of debt to GNP.

B. Defining Sustainability

A formal definition can now be given to the notion of sustainability of fiscal policy. Fiscal policy can be thought of as a set of rules, as well as inherited level of debt and sustainable fiscal policy can be defined as a policy such that the ratio of GNP eventually converges back to its initial level, "b_0". Obviously, it would make little sense to classify as unsustainable which implies a temporary bulge in the ratio. The justification for requiring the ratio eventually return to its initial level, as opposed to say to zero, or to a higher but stable level, is, however, much less evident. As noted later, this condition can be substantially relaxed with no change in results; the discussion will be easier once the basic equations have been laid out.

What restriction does sustainability then impose on fiscal policy? To answer the question, the first equation is to use the equation (2) to characterize the evolution of "*b*". Suppose one starts at time zero with a ratio of debt to GNP equal to b_0 and that fiscal policy as currently deficit to GNP (ds). It is assumed that the difference between "r" and "θ" is a constant and positive. Although, constancy is only for notational simplicity, the assumption that (1- θ) is positive is an important one about which more is said below. The debt to GNP ratio at any time "*n*" is then given by;

$$b_n = b_0 \exp(r-\theta)\mathrm{n} + \int_0^{\mathrm{n}} d_s \exp(r-\theta)(n-s)ds \qquad (3)$$

The ratio of debt to GNP at time "*n*" is equal to the value of the initial ratio at time zero, accumulated at a rate equal to the difference between the interest rate and the growth rate, pulse the accumulated value, at the same rate, of the primary deficits along the way. Two sample manipulations of equation (3) are needed. First, both sides of equation (3) are pre-multiplied by "exp – (1-θ) (Which in economics term is equivalent to discounting both sides to time zero), yielding;

$$\int_0^n d_s \exp-(r-\theta)sds = -b_0 + b_n \exp-(r-\theta)n \qquad (4)$$

Secondly, taking the limit of equation (4) as "*n*" goes to infinity yields the proposed definition of sustainability. The requirement that the ratio of debt to GNP, "b_n" tends eventually back to "b_0" as "*n*" tends to identify implies that the discounted value of debt goes to zero;

$$\lim \xrightarrow{n \to x} b_n \exp-(r-\theta)n = 0 \qquad (5)$$

Combining equation (4) and (5) yields a second important relation;

$$\int_0^x d_s \exp-(r-\theta)sds = -b_0 \qquad (6)$$

Equation (6) says that the fiscal policy is sustainable if the present discounted value of the primary deficit to GNP under the latter policy is equal to the negative of the current level of debt to GNP. Furthermore, putting another and simple way, for a fiscal policy to be sustainable, a government which has debt outstanding must anticipate sooner or later to run primary budget

surpluses. Those surpluses have to be large enough to satisfy equation (6).

C. Fiscal policy and economic growth

Fiscal policy is generally believed to be associated with growth. More precisely, it is held that appreciate fiscal measures in particular circumstances can be used to stimulate economic growth or developement. (Barro, 1990; Barro and Sala – i-Martin, 1992). There is considerable debate over the effect on government fiscal policy on economic growth, especially in developing countries. The impact on fiscal policy on economic growth is a controversial and long-standing topic in economic theory, empirical research and economic policy making. Tanzi and Zee (1997) have discussed that there are three candidate indicators of fiscal policy-government expenditure, taxes and deficits. The literature does not systematically favor one indicator of fiscal policy over the others. In recent years, a vast literature has emerged on the relationship between fiscal policy and long-run economic growth. Generally, the empirical literatures have found an inverse relationship between government spending and growth (Engen and Skinner, 1992; Levine and Renelt, 1992), but there seems to be a positive relationship between the increase in expenditure and the economic growth rate (Easterly and Rebelo, 1993).

In general, government impact can have a positive impact on growth through two main channels: through increasing the quality of factors of production and thus causing increase in output growth, and indirectly through increasing marginal productivity of privately supplied factors of production (Barro and Sala-i-Martin, 1992).

Much of theoretical debate centers on the effect of fiscal expansions on growth where the classical Keynesian theory expects this effect to be positive, and vice versa, fiscal contractions are in this tradition associated with lower growth and recessions.

III. METHODOLOGY

A. Data Description

The time series data during the period of 1950 – 2010 were used in this study. Data is obtained from various issues of the Central Bank reports published by Central Bank of Sri Lanka. Data was analyzed using E-views statistical software.

B. Model 1- Determine the Fiscal Sustainability using Inter-Temporal Budget Constraint Approach

a. Theoretical Derivation of IBC Approach

In this present theoretical derivation of the IBC that satisfied the fiscal sustainability. Fiscal process is sustainable if the expected discounted value of the debt convergence to zero.

Consider the government budget identity;

$$B_t - B_{t-1} = r_1 B_{t-1} + d_t \qquad (1)$$

Where;

B_t – Real stock of outstanding debt at the end of year "t"

r_t – Real rate of interest during the period "t"

d_t – At period "t" net-of-interest "deficit"

Equation (1) describes the evaluation over the time of stock variable B. Let I_{t-1} denote the information set of private agents at the beginning of period "t". Assume that r_t is stochastic with $E(r_{t+1}/I_{t-1})=r$, for all $i \geq 0$. R_t will be used to denote the realized gross rate of return $1+r_t$, and its expected value will be denoted by R. Further, assume that while B_{t-1} is in I_{t-1}, neither r_t nor d_t are in I_{t-1}. Taking expectation of equation (1), conditional on the information set I_{t-1} and recursively eliminating future value of the stock debt yields the IBC.

$$B_{t-1} = -\sum_{j=0}^{\alpha} R^{-(j+1)}(d_t / I_{t-1}) + \lim R^{-(j+1)} E(B_{t+j} / I_{t-1}) \qquad (2)$$

Under the hypothesis of present value budget value balance, the last term in equation (2) must be equal to zero.

$$\lim_{j \longrightarrow \alpha} R^{-(j+1)} E(B_{t+1} / I_{t-1}) = 0 \qquad (3)$$

If the condition (3) is satisfied, the discounted value of the expected future stock of debt convergence to zero as the time horizon goes to infinity. Then the equation (2) implies that the current outstanding real stock of debt B_{t-1}, must be equal to the present discounted value of current and expected future net-of-interest surpluses, - $\sum R^{-(j+1)}(d_t / I_{t-1})$. (Trehan, B and Walash, C.W, 1991).

b. Theoretical Derivation of Inter-Temporal Budget Constraint Model for Sri Lanka

The derivation of IBC in this section is mainly drawn from the work by Grasen and Nellor (1997). The relationship between the government debt and fiscal deficit is described by the following equation.

$$B_t = B_{t-1} + r_{t-1} B_{t-1} - S_t \qquad (4)$$

Where;

B – Total debt

r – Interest rate

S – Primary deficit

$$S = G_t - R_t$$

G – Expenditure net of interest rate

R – Revenue

This can be written as;

$$B_t = (1 + r_{t-1}) B_{t-1} - S_t \qquad (5)$$

This equation describes the dynamics of accumulation of debt at time "t", can be given as a function of previous debt, amount of interest rate for previous debt and primary surplus at time "t".

The government budget identity for Sri Lanka is as follows (Siriwardena M, 1998)

$$D_t + X_t D_t = (1 + r_{t-1}) D_{t-1} + (1 + r^*_{t-1}) X_t D^*_t - S_t - \sigma_t \qquad (6)$$

D_t – Domestic currency denominated net total debt

D^*_t – Foreign currency denominated net total debt in foreign currency

X_t – Current period exchange rate

r_{t-1} – Interest rate on domestic currency denominated debt

r^*_{t-1} – Interest rate on foreign currency denominated debt

S_t – Primary surplus of government

σ_t - Increase of the nominal stock of reserve money (or base money)

Hence,

$$B_t = D_t + X_t D^*_t \qquad (7)$$

B_t – Net total debt measured in domestic currency

Define δ_t as the proportional depreciation rate of the exchange rate.

$\delta_t = \Delta X_t / X_t$ In period "t". Then equation (6) can be written as

$$B_t = (1+r_{t-1})B_{t-1} - S_t + X_t D^*_{t-1}\{(1+r^*_{t-1}) - (1+r_{t-1})(1-\delta_t)\} - \sigma_t \quad (8)$$

Defining the augmented primary surplus, in order to account for changes in debt due to variations from uncounted interest parity and the increase in the reserve money as

$$S'_t = S_t - X_t D^*_{t-1}\{(1+r^*_{t-1}) - (1+r_{t-1})(1-\delta_t)\} + \sigma_t \quad (9)$$

Then, the equation (8) can be written as

$$B_t = (1+r_{t-1})B_{t-1} - S'_t \quad (10)$$

As suggested by Wilcox (1989), the following discounted factor is applied to discount the variables from period "t" back to period "0".

$$Q_t = \pi_{j=0}^{t-1} \frac{1}{1+r_j}; Q_0 = 1$$

This allows stochastic interest rates in the process, as against the assumption of fixed interest rate made by Hamilton and Flavin (1986). The realization of Q_t will be known as time "t". Applying this discounted factor in to equation (10) the discounted variables can be obtained in the following form.

$$Q_t B_t = Q_{t-1} B_{t-1} - Q_t S'_t \quad (11)$$

Letting b_t and S_t as the discounted value of the debt and augmented primary surplus respectively, equation (10) can be written as follows.

$$b_t = b_{t-1} - S_t$$

Rearranging the above equation

$$\Delta b_t = b_t - b_{t-1} = -S_t \quad (12')$$

This implies that the changes in the discounted value of the debt at period "t" equals to the discounted primary surplus at period "t".

As Hamilton and Flavin (1986) pointed out, forward recursive substitution of equation (12) yields the following equation.

$$b_t = b_{t+N} + \sum_{j=1}^{N} S_{t+j} \quad (13)$$

If the first term of the right hand side of the equation (13) goes to zero or is non-positive in the final period, the stock of debt will be zero or non-positive in a finite horizon economy. In an infinite horizon economy if the transversality condition holds;

$$N \xrightarrow{Lim} \alpha \; E_t b_{t+N} = 0 \quad (14)$$

Then, the outstanding debt of time "t" equals to the present discounted value of future augmented primary surpluses. The, term E_t is equation (14) act as the expectation operator based on the information at time "t". This stated that the expectation at time "t" of the present value of future government debt go to zero in the limit. Then, the supply this condition to equation (13) the government IBC can be obtained as follows.

$$b_t = \sum_{j=1}^{\alpha} S_{t+j} \quad (15)$$

When b_t is the current stock of debt and S_t is the expected future augmented non interest (primary) surplus. If the debt stock is positive, government will have to make negative primary surpluses in the future to compensate current positive primary surpluses.

The sustainability of fiscal policy can be determined by obtaining the forecast trajectory of stochastic process of the b_t and testing whether $N \xrightarrow{\lim} \alpha \; b_{t+N} = 0$. If forecasted trajectory of the discounted debt convergence to zero, fiscal policy can be considered as sustainable (Wilcox, 1989). In order to conduct econometric analysis it is assumed that b_t (discounted debt) follows Multivariate Auto Regressive Integrated Moving Averaged (ARIMA) process as suggested by Wilcox (1989). In this analysis b_t should display two properties. First, it has to be stationary and secondly, b_t must have its unconditional means equals to zero. If non-stationary is found, then it would imply that the policies pursued during the sample period would be unsustainable and if they were adhered in to the indefinite future, imply ultimate insolvency of the government.

The following model is used to ascertain the stationary of discounted net total debt.

$$b_t = \alpha + \beta b_{t-1} + u_t \quad (16)$$

Where,

b_t – Discounted net total debt at time "t"

α – Drift term

β – Auto regressive parameter

U_t – Random error term

$$E(e_t / Y_{t-1} \; Y_{t-2} \ldots\ldots\ldots Y_0) = 0 \quad (17)$$

The error term is assumed to be independent and identically distributed. The equation (16) is used a conventional model developed by Dicky and Fuller (1979) for unit root tests. β is the parameter concern in this analysis. The discounted net debt will be stationary if β is less than one. If b_t follows a equation (16) it has unit root if and only if β=1. If α=0 and β=1, b_t follows a random walk without drift (with the innovations e_t satisfying (17)). If $\alpha \neq 0$ and β = 1, b_t is a random walk with drift, which means that E(b_t) is a linear function of "t". A unit root process drift behaves very differently from without drift. Nevertheless, it is common to leave α unspecified under null hypothesis and this approach applied for this study. Therefore, the null hypothesis has unit root.

H_0: β = 1

In almost all cases it is interested in one side alternatives.

H_1: β < 1

(In practice this means 0< β<1 as β<0 for series that we suspect it has unit root would very rare) Alternative H_1: β > 1 is not usually considered, since it implies that b_t is explosive. In fact, if α > 0, b_t has an exponential trend in its mean when β > 1. When $|\beta < 1|$, b_t is stable AR(1) process which means it is weakly dependent and asymptotically uncorrelated. A convenient test for carrying out the unit root test is to substrct *bt-1* from both sides of the equation (16) and defines θ = β – 1. Then equation (16) become;

$$\Delta b_t = \alpha + \theta b_{t-1} + e_t \quad (18)$$

E_t satisfied condition of equation (17). This is dynamically completed model and hence it seems to be straight forward to test.

H_0: $\theta = 0$

H_1: $\theta < 0$

Further, this study analyzes the unit root is more completed dynamic process adding more lags for equation (18). Then it becomes;

$$\Delta b_t = \alpha + \theta b_{t-1} + \gamma \Delta b_{t-1} ..... \gamma_p \Delta b_{t-p} + e_t \quad (19)$$

Then, t-test is carried out on θ, the coefficient on b_{t-1} as before. This extended version on Dicky Fuller is known as Augmented Dicky Fuller Test (ADF Test).

Then, this can be modified using time trend as follows.

$$\Delta b_t = \alpha + \delta_t + \theta b_{t-1} + \gamma \Delta b_{t-1} ..... \gamma_p \Delta b_{t-p} + e_t \quad (20)$$

Pillips and Perron (1988) have introduced another more useful test for unit roots where the residuals are not necessarily white noise in this test. In order to make the results more robust, the econometric analysis of this study based on these three targets. In addition to discounted net total debt, the total debt as a percentage of GNP or debt/GNP ratios will be analyzed using the same models.

Moreover, the definition for the variable areas follows. The net total debt cossets of net total domestic debt and bet foreign debt. The net total domestic debt calculated by adjusting government domestic debt to treasury bills held by Central Bank of Sri Lanka. The net total foreign debt consist of public and publicly guaranteed long term and short term foreign debt and use of IMF credit for Sri Lanka. Foreign assets are subtracted this figure. In order to discount the variables, government rupee loan interest rate and Treasury bill yields rate used. It is difficult to find one discount rate which represents the true marginal cost of public debt. This is the main limitation of this study. Therefore, in order to obtain more accurate findings, two different discount rates are used in this study.

C. *Model 2 - Determining the Factors Affecting the National Total Debt in Sri Lanka*

In order to achieve this objective, regression analysis has been applied according to the Ordinary Least Squares (OLS) method. Further, following model is used to determine the factors affecting to the national total debt in Sri Lanka.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + U \quad (20)$$

Y – Total national debt

X_1 – GDP

X_2 – Budget deficit

X_3- Economic policy – Dummy variable

$X_3 = 1$: Open economic policy

$X_3 = 0$: Otherwise

X_4 – Time trend

X_5 – Ethnic problem – Dummy variables

$X_5 = 1$: War period

$X_5 = 0$: Otherwise

IV. RESULTS AND DISCUSSION

A. *Results of IBC Approach*

This section presents the results of model 1 and model 2 that mention in the previous section. Table 1 illustrates the results of equation (18).

Table 1: DF Test Results for Discounted Net Total Debt

Test Variables	α	θ
b_1	109.82 (674.39) (0.16)	0.159 (0.06) (2.47)
b_2	218.62 (801.33) (0.27)	0.12 (0.05) (2.36)
b_3	3.91 (2.02) (1.93)	-0.033 (0.02) (-1.177)
Critical Value		
1%	-3.55	
5%	-2.91	
10%	-2.59	

Note: Standard errors are in the first parentheses and test statistics are in the second parentheses.

b_1 – Discounted net debt by government rupee loan interest rate

b_2 – Discounted net debt by Treasury bill yield rate

b_3 – Net total debt as a percentage of GNP

*** - Significant at 1%

** - Significant at 5%

* - Significant at 10%

According to DF test results illustrated in above table, the parameter θ is not significant at any significance level. Therefore, the results are in unit root process. This situation reflects un-sustainability of Sri Lanka's fiscal policy system.

Table 2: ADF Unit Root Test Results for Discounted Net Total Debt and Net Total Debt-GNP Ratio with Drift

	Number of Lags		
Critical Value	1	2	3
1%	-3.56	-3.56	-3.56
5%	-2.91	-2.92	-2.92
10%	-2.59	-2.25	-2.59
With Drift Only			
b_1	0.24 (0.11) (2.14)	0.246 (0.43) (1.72)	0.44 (0.18) (2.32)
b_2	0.223 (0.15) (1.46)	0.41 (0.18) (2.26)	0.24 (0.08) (2.97)*
b_3	-0.039 (0.02) (-1.31)	-0.034 (0.03) (-1.08)	-0.03 (0.03) (-0.96)

Above table illustrates the results of ADF test for discounted net total debt and net total debt to GDP ratio with drift and three lags. According to this result, net total debt discounted by Treasury bill yield rate with only third lags case is significantly shown stationary process at 10% significance level. Remaining cases reflect that fiscal policy is un-sustainable.

The following table presents the results of ADF test for discounted net total debt and net total debt to GDP ratio with drift and trend variable.

This result also points out except debt discounted by Treasury bill yield rate with two lags. Therefore, in all other cases null

hypothesis cannot be rejected. Hence, fiscal policy system is in non stationary process. Thus, this result also evidence for un-sustainability of fiscal policy of Sri Lanka.

Table 3: ADF Unit Root Test Results for Discounted Net Total Debt and Net Total Debt-GNP Ratio with Drift and Trend

	Number of Lags		
Critical Value	1	2	3
1%	-4.14	-4.14	-4.15
5%	-3.49	-3.50	-3.50
10%	-3.17	-3.17	-3.18
With Drift and Trend			
b_1	0.41 (0.13) (2.93)	0.2229 (0.08) (2.67)	0.42 (0.23) (1.79)
b_2	0.22 (0.88) (2.48)	0.37 (0.11) (3.26) *	0.20 (0.88) (2.27)
b_3	-0.25 (0.094) (-2.706)	-0.034 (0.10) (-2.69)	-0.03 (0.01) (-2.21)

The following illustrates Phillips-Parron Test results for two discounted debt series and debt to GDP ratio with drift.

Table 4: Phillips-Parron Unit Root Test Results for Discounted Net Total Debt and Net Total Debt-GNP Ratio with Drift

	Number of Truncation Parameters		
Critical Value	1	2	3
1%	-3.55	-3.55	-3.55
5%	-2.91	-2.91	-2.91
10%	-2.59	-2.59	-2.59
With Drift			
b_1	2.32	2.41	2.13
b_2	1.97	1.57	1.23
b_3	-1.18	-1.18	-1.16

The following results also show Sri Lanka's fiscal policy is in un-sustainable way since they are in non-stationary process reflecting unit root process.

Moreover, the following table summarizes Phillips-Parron test results for two discounted debt series and debt to GDP ratio with drift and trend.

Table 5: Phillips-Parron Unit Root Test Results for Discounted Net Total Debt and Net Total Debt-GNP Ratio with Drift and Trend

	Number of Truncation Parameters		
Critical Value	1	2	3
1%	-4.14	-4.14	-4.14
5%	-3.49	-3.49	-3.49
10%	-3.17	-3.17	-3.17
With Drift and Trend			
b_1	2.32	3.08	2.39
b_2	2.81	2.72	2.06
b_3	-2.55	-2.61	-2.57

After including the trend term also, the results indicate that un-sustainability of Sir Lanka's fiscal policy under the Phillips-Parron test.

Considering all results of DF, ADF and PP tests, Sri Lanka's fiscal policy system is un-sustainable for discounted two debt series and debt GDP ratio. In very few cases, it reflects Sri Lanka's fiscal policy system is sustainable. Sometimes, high interest rate may cause these different results. It is difficult to find appropriate discount rate which represented true marginal cost of public debt for developing countries like Sri Lanka.

Moreover, the second model was used to quantify the factors that influence to increase the total debt in Sri Lanka.

B. Results of the OLS Regression

The following table indicates the results of OLS regression that was employed to identify the factors that affect to national total debt in Sri Lanka.

Table 6: Results of the OLS Regression

R- square	0.98			
Adjusted R-square	0.98			
Variables	**Coefficients**	**Standard Error**	**t-Values**	**Prob.**
Intercept	-97867.53***	25205.86	-3.88	0.00
GDP	1.16***	0.26	4.51	0.00
Budget deficit	7.51***	0.79	9.45	0.00
Economic policy	-29677.94	37620.43	-0.79	0.00
Time Trend	7478.11***	2203.87	3.39	0.00
Ethnic problem	99664.718***	38032.73	2.62	0.01

*** - Significant at 1% level

According to the results overall results is good in fit since there is a higher R-square and adjusted R square values. Almost same R-square and adjusted R square values also suggest that sufficient variables have been included in the model. The variables GDP, budget deficit, time trend and ethnic problem are highly significant and show positive relationship with total debt. The relationship further emphasizes the above DF, ADF and PP unit root test results of un-sustainable way of Sri Lanka's fiscal situation. The most obvious reason that affects to increase debt is higher growth of GDP. With a liberalized policy, Sri Lanka's GDP growth rate is increased because of investment on industrial and services sectors. Most of this investment is supplied by foreign and domestic debt and this situation badly affect the fiscal system. Budget deficit also highly affects to increase the net total debt in Sri Lanka. Especially, except two years; Sri Lanka recorded higher rate of budget deficit and it resulted to increase the debt. According to the figure -1 in the introduction part showed the gap between debt and budget deficit. Economic policy i.e. open economic policy compared to the closed economic situation does not significantly affect the debt level. However, with the time trend there is a positive and significant relationship with the debt level. The main reason for this situation is also high growth rate of GDP and political instability with war in 1980s decade. With the continuing war situation in Sri Lanka, especially after 1980; defense expenditure is highly increased. Therefore, Sri Lanka had to depend on more foreign and domestic debt. This situation also increases the debt level in Sri Lanka.

Hence, the overall results suggest that Sri Lanka's fiscal policy is in a un-sustainable position and GDP, budget deficit, ethnic

problem and time trend are positively affect to the national debt level.

V. CONCLUSION AND POLICY IMPLICATION

A. Conclusion

The budget deficit constitutes a major fiscal indicator as it has important ramifications on a country's macroeconomic position. Without fiscal sustainability, no economic development strategy get succeed. Unfortunately, in many emerging markets and developing countries, weak political institutions, incompetent and corrupt public administrations impose very strict limits on the amount of public debt, internal and external, that can be carried. In principle, tight constraints on government borrowings and debt capacity does not prevent from reaping the benefits of consumption smoothing. In developing countries particularly, governments are likely spend more on various obligations incurring high expenditure costs though revenue sources are limited. This leads to incur budget deficit. According to Keynesian Theory, budget deficit through expansionary spending and increased borrowing have desirable counter cyclical and growth effects. The higher deficit has resulted in accumulation of debt over the years and this is more common in developing countries. Sri Lanka also faces budget deficit and a higher rate of accumulation of debt. This situation causes the un-sustainability of fiscal policy.

Hence, in this study analyzed the fiscal sustainability of Sri Lanka using IBC approach and determine the factors that affect to the net total debt in Sri Lanka using OLS regression model. Time series data from 1950 to 2010 were used for the analysis. Further, DF, ADF and PP unit root test results reflect Sri Lanka's fiscal policy is un-sustainable in almost all cases and OLS regression model emphasizes that GDP, budget deficit, time trend and ethnic problem in Sri Lanka positively related with national debt level.

B. Policy Implication

This analysis suggested the need for fiscal consolidation measures to address the problem of sustainability. In this regards, the reduction of budget the deficit would constitute an important fiscal adjustment measures towards a more sustainable deficits. The adjustment would be made in mainly two ways i.e. trough increased tax revenues and decreased government expenditure. However, increase in tax revenue would be a difficult task because of the inelastic nature of the tax base in Sri Lanka. However, this achievement can be reached by improving tax administration, introducing new tax and introduce broad base tax system. Although the revenue could be increased through the taxes, there will be a limited opportunity because higher taxes may reduce private sector participation in the production activities. Therefore, reduction in expenditure would be other alternative way. The minimization of the welfare expenditure, better targeting of welfare programmes, reduction of transfers to corporation and specially reduce the defense expenditure can be introduced as important policy implications. As an important way of obtaining primary surpluses (or at least to reduce the budget deficit to considerable level), reduction of interest burden is important. This will have favorable effect on the debt procedure since interest payments have significantly increased recent years.

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A Study to Evaluate the effect of Fatigue on Knee Joint Proprioception and Balance in Healthy Individuals

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Abstract- **INTRODUCTION:** Balance and proprioceptive testing is more commonly used in clinical settings to evaluate injured athletes to return to activity. Muscle fatigue produces neuromuscular deficiency within the muscle, thus predispose a joint to injury and decrease the athletic performance. A finding of previous studies shows contradictory findings of effect of muscle fatigue on proprioception and balance.

AIMS & OBJECTIVES: A study to investigate the effect of fatigue on knee joint proprioception and balance in healthy individuals.

MATERIALS & METHODS: An observational study was conducted on 30 healthy subjects (age 18-30 years) from Srinivas college of physiotherapy, Mangalore. Subjects were selected by simple random sampling techniques. Fatigue was induced in the subjects by cycling upto level of exceeding 60% of predicted HRmax (14-17 PRE). Subjects were tested to estimate reproduction error by using weight bearing joint position sense test at 30 ^{0} of knee flexion , by goniometric evaluation accompanied by photographic method and the balance assessment was done on force platform with the measurement of anteroposterior, lateral CoP excursion and stability score in single limb stance, before and after fatigue protocol.

RESULTS: After inducing fatigue,significant reproduction error was found for perception of joint position sense (t=-4.103) with significant changes were found in AP (t=3.997), lat CoP excursion (t=10.949) and stability score (t=11.785) at p>0.05.

CONCLUSION: A study revealed that moderate exercises can reduce proprioception which affects the neuromuscular control of joint making individual more suspectible to injury.

Index Terms- fatigue, proprioception, balance, dynamic stability

I. Introduction

Muscular fatigue is most often defined as an exercise induced reduction in the ability of a muscle to generate force.[1] It is caused by a combination of different physiological mechanisms occurring at both the central through the impairment of central drive and peripheral level through the impairment of muscle function.[2] The high incidence of injuries occur during later session of sports suggest that fatigue may predispose a joint to injury and decrease the athletic performance.[3] The study of fatigue relative to performance of different skills in the sports has long been a subject of practical interest.[4]

Since sports activities are strongly promoted, the risk of sport injuries is likely to increase. It is reported that knee joint injuries are the common injuries among all sports injury, 39.8% of all sports injuries involve the knee.[5] It has been suggested that a higher incidence of injuries at the last third of match could be related to alteration of the lower limb neuromuscular control and altered ability to dynamically stabilize the knee joint but exactly how this impairment comes about is less clear.[6] It is possible that one factor is reduced proprioceptive acuity.[7]

In 1906, Sherrington defined “Proprioception” as the perception of positions and movements of the body segments in relation to each other, without the aid of vision, touch or the organs of equilibrium.[7] The importance of the proprioception in knee function, stability, injury prevention has been studied extensively in literatures. The current consensus is that the sense of proprioception originates in the simultaneous activity of a range of different types of receptors located in muscles, joints, and skin.[8] Some of these receptors have been shown in animal studies to be affected by muscle fatigue[9] and/or by increased intramuscular concentrations of substances (Arachnoid acid, KCL, 5-HT, Bradykinin) released during muscle contractions[10] which have a direct impact on the discharge pattern of muscle spindles that represent the peripheral component of fatigue and efferent as well as afferent neuromuscular pathways are modulated with excessive fatigue via reflexes originating from small-diameter muscle afferents (group III and IV afferents) could modify the central processing of proprioception.[11]. Although it is reasonable to assume that these receptors are affected in a similar way in humans, comparably little is known about the fatigue effects on human proprioception.[12]

The perception of movement or joint position in clinical measurements reflects the status of the whole system, or that measured proprioceptive defects are connected to functional disability.[13] It is believed that the Central Nervous System (CNS) links together afferent proprioceptive feedback from multiple joints of a limb segment and redundancy of the afferent information can be used as an "error check" to improve proprioceptive feedback in order to maintain function.[8] Reproduction ability is decreased; possibly due to increased sensitivity of capsular receptors from muscle fatigue-induced laxity.[3] The assessment of potential injury risk before sports participation followed by intervention may decrease the relative injury incidence in athletes.[14]

The integrity and control of the proprioceptive acuity is essential for the maintenance of balance.[15] Balance is defined as person’s ability to maintain an appropriate relationship between

the body segments and between the body and the environment and to keep the body's center of mass over the base of support when performing a task.[16] It is assumed that some form of muscle spindle desensitization or perhaps ligament relaxation and Golgi tendon desensitization occurs with excessive fatigue which leads to decreased efferent muscle response and poorer ability to maintain balance.[17] Balance testing is more commonly used in the clinical setting to establish gains in the proprioceptive capacity of injured limbs and helps to evaluate injured athlete to return to activity.[15] Measures of postural control such as center of pressure (CoP) excursion which may be a more sensitive measure of postural control that incorporates proprioception have been used clinicaly.[18]

In humans, the effect of fatigue on proprioception has been investigated at various joints. Findings of disturbed proprioception and balance are frequent in the literatures, but together they are not conclusive. So the purpose of this study is to investigate the effect of muscular fatigue on proprioception and balance in healthy individuals.

II. METHODOLOGY

Study design: Observational study design
Sampling Technique: Simple Random Sampling
Sample collection: 30 healthy subjects in age group of 18-30 yrs of both sexes were taken for the study from Srinivas College of Physiotherapy, Mangalore.

Inclusion Criteria:

1. Age group: 18-30 years
2. Both male and female were included.

Exclusion Criteria:

1. Knee joint pathology
2. Musculoskeletal disease of lower limb
3. Neurological condition
4. Respiratory and heart problem

Materials used:

- Static cycle
- Reference markers
- Universal Goniometer
- Video camera
- HR assessment apparatus (cardio-vigil)
- Two dimensional digitizing software of the peak measurement system (UTHSCSA Image Tool version 3)
- Force Platform (BERTEC, Columbus, OH 43229, U.S.A.)

Testing Procedure:

The proposed title and procedure was being approved by ethical committee members, written consent was taken from subjects who fulfilled the inclusion and exclusion criteria and they were randomly selected. Subject's age, sex, height, weight, body mass index (BMI), resting heart rate was recorded prior to the test. Borg scale of perceived rate of exertion (PRE) was clearly explained to all the subjects before cycling. Right lower limb was used for measurement of proprioception and balance test.

Fatigue was induced by asking the subject to perform cycling on a static cycle as fast as possible, the level of fatigue was indicated and measured by using "Borg's Rate of Perceived Exertion (RPE) scale" and HR was monitored using cardio-vigil. Fatigue was induced in the subjects by cycling. When subjects reached upto level of exceeding 60% of predicted HRmax and a level of exertion of 14-17 on the RPE scale, immediately the subjects were asked to discontinue cycling.[19]

Proprioception and balance tests were performed before and after fatigue protocol and scores were recorded.

Subjects were tested to estimate reproduction error by using weight bearing joint position sense test at 30 ^{0} of knee flexion , by goniometric evaluation accompanied by photographic method.The subject was given three trials to identify and reproduce knee joint position (30^0 knee flexion) initially with eyes open followed by eyes closed. After trials of test positions, reference markers were placed along the lateral aspect of the lower limb for photographic evalution: a) over the greater trochanter, b) over the iliotibial tract proximal to the superior border of the patella and c) over the neck of fibula.[20]

The balance assessment was done on force platform while the leg was flexed to 90°at the hip and knee joints, with both arms hanging relaxed at the sides in single-limb stance with the measurement of AP, Lat CoP excursion and Stability score in single-limb stance on the force platform after the JPS test following fatigue protocol.[21]

III. DATA ANALYSIS

The demographic data were analyzed using paired t-test for comparison of pre and post fatigue measurement.The data analysis was done using SPSS softwear package version 14.level of significance was set at ≤ 0.05 with Cl of 95%

IV. RESULTS

Table 1: Distribution of age groups

Age	Frequency	Percent	Valid Percent
19	3	10.0	10.0
20	5	16.7	16.7
21	13	43.3	43.3
22	6	20.0	20.0
23	3	10.0	10.0
Total	30	100.0	100.0

Table 2: Gender Proposition

	Frequency	Percent
male	21	70.0
female	9	30.0
Total	30	100.0

Table 3: Comparison of pre and post fatigue joint position sense (JPS) test score, AP CoP excursion, Lateral CoP excursion and stability score.

	Mean	Std. Deviation	Std. Error Mean	t	df	p
Pre fatigue JPS test score	6.7370	3.04761	.55641	-4.103	29	.000 VHS
Post fatigue JPS test score	8.7197	3.04767	.55643			
Pre fatigue AP CoP excursion	1.2777	.27712	.05060	-10.949	29	0.000 VHS
Post fatigue AP CoP excursion	1.7620	.32318	.05900			
Pre fatigue LAT CoP excursion	.4590	.32341	.05905	-3.997	29	.000 VHS
Post fatigue LAT CoP excursion	.6820	.44055	.08043			
Pre fatigue stability score	86.6090	2.84795	.51996	11.785	29	.000 VHS
Post fatigue stability score	81.7803	2.75167	.50238			

VHS=very highly significant

The above table shows the mean of pre JPS test score i.e. 6.7370 ±3.04761 (SD) and post JPS test score i.e. 8.7197±3.04767 which shows significant differences ($t = -4.103$, $p<0.05$) (figure 1), mean of pre AP CoP excursion i.e. 1.2777± 0.27712 (SD) and post AP excursion i.e. 1.7620±0.32318 which shows significant difference ($t = -10.949$, $p < 0.05$) (figure 2), mean of pre Lat Cop excursion i.e. 0.4590 ± 0.32341 (SD) and post Lat excursion i.e.0.6820 ±0.44055 (SD) which shows significant difference ($t = -3.997$, $p < 0.05$) (figure 3), mean of pre stability score i.e. 86.6090 ± 2.84795 (SD) and post stability score i.e. 81.7803 ±2.75167 (SD) which shows significant difference for pre and post stability score ($t = 11.785$, $p < 0.05$) (figure 4) for the present study.

V. DISCUSSION

The results of the present study indicated that fatigue reduces knee joint proprioception i.e. higher reproduction error was found for perception of joint position sense ($t = -4.103$, $p < 0.05$) thereby supporting the experimental hypothesis.

The findings of David Roberts et al. **(2003)** on healthy young persons, to estimate threshold for perception of movement before and after fatigue shows statically significant difference in threshold value, after inducing fatigue which support the results of our study.[22] However, Marks and Quinney (1993) provided contradictory findings suggested that muscle fatigue had a negligible effect on knee JPS. However, they induced fatigue by having the subject contract the quadriceps muscle 20 times, which likely was less fatiguing and that mainly affected the anterior structures of the thigh. Therefore, the posterior structures, which are of afferent importance during extension, were probably less affected by fatigue.[23]

An important issue here in this present study is, whether the effects of fatigue on position sense of knee can be attributed to central fatigue or to muscle fatigue. Central fatigue may have accompanied peripherally elicited effects, but there is a chain of evidence indicating that alterations in the proprioceptive inflow from peripheral muscle receptors have contributed considerably to the central fatigue effects.[10] Djupsjobacka M. et al. (1995) suggested that muscle spindles are strongly affected by metabolic products , such as bradykinin, 5-HT, and lactic acid, the proprioceptive inflow from spindle afferents during the JPS test is likely to have been affected by fatigue.[24]

Different methods have been used to assess proprioceptive acuity in various studies. Amongst them, Goniometric evaluation for measuring the angle accompanied by video films is an adequately accurate method of measuring the joint angle. Berry C. Stillman et al. (2001) explained that WB assessments of proprioception which is more functional might have greatest relevance in the area of sports medicine . Theoretically, fatigue may increase the time of reaction, which, in the present study, would be seen as higher reproduction error scores. [20]

The results of the present study also indicated that fatigue reduces balance performance (t= 11.785; $p < 0.05$). There are several possible reasons why muscular fatigue affects balance performance. It seems plausible that some form of muscle spindle desensitization or perhaps ligament relaxation and Golgi tendon desensitization occurs with excessive fatigue. The increased AP and Lat CoP excursion observed after cycling in the present study may be explained by a decrease in muscle response and a delay in muscle reaction and poorer ability to maintain balance.[17] Eva Ageberg et al. (2003) found that short-term cycling decrease ability to maintain balance in single limb stance in healthy subjects [30] support the result of present study. [21]

We found that a short period of moderate exercise can reduce proprioception, which may affect the neuromuscular control of the knee joint and significantly affects the ability of an individual to maintain balance on force platform device, thus, may make it more susceptible to injury.

VI. CLINICAL IMPLICATION

Balance and Proprioceptive testing can be used in the clinical setting to evaluate injured athlete to return to activity.

VII. CONCLUSION

The knee joint proprioception and balance are affected after fatigue in healthy individuals.

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Anxiety and Depression - A Suicidal Risk in Patients with Chronic Renal Failure on Maintenance Hemodialysis

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***Abstract*- Background:** Depression and anxiety is well established as a prevalent mental health problem in end-stage renal disease patients treated with hemodialysis. However these problem remains difficult to assess and is undertreated.

Aims & Objective: To assess the demographic and psychological factors associated with depression among hemodialysis patients and elucidated the relationships between depression, anxiety, fatigue, poor health-related quality of life, and increased suicide risk.

Method: This cross-sectional study enrolled 150 end-stage renal disease patients age >18 years on hemodialysis. Psychological characteristics were assessed with the Mini-International Neuropsychiatric Interview, the Hospital Anxiety and Depression Scale, the short-form Health-Related Quality of Life Scale, and Chalder Fatigue Scale, and structural equation modeling was used to analyze the models and the strength of relationships between variables and suicidal ideation.

Results: Of the 150 patients, 70 (46.6%) had depression symptoms, and 43 (28.6%) had suicidal ideation in the previous month. Depression was significantly correlated with a low body mass index (BMI) and the number of co morbid physical illnesses. Depressed patients had greater levels of fatigue and anxiety, more common suicidal ideation, and poorer quality of life than nondepressed patients. Results revealed a significant direct effect for depression and anxiety on suicidal ideation.

Conclusion: Among hemodialysis patients, depression was associated with a low BMI and an increased number of comorbid physical illnesses. Depression and anxiety were robust indicators of suicidal ideation. A prospective study would prove helpful in determining whether early detection and early intervention of comorbid depression and anxiety among hemodialysis patients would reduce suicide risk.

***Index Terms*-** anxiety, depression, chronic kidney disease, dialysis

I. Introduction

Depression and anxiety are the primary psychiatric problems of end-stage renal disease (ESRD) patients.[1–5] Depression and anxiety symptoms has been gaining increasing attention as an authoritative measure of psychopathology in ESRD populations. [6–8] Hemodialysis significantly and adversely affects the lives of patients, both physically and psychologically. [1–3] The global influence on family, work competence, fear of death, and dependency on treatment may negatively affect quality of life and exacerbate feelings associated with a loss of control.[2,3] Postulated explanations for high incidence and prevalence of ESRD in India include high prevalence of diabetes and incidence of chronic kidney disease, failure to identify patients with an early stage of chronic kidney disease. Roughly 95% of ESRD patients in India are on hemodialysis.[5]Among ESRD patients undergoing hemodialysis, besides the disease itself; accompanying modifications in the occupational, marital, familial, social, and personal life provide a sufficient base to give rise to anxiety. The effects of illness, dietary constraints, time restrictions, financial burdens, feeling of handicap, psychological strain of awareness of impending death, and many such factors impede the normal life, therefore, it is important to determine the psychological effects of hemodialysis.

The co morbidities of depression and anxiety increased over time in subjects who were on hemodialysis.[11] The incidence of anxiety a common disorder in hemodialysis patients, is 27%–46%.[10,11] Suicide may be the gravest result of depression. A high suicide rate is also related to poor quality of life.[22] Fatigue is also one of the most debilitating symptoms reported by hemodialysis patients, and it is negatively correlated with quality of life.[14] Approximately 60%– 97% of patients on hemodialysis experience some fatigue.[13] This is a subjective symptom characterized by tiredness, weakness, and lack of energy.[12] Health-related quality of life is an important measure of how a disease affects the lives of patients. The quality of life domains include physical, psychological, and social functioning and general satisfaction with life.[15] Numerous studies have demonstrated that hemodialysis patients had a lower quality of life than that of a healthy population.[16–18]

Identification of the relationships between psychological issues and suicide risk for dialysis patients is crucial. Currently, the relationships between suicide, depression, anxiety, fatigue, and life quality remain poorly understood. The objective of this study is to identify the demographic and psychological factors associated with depression in hemodialysis patients, to establish the relationships among depression, anxiety, fatigue, health-related quality of life, and suicide risk.

II. Material and Method

Study Population- A hospital based cross sectional comparative observation study was conducted in Nephrology Unit, Department of Medicine CSM Medical University

(Erstwhile KGMC) Lucknow India from March 2009 to July 2011. One hundred fifty patients, age >18 years, on hemodialysis were enrolled in this study. Written informed consent was obtained from each patient before participation. This study was approved by the ethical & research committee of CSMMU, Lucknow to use human subject in the research study.

Procedures- In this cross-sectional study, all hemodialysis patients underwent assessments for fatigue symptoms with the Chalder Fatigue Scale (CFS), for depressive symptoms with the Hospital Anxiety and Depression Scale (HADS), and the Short-Form Health-Related Quality of Life Scale (SF–36), as well as psychiatric diagnostic interviews, using the Mini-International Neuropsychiatric Interview (MINI). Psychiatric diagnoses were made by Diagnostic and Statistical Manual of Mental Disorders (DSM–IV) after a structured psychiatric interview using the MINI. The MINI is a short, structured diagnostic interview for psychiatric disorders.[23] This module uses specific questions to assess suicidal ideation, suicide plans, and suicide attempts within the past month and lifetime suicide attempts.

The Chalder Fatigue Scale (CFS) - Fatigue symptoms were evaluated with the self-report CFS.[29] This scale consists of 11 items covering the physical and mental aspects of fatigue. Total fatigue score, which is obtained by adding the scores for all 11 items, has a range of 0–33. The CFS has a high degree of internal consistency, with a Cronbach-α of 0.89. Principal-component analysis supports the use of a two factor solution (Physical Fatigue and Mental Fatigue).[29]

The Hospital Anxiety and Depression Scale (HADS) - The HADS is a 14-item, self-administered questionnaire for assessing the severity of depression.[26] The HADS is commonly used in hospital practice and primary care, and for the general population. Seven items assess anxiety, and the other seven items assess depression. Each item has four possible responses (scored 0–3); the anxiety and depression subscales are independent measures. Patients with Anxiety scores (HADS–A) >8 are diagnosed with anxiety disorders (sensitivity: 0.89; specificity: 0.75), and patients with depression scores (HADS–D) >8 are diagnosed with depression disorders (sensitivity: 0.80; specificity: 0.88).[26]

The Short-Form Health-Related Quality of Life Scale (SF–*36)* - The SF–36 assesses eight dimensions of physical and mental health. The score range is 100 (optimal) to 0 (poorest). The eight subscales are the following: physical functioning (PF); physical role-functioning (RP); bodily pain (BP); general health (GH); vitality (VT); social functioning (SF); emotional role-functioning (RE); and mental health (MH).[27] A standard scoring algorithm aggregates scores from the eight SF–36 subscales into two summary scores for the Physical Component Summary (PCS) and Mental Component Summary (MCS).[28] The SF–36 has demonstrated sensitivity to change, and score changes can be interpreted as changes in the health-related quality of life of patients.

III. STATISTICAL ANALYSIS

Data were analyzed with SPSS Version 16 statistical software. Variables are presented as mean ± standard deviation (SD) or frequency. An HADS score >8 is the dichotomous cutoff for significant depression or anxiety symptoms. Descriptive statistics were analyzed by independent *t*-test and paired *t*-test; metric variables were analyzed by one-way analysis of variance (ANOVA); and x^2 test and Fisher's exact test were used for categorical variables. The Mann-Whitney test and Wilcoxon signed-ranks test were also applied to metric variables when the data distribution violated parametric assumptions. Partial correlation was used to analyze the relationships among suicide risk, and HADS, SF–36, and CFS scores, while controlling for body mass index (BMI) and number of comorbid physical illnesses. Structural-equation modeling, using maximum-likelihood estimation, was further utilized to analyze the strength of variable relationships among depression, anxiety, fatigue, quality of life, and suicide risk. All tests were two-tailed, and the level of significance was $p < 0.05$.

IV. RESULTS

Mean age of the 150 patients on hemodialysis in this study was 57.5 (13.5) years. Of all patients, 70 (46.6%) were men, and 80 (53.3%) were women. Of the 150 subjects, 50 (33.3%) fulfilled DSM–IV criteria for a major depressive disorder, and 36 (72%) reported having suicidal ideation within the past month. Of the 36 patients with suicidal ideation, 27(75%) fulfilled the DSM–IV criteria for major depressive disorder; 9 (25%) did not. The mean HADS–D score for all 150 patients was 6.5 (5.6); range: 0–21; 50 patients (33.3%) had depressive disorders (HADS–D score >8), and anxiety symptoms. **Table 1** summarizes the demographic characteristics of depressed and nondepressed patients, categorized using the >8 cutoff point of the HADS–D scale. There was no significant difference in gender ratio, age, and education, duration of hemodialysis, smoking, or alcohol drinking history between the depressed and nondepressed groups. Compared with nondepressed patients, patients' depression was significantly associated with low BMI and number of comorbid physical illnesses. **Table 2** shows the psychological characteristics of suicidality, anxiety, fatigue, and quality of life for depressed and nondepressed patients. Among the subjects, there is a significant difference in the rate of suicide attempts in their lifetime between the depressed and nondepressed patients. In 150 subjects, 70 (46.6%) fulfilled DSM–IV criteria for a major depressive disorder, 36 (51.4%) having suicidal ideation, 6(8.8%) having suicidal plan and 5(7.15%) suicidal attempts within the past month. Of the 36 patients with suicidal ideation, 27(75%) fulfilled the DSM–IV criteria for major depressive disorder; 9 (25%) did not. The mean HADS–D score for all 150 patients was 6.5 (5.6); range: 0–21; 50 patients (33.3%) had depressive disorders (HADS–D score >8), and anxiety symptoms. The depressed patients had significantly more suicidal ideation and suicide plans and had a higher incidence of anxiety disorders than nondepressed patients. Moreover, depressed patients had significantly higher scores on the HADS–D, HADS–A, and CFS, and significantly lower scores for all dimensions of the SF–36 than nondepressed patients. Physical functioning (PF); physical role-functioning (RP); bodily pain (BP); general health (GH); vitality (VT); social functioning (SF); emotional role-functioning (RE); and mental health (MH) were statistically significant in depressed patients ($p<0.001$).

The correlations between suicidal ideation and HADS scores for the Depression and Anxiety scales, CFS scores, and the PCS and MCS of the SF–36 are shown in **Table 3**. After controlling

for BMI and number of comorbid physical illnesses, suicidal ideation and scores on the HADS Depression and Anxiety scales and CFS were positively and strongly correlated. Scores on the SF–36 PCS were positively and strongly correlated with the SF–36 MCS, and both were negatively correlated with suicidal ideation and scores on the HADS Depression, Anxiety scales and the CFS. Significant and mutual correlations existed between fatigue, depression, anxiety, and quality of life. Structural-equation modeling revealed that depression and anxiety had a significant direct relationship with suicidal ideation, whereas fatigue and quality of life did not.

Table 1: Demographic Characteristics of Depressed and Non-Depressed Hemodialysis Patient

Characteristic	Total (N=150)	Non Depressed (N=80)	Depressed (N=70)	p
Gender (men/women),N %	70/80 (46.6/53.3)	46/34(57.5/42.5)	38/32 (54.3/45.7)	NS
Smoking, N (%)	36 (24)	19 (23.7)	17(25.0)	NS
Alcohol use, N (%)	22 (14.6)	10(12.5)	12(17.6)	0.058
Age, year	58 (13.9)	58.5(13.3)	58.8(15.0)	NS
Education, year	7.1+ (4.6)	7.3(4.4)	6.6(4.8)	NS
Body mass index (BMI: kg/m)	23.3 (4.0)	24.0(4.7)	20.3(2.8)	<0.001
Comorbidly physical illnesses,N	2.0(1.6)	1.8(1.4)	2.4(1.8)	0.018
Hemodialysis duration, month	68.1(65.8)	67.1(64.1)	69.7(69.5)	NS
Depression was defined as a Hospital Anxiety and Depression Rating Scale (HADS-D) score> 8.				

Table 2: Psychological Characteristics of Depressed and Non Depressed Hemodialysis Patients

Characteristic	Non- Depressed N=80	Depressed N=70	p
Suicidality, N			
Suicidal Ideation, past month	8 (6.2)	35 (50.0)	<0.001
Suicide plan, past month	1 (0.8)	6 (8.6)	0.008
Suicide attempt, lifetime	2 (1.5)	5 (7.1)	0.052
HADS-Anxiety score	3.0 (2.9)	7.7 (4.3)	<0.001
HADS- Depression score	2.9 (2.2)	13.2 (3.5)	<0.001
Fatigue srore	17.0 (4.2)	24.7 (5.5)	<0.001
Health- Related Quality of life			
physical Functioning	67.2 (23.2)	44.1 (34.0)	<0.001
Physical Role Functionig	71.9 (40.0)	34.6 (43.3)	<0.001
Emotional Role Functioning	87.1 31.0	36.2 (42.8)	<0.001
Vitality	60.8 (18.3)	29.1 (14.9)	<0.001
Mental Health	79.8 (13.7)	42.4 (17.1)	<0.001
Social Functioning	81.9 (22.9)	59.3 (24.8)	<0.001
Bodily Pain	76.2 (22.5)	59.3 (24.8)	<0.001
General Health	52.0 (24.0)		<0.001
Physical Component	57.9 (25.1)	39.6 (27.0)	<0.001
Summary			
Mental Component Summary	81.9 (18.4)	36.8 (22.7)	<0.001
Depression was defined as the Hospital Anxiety and Depression Rating Scale HADS-D =8			
Values are mean standard deviation unless otherwise indicated.			

Table-3: Correlation of Suicide Rick, Depression, Anxiety, Fatigue, and Health-Related Quality of life, Contolling for body Mass Index BMI and Number of Comorbid Physical II Inesses.

	Suicide Risk	Depression	Anxiety	Fatigue	PCS	MCS
Suicide Risk	___					
Depression	0.46***	___				
Anxiety	0.46***	0.59***	___			
Fatigue	0.37***	0.68***	0.58***	___		
PCS	_0.19**	_0.35***	_0.39***	_0.54***	___	
MCS	0.39***	0.77***	_0.62***	_0.63***	0.21**	___

PCS: Physical Component Summary of Health-Related Quality of Life, MCS: Mental Component Summary of Health- Ralated Quality of life.

*p<0.05,*** p<0.001.

V. DISCUSSION

Study results demonstrate that depression was correlated with low BMI and a high number of comorbid physical illnesses. Depressed patients had a significantly higher incidence of anxiety and fatigue, more common suicidal ideation, and significantly lower quality of life than nondepressed patients. The intercorrelations between fatigue, depression, anxiety, and quality of life were significant. Suicidal ideation was strongly related to depression and anxiety, but not to fatigue or quality of life.

A high BMI is associated with increased survival rate and reduced risk of hospitalization for hemodialysis patients. [30,31] Poor nutrition and inflammation have been suggested as plausible explanations for this epidemiological phenomenon.[31] Interestingly, the correlation between BMI and survival rate was noted among most ethnic groups, with the exception of Asians.[30] Analytical results obtained by this study demonstrate that depressed patients had lower BMIs than nondepressed patients. Loss of appetite and decreased body weight are common manifestations of depression. Thus, the causal relationships among low BMI, depression, and mortality warrant further investigation.

Empirically, patients with many comorbid physical illnesses have worse physical condition and greater psychological stress than those with few comorbid physical illnesses. Our results also demonstrate that depression was significantly correlated with the number of comorbid physical illnesses. The comorbidity score of a major comorbid physical disease has been demonstrated to be a predictor of mortality in general-medical inpatients.[32]

In this study, 33.3% of patients had a major depressive disorder HADS-D score was 13.2+3.6 (p<0.001) as defined by DSM–IV criteria. To meet the diagnostic DSM–IV criteria for major depressive disorder, the subjects needed to fulfill the exclusion criteria "symptoms are not due to the direct physiological effects of a medication or a general medical condition." Therefore, a substantial proportion of subjects who met the criteria for "depressive disorders" defined by HADS–D scores >8 did not meet DSM–IV criteria for major depressive disorder. Some studies indicated that moderate depressive syndromes are common in roughly 25% of ESRD patients, and major depression is common in 5%–22% of ESRD patients.[32,33] The etiology of dialysis-related depression is multifactorial, and is related to biological, psychological, and social mechanisms.[3] Biological mechanisms include increased cytokine levels,[1] possible genetic predisposition, [34] and neurotransmitters affected by uremia.[35] Psychological and social factors include feelings of hopelessness, perceptions of loss and lack of control, job loss, and altered family and social relationships.[1,34] Depression is a significant factor influencing survival[9] and is strongly correlated with fatigue, anxiety, quality of life, and suicide. Fatigue can be a debilitating symptom for patients undergoing hemodialysis, and it is strongly correlated with depression. [36] The pathogenesis of fatigue among hemodialysis patients has been attributed to osmotic disequilibrium, change in blood pressure, intramuscular energy metabolism, and central activation failure.[13,37] Fatigue is not only strongly correlated with scores for many SF–36 subscales, but it is strongly correlated with dialysis patient survival.[38] Fatigue and depression may be closely related, and depression may manifest as feelings of tiredness and lack of energy.[13] In this study, significant mutual correlations existed between fatigue, depression, anxiety, and quality of life. This finding is generally compatible with those in the literature.

High rate of co morbid depression and anxiety was noted in hemodialysis patients. Those with a persistent course of depression had marked decreases in quality of life and self-reported health status; however, this pattern did not emerge with an anxiety diagnosis.[11] In this study, 33.3% of subjects had co morbid depression and anxiety, and in depressed patients HADS-Anxiety score was 9.5+4.5 (p<0.001). Furthermore, anxiety is also a factor strongly correlated with suicidal ideation. Uncertainty regarding the future and fear of losing control in life are important factors associated with anxiety that adversely affect emotional stability.[22] The importance of anxiety may have been underestimated for hemodialysis patients. Notably, anxiety is a common psychological problem that may emerge during the initial course of dialysis;[11] thus, it is important to identify anxiety symptoms in dialysis patients.

Improved quality of life is correlated with high self-esteem and low levels of mood disturbances.[17] Decreased health-related quality of life is strongly correlated with depression, anxiety,[39–41] and increased mortality in hemodialysis patients.[8,17] Poor exercise tolerance and muscle weakness may limit daily activity, further resulting in poor quality of life.[5,42] Depression scores

were independently correlated with all SF–36 dimensions.[18] Nevertheless, composite scores for all eight SF–36 subscales were aggregated into the PCS and MCS. The MCS had a stronger correlation with depression than did the PCS.[8] Although our results showed that the correlation coefficient between depression and the MCS (– 0.76) was higher than that for depression and the PCS (– 0.36) both were significant ($p<0.0001$). Fatigue, anxiety, depression, or reduced quality of life may be a primary response when a patient begins hemodialysis; nevertheless, suicide is undoubtedly an adverse consequence.[22] The suicide rate of ESRD patients was approximately 15 times greater than that for the general United States population. Suicide was associated with several demographic characteristics.[20] A preexisting anxiety disorder was identified as an independent risk factor for subsequent onset of suicidal ideation and attempts.[43] Depression is also a prominent predictor for suicide for many chronic illnesses.[20,44]

Results of this study revealed a significant direct effect for depression and anxiety on suicidal ideation. Several limitations of this study must be considered. First, this is an observational, cross-sectional study. The causal inferences of fatigue, anxiety, depression, and reduced quality of life remain unclear. Second, the Charlson Co morbidity Index,[45] which been shown to be an effective measure of co morbidity severity, was not computed for patients in this study. Third, diagnosing depressive disorders or anxiety disorders is difficult for hemodialysis patients when we apply DSM–IV criteria. To meet the diagnostic DSM–IV criteria for major depressive disorder or anxiety disorders, the subjects need to fulfill the exclusion criterion "The symptoms are not due to the direct physiological effects of a medication or a general medical condition." It is difficult to judge arbitrarily whether the depressive symptoms are due to the direct physiological effects of a medication or a general medical condition in hemodialysis patients. The DSM–IV criteria may have a higher specificity but a lower sensitivity than the HADS. Therefore, the authors used the HADS to define cause of depressive disorders and anxiety disorders. Last, subjects in this study were from a single site. Hence, the external validity may be limited. Ethnic differences in quality of life have been identified among hemodialysis patients.[46] It was postulated that Asian patients perceive kidney disease as a social burden.[46] Perceived "burdensomeness" has been reported to be correlated with suicidal ideation.[47,48] Whether Asian hemodialysis patients perceive their illness as a greater burden to their family or society than other ethnic populations do, and whether this could account for the high incidence of suicidal ideation in this population are areas for further study. We would recommend further research with samples from multiple sites and other ethnicities to improve generalization. Although this cross-sectional design could not determine causal relationships, this study provides a path-analysis for the complex relationships between depression, anxiety, fatigue, quality of life, and suicide risk in hemodialysis patients.

In conclusion, depressed hemodialysis patients had greater levels of fatigue and anxiety, greater suicide risk, and poorer quality of life than nondepressed patients. In this population, depression was associated with a low BMI and an increased number of comorbid physical illnesses. Depression and anxiety were robust indicators of suicide risk. Depressed and anxious patients should be identified early and offered appropriate treatment. A prospective, controlled study will prove helpful in determining whether early detection and early intervention of comorbid depression and anxiety among hemodialysis patients will reduce their suicide risk.

Conflict of Interest: None

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Insights into case-study: A discussion on forgotten aspects of case research

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Abstract- Case-study as a qualitative research is a strongly debatable research strategy among all academicians and particularly practitioners. Therefore, in order to provide some up-to-date insights into this controversial issue, the current paper seeks to investigate and document some aspects of case-study research. In fact, after reviewing some literatures in order to define, clarify and classify case-study research, the paper tries to consider and trade-off this qualitative strategy from different philosophical perspectives and approaches. Then, by relying on some recently outstanding papers and other highly recognized written resources, the paper gets into the appropriateness of case-study including Generalizability, Validity, Construct validity, Internal validity and Reliability. Next, the role of case-study to build a social theory is investigated that leads to preset a step-by-step process to achieve this visionary goal. At the end, a brief comparison between case-study, as a common representative of qualitative research, and survey, an indicator of opposite view, is done. This paper contributes to research method's development used by scholars looking to establish a case research by improving the level of understanding regarding the discussed issues.

Index Terms- case-study appropriateness, case-study classification, case-study approaches.

I. Introduction

One of them main question in research is that what is most appropriate approach in order to get into a problem. Sometimes, students know what they want, but they do not exactly know how to face with the proposed problem. Case study, which is known as one of the most appreciated qualitative methods, is a kind of research approach in order to investigate and go into a complex issue. In fact, by choosing case study as our research approach, the research is going to understand and explore a phenomenon (i.e. case) deeply. A case study of a single, or a small number, of such entities can provide a great deal of, largely qualitative, data which can be written up as a case study, offering insights into the nature of the phenomena.(Easton,2010) Mostly, case study is chosen as research approach whenever there is not a clear picture regarding the research problem.As a case in point, case study is highly appreciated by practitioners in the field of industrial marketing because its nature.

In social study, case study is recognized as an important research methodology as well(Zainal,2007) specially when research is conducted to study some issues such as education, sociology and community based problems including poverty, unemployment, drug addiction and illiteracy. One the main reason to choose case study is that quantitative methods have limitation to provide in-depth explanations of social and behavioral problems which shape the huge proportion of social studies. On the other hand, case study is even employed in other field of knowledge such as medical care, law and management. As a case in point, in medical body of knowledge, after developing a medicine, scientists are trying to understand and explore its side effects by adopting a case study, or in organizational management, case study is a routine method in order to explain all aspects of organization as a whole.

Although case study is an appropriate method in social studies, Flyvbjerb (2006) believes that case study is a useful method in the first steps of research that could bring an insight into the research problem, but it should be elaborated with hypothesis-based methods. It is exactly in the line with Sanders et al. (2007) quotation that the most appropriate method in social studies is the combination of both qualitative and quantitative methods. It seems that the reliability of qualitative is the main issue that these researchers emphasis on a combined method and take more positivist position. A case study is not able to provide reliable information about the broader case (Abercrombie et al., 1984, 34).

Yin (1994) classified case-study research into three main categories including;

- *Exploratory*: exploratory case studies set to explore any phenomenon in the data which serves as a point of interest to the researcher. In this case study also, prior fieldwork and small scale data collection may be conducted before the research questions and hypotheses are proposed. A pilot study is considered an example of an exploratory case study.
- *Descriptive*: descriptive case studies set to describe the natural phenomena which occur within the data in question. For instance, understanding strategies are used by a reader and how the reader uses them. The challenge of a descriptive case study is that the researcher must begin with a descriptive theory to support the description of the phenomenon or story.
- *Explanatory*: Explanatory case studies try to explain a phenomenon in both surface and deep level. Based on explanatory case studies, researchers first form a theory and then tries to test the theory.

In order to recognize the appropriateness of 'case study' the first stage is defining all aspects of case study and determining its

characteristics, then exploring different perspectives and approaches to case studies.

II. CASE STUDY CHARACTERISTICS

- Case study is employed when the aim of research is to closely examine the data within a specific context.
- A case study method selects a small geographical area or a very limited number of individuals as the subjects of study.
- Investigating a phenomenon within its real-life context.
- Case study is a longitudinal examination to provide a systematic way of observing the events, collectingdata, analyzing information, and reporting the results over a long period of time.

As it is discussed above, in case study, the reliability of research which is recognized as the level of justification is highly controversial among supporters and critics. Eason(2010) claims that the only way to increase reliability of case-study is considering this kind of research from pragmatic point of view.

To establish a research based a specific case or phenomenon there are three initial tasks that should be done before any particular action. Firstly, the boundaries of subject should be clearly determined in order to narrowly concentrate on subject. Then, research questions should accurately target what determinates associated with the phenomenon to occur. Finally, the last task is to identify entities which involve into the phenomenon being studied.

The advantage of case studies is classified as;

- The examination is conducted in the context in which activity takes places.(Zainal,2007)
- Variations in terms of intrinsic, instrumental and collective approaches to case studies allow for both quantitative and qualitative analyses of the data.(Zainal,2007)
- It allows researchers to learn a lot from a particular case(Lanthier,2002)
- Provides a detailed qualitative description of a phenomenon(Zainal,2007;Lanthier,2002)
- Case studies can be accomplished conductively and inductively(Easton,2010)

In contrast, the disadvantages of case studies would be listed as;

- The sample size in no case study is going to be enough to statistically generalize the findings into other contexts.(Easton,2010)
- There is no standard to judge findings and procedure(Easton,2010)

III. PERSPECTIVES AND APPROACHES TO CASE-STUDY

Having compared moderate constructionism with realist, critical realist, and relativist approaches to case studies, Järvensivu and Törnroos (2010) addressed abduction and its relations with induction and deduction and even clarified the role of abduction in case studies with moderate constructionist orientation.

Table 1: Comparing different perspectives (Järvensivu and Törnroos, 2010)

	Naïve realism	**Critical realism**	**Moderate constructionism**	**Naïve relativism**
Ontology	Only one, true reality exists; universal truth claims apply	There is a reality; specific local, contingent truth claims apply	There may be a reality; specific local, contingent truth claims apply	There is no reality beyond subjects
Epistemology	It is possible to know exactly what this reality is through objective, empirical observations	It is possible to move closer to local truths through empirical observation, bounded by community-based critique/ consensus	It is possible to understand local truths through community-based knowledge creation and empirical observations bounded by subjectivity	It is possible to form an understanding of the subjective reality through analysis of the subject's account of knowledge
Methodology	Direct empirical observation	Empirical observations bounded by subjectivity and community-based critique/consensus	Community-based knowledge creation through empirical	Analysis of knowledge structures and processes by observing texts
Research process	Deductive; theory testing	Abductive; theory generating and testing	Abductive; theory generating and testing	Inductive; theory generating

A clear conclusion form their research shows an epistemological similarity between moderate and critical realism, despite the fact that critical realism employs a more realist and triangulation-based concept of truth, while moderate constructionist orientation needs to employ a community-based, multifaceted conception of knowledge.

Inevitably, all case studies deal with multiple constructed, community-bounded realities, but in the context of case studies,

these realities are being taken into account by moderate constructionism.

Generalizability and validity of moderate constructionist orientation in researches using case studies has been conceptualized by Järvensivu and Törnroos (2010) as being contingent on both community-bounded critical dialogue and empirical evidence.

Critically, in the other hand, abduction perspective can be criticized as being middle-of-the-ground approach between deduction and induction. On the other hand, it has benefits such as:

- Being based on a true dialogue between conceptual and empirical inquiry,
- Vulnerability to unintentional blindness towards unexpected empirical evidence and unconventional theoretical visions.

Collection and analysis of data, and therefore overturning the generation of new theories can be directed from the researcher's initial theoretical insights.

Moreover, according to Järvensivu and Törnroos (2010), the abductive researcher must exhibit openness and clearness in the research process, because any researcher may accidentally pursue theoretical frameworks that fit their empirical observations and therefore neglect offline frameworks.

Choosing one viewpoint at a time by researchers and looking at reality through that perspective and crystallizing different viewpoints with a critical and open mind can be very useful for scholars to conduct case research.

Moving closer to the different knowledge perspectives of studies of communities with moderate constructionism approach can built on the dialogue between the subjects and researchers which allows the researcher to clearly develop the studied phenomena rather than triangulation.

There are suggestions made from Järvensivu and Törnroos (2010) for network researchers to be more unambiguous in their implemented view, because it seems that scholars often continue to be mute about these issues and there is no particular way to determine the validity of the case study results however theirs researches should be examined if they are transferable from one to another context.

The moderate constructionism approach is influential as a case study approach because it rests on consensusand consensus rests on clearness and communication.

Paying special attention to choose the case study method and its appropriateness is a crucial step in any case research. For instance, by describing five years of past methodological failures, Cutler (2004) weakened the potential of case research to contribute to the development of the public relations body of knowledge. He concluded that the failure of case method is not related to the method itself but the reason behind is the application of scholars.

According to Cutler (2004), use of quasi-experimental research methods by scholars can contribute to develop a body of knowledge and theoretical propositions that are being tested in a systematic manner.

If any researcher, author or scholar fails to meet the basic methodological standards needed to achieve tests of validity for a case study, most of their efforts in developing the research body and data gathering and further analysis would be wasted.

As Cutler (2004) mentions, researchers should apply Yin`s (1994) comprehensive research strategy to their case study research and failure to do so may lead to disconnection between theory and method and limitation in research value.

Gathering variety of data from different sources and campaigns alongside with valid and reliable designs, form a powerful tool for researchers to deal with case research.

Moreover, with the application of appropriate methodology, substantial time and resources being applied to case study research could return far greater results than is evident at present. (Cutler, 2004)

Furthermore, the influence of research on practice can be increased by the application of appropriate case method and influencing the practice can be more appropriate and more useful by using case methods to test and establish theoretical propositions. No wonder that “prematurity” and “inappropriateness” was adjectives being used by Hazelton and Botan (1989) for those researchers that are stick to humanistic or empirical traditions.

“If, case researchers master their case method, a fruitful source of theory and results would result—and perhaps a different world view.” (Cutler, 2004)

IV. CASE-STUDY APPROPRIATENESS

Building on appropriateness of the case study method for different fields of management, there are very interesting and useful academic viewpoints. For instance, scholars such as Järvensivu and Törnroos (2010) tried to discuss the case study method and its role in industrial marketing, especially in business-to-business networks. But their discussion is more related to approaches that allow researchers to select appropriate strategies for looking into case studies used in their research as a method.

Looking further, some methodological issues seem more common in most types of social science research, especially in research with case study methods.

Firstly, the clearness of research methods used to collect data which is called reliability is a common issue. Reliability “is normally known as to be high if two or more researchers, addressing the same subject with the same methods, come up with the same, or very nearly the same outcomes” Halloran (2004).

Basically, reliability needs explanation and descriptions of the research methods used in any study. These explanations can be commonly found in the methodology section of a published research. Also reliability can be described through the use of a particular protocol that defines each step in the research process.

Secondly studies often lack generalizability. This looks clearer while comparing research cases with social science research that practices statistical sampling to attain statistical generalizations. Cases can be used to reach analytical generalizations rather than a statistical generalization because they cannot be reflected as sample units.

Moreover, showing two or more cases to support the same theorymight be considered as replication. And according to Yin (1994), empirical results might be more potent if two or more cases upkeep the same theory but do not support an equally reasonable, rival theory

Granting this kind of approach will shift the focus to ensure the procedures by which case research is carried out is sufficiently rough to ensure the validity of outcomes.

Another issue is validity that has been described as being related to the nature of findings, and the degree to which these are a true consideration of what researchers formally state we are dealing with in affirming our goals and objectives. According to Cutler (2004), three tests can be applied to achieve validity.

In the other hand, operationalizing the data-collecting units of analysis and measures is a factor involved to achieve construct validitythat leads to avoidance of subjective judgments.

Furthermore, there has been an internal validity issues. Avoiding invalid links is very crucial and it is important for the researcher to consider alternative explanations in his or her research design, and seek out evidences that might disconfirm the link.

According to Cutler (2004), internal validity is important for asubject such as public relations where many factors may have an influence on the outcome of a campaign. Thebenefit of case method is that if the research design detects a causal link to study, it can engage a range of data collecting methods to ensure internal validity.

In conclusion, appropriateness of case studies can be evaluated using measures below to show the appropriateness of this method used or to be used by a research:

- *Generalizability*
- *Validity*
- *Construct validity*
- *Internal validity*
- *Reliability*

Case study design might be nominated as one measure of case study appropriateness that could be adopted for either a single-case design or multiple-case design. When using multiple cases, each case is treated as a single case. Each case's conclusions can then be used as information contributing to the whole study, but each case remains a single case. (http://www.gslis.utexas.edu). The problem of using single-case design is its inability of generalization to other contexts whereas by adopting a multiple-case design, this inability is relatively covered. By replicating the case through pattern-matching—a technique linking several pieces of information from the same case to some theoretical proposition—multiple-case design enhances and supports the previousresults.This helps raise the level of confidence in the robustness of the method (Zainal, 2007).

Regardless the classification of research strategies, validity of research is controversial issue among academicians that reflects the degree of accuracy of research. Validity is divided into 4 main categories including construct validity, internal validity, external validity and reliability (De Weerd-Nederhof, 2001). Table below presents some tactics and their occurring times to increase validity of research accomplished in case study format.

Table 2: Validity of case-study (De Weerd-Nederhof, 2001)

Validity	**Case-study tactics**	**Occurring time**
Construct validity	-Use of multiple source of evidence -Establish a chain of evidence -Have key information review draft case reports	- Data collection -Data collection -Data collection -Composition
External validity	-Do patter matching -Do explanation building -Do time series analysis	-Data analysis -Data analysis -Data analysis
Internal validity	-Use replication logic in multiple case study	-Research design
Reliability	-Use case study protocol -Develop case study data base	-Data collection -Data collection

Moreover, in correlation with different approaches, generalizability and validity of moderate constructionist orientation in researches using case studies has been conceptualized by Järvensivu and Törnroos (2010) as being contingent on both community-bounded critical dialogue and empirical evidence.

V. CASE-STUDY AS THE FACILITATOR OF THEORY

Theories of social body of knowledge are not the same as those being matured in pure math territory. Woodside (2010) stated that it is impossible for a theory of social behavior to be simultaneously general, accurate and simple. To develop a theory, generalization of causal relationship is a key factor. Through a case study, when a recognized causal explanation is defendable due todata, it might be claimed that explanation provides a basis for developing theory beyond that case. In addition, to build a theory based on case study research, researcher should face to issue with neither pre-prepared theory nor consideration in which the ways of developing theory would be limited.

Hence, according toEastorn(2010), to develop a theory based on a singlecase, firstly, identification of networks and events shaping our case should be in line with supposed theory. Secondly, reliability of determines should be hypothetically studied. Thirdly, identified relationships within the case should be confirmed either conductively or inductively. De Weerd-Nederhof(2001) states that case studies should adopt a combination of archives, observations, interviews and questionnaires to achieve this purpose. Finally, preparation of some evidencein favorof recognized mechanisms within the case.

In general, evidence at least must be referred to a loose relationship with an existing theory.

VI. CASE-STUDY VS. SURVEY AS TWO RESEARCH STRATEGIES

Research design as a crucial part of any research requires a choice of research strategy. There are 6 main research strategies namely experimentation, survey, archival analysis, histories or case studies which are chosen based on the necessary of research. Yin (1984,p.17) claims that there are three conditions enforcing researchers to choose a particular strategy. First, the type of research question; secondly, the degree of investigator control possible; and finally, the degree of focus on contemporary events desired.

Yin (1989,p.17) tried to briefly illustrate the main differences between discussed strategies as below;

Table 3: Survey vs. Case-study (Yin,1984,p.17)

Strategy	**Form of research question**	**Requires over behavioral control**	**Focus on contemporary events**
Survey	Who,what,where,how many, how much	No	Yes
Case study	How,what	No	Yes

Survey and case studies are too closed to each other in terms of question, behavioral control and contemporary events. We shall recognize the main difference between these two research strategies from research question. Case study, indicated by 'How' and 'why' questions, are more explanatory by nature. and are likely to lead to the use of experiments, histories and case studies. These questions tend to deal with operational links which occur during a span of time, rather than the incidents or phenomena which occur at intervals over time. According to De Weerd-Nederhof (2001), when the aim of research is to answer related to ‘how’ and ‘what’, case studies seems to be more appropriate. Woodside (2010) tries to criticize case-study research from survey-oriented point of view and reversed perspective.

Table 4: Criticism of case-study and survey

Criticism of case study	**Criticism of survey**
Inability toexplicit steps to create and test theory	Collected informants have very limited abilities to retrieve implicit thoughts explicitly
Chaotic complexity of case studies	The use of fixed-point measures fails to capture the real-life outcomes of interest in behavioral science research
variability in multiple-person interpretations of verbal data	Symmetrical relationship between independent and dependent variables
inadequate replications to support eithergeneralizationor practical relevance to aiding decision-making in othercontexts	Inability to report and interpret interaction effects among three or more variables

There are three paradigms including accuracy, generality and simplicity (woodside, 2010) that illustrate the level of appropriateness of a particular research design. Thorngate (1976) demonstrates strength and weakness of these two controversial research designs based on accuracy and generalization of them.

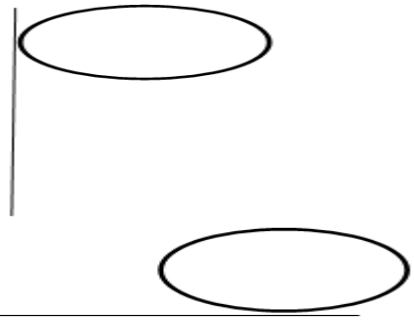

Fig. 1 Method’s objectives (Woodside, 2010)

As it is obvious in above figure, the main objective of any kind of survey is to generalize findings of previous research into other contexts while case study is more likely to increase accuracy of research there by relying on a specific context. In fact, results of survey might be generalized into other contexts because of its external reliability whereas findings of case study are in relevance with particular context, and not being easily generalized into other contexts.

VII. CONCLUSION

Briefly, case-study is an accurately qualitative research that is constructed based on realism philosophy of research. It highly depends on context being studied that declines its ability to broadly generalize its findings into other contexts, especially, when the degree of contingency between those contexts is not significant. In line with other research strategies, the appropriateness of case-study is a reflection of scholar’s

anticipations and intentions of research. In fact, the first steptoward accomplishing a great case research is to clearly understand the appropriateness of case-study that will be completed when scholars correctly adjust their philosophical point of view with the reality of cases. Once scholars made sure about the appropriateness of using case-study as this paper explained in their research, they would able to fluently support their findings thereby firstly, improving their probability of success to develop a theory and secondly, being in line with other works that will eventually leads to build a valuable research.

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Vocational Education and Training: the role of ODL

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Abstract- There has been a tremendous focus on vocational education in the five year plans. It has off late caught the fancy of the academicians, policy makers, etc. The Twelfth Five Year Plan has specially laid its emphasis on skill education in its Approach paper.

However, the reality check is that, given a choice between the two options for education: general education and vocational education, the tilt has been more towards general education than vocational and compared to the western countries the participation rate of students in the vocational courses are very less. Due to globalization and the growth of knowledge economy, there is a tough competition everywhere and therefore the only mantra to success is knowledge, skill and training. The focus is more on working skills and expertise in a particular field of one's own. Hence vocational education and training can prove to be double edged weapon to be used against unemployment problem and also producing skilled technicians and workers for the global market. Vocational Education has been defined as any form of education, the purpose of which is to fit an individual to pursue effectively a recognized profitable employment, whether pursued for wages or otherwise. Earlier vocational education had no formal base and hence it was imparted in such a way that the learner acquired the skill by observation and manually handling things.

Distance and Open Learning has emerged as a most viable option in higher education sector. In Assam, we have two dual mode Universities, one State Open University and IGNOU, beside some private institutions and "foreign universities" offering off campus education through their study center in the state.

The present paper aims to view the status of the vocational education and training as provided through distance mode by the distance educational Institutes. The paper has its own limitations, as it deals with the vocational education at the tertiary level only. The paper will lay emphasis on the potentialities of such education and training for the youths of Assam and the role that distance education can play to give them a dignified life by equipping them with the required skill.

Index Terms- distance education, vocational education, Indira Gandhi National Open University, KKHSOU

I. Introduction

"Education offers the best strategy to break the cycle of poverty, misery and violence."

____ Sir John Daniel (2005)
Former VC of UK Open University

Let us have a look at this:

According to the Country's Eleventh National Development Plan, the number of poor people in India comes close to 300 million. Almost one third of its population lives below the poverty line and 30% face poverty in rural areas. Poverty is more chronic among the marginalized sections like the Scheduled castes and tribes, and geographically Assam is hit by poverty, as it is prone to floods and other natural disasters (IFAD, 2010).

Several other studies and policy documents have shown there is a serious mismatch between the workforce requirements and the availability of skilled workers to sustain the economic growth rate. One estimate indicates that there may be an urgent need for a 20 million increase in skilled worker by 2015 or training of 1.5 million people every year (CII McKinsey Report "Made in India: the next big manufacturing export story "(Oct, 2004) (NCEUS, 2007). The ASSOCHAM reports points out that the demand for skilled labor will soon increase and 10 to 15 million jobs are expected to be created in India by next year, in which 75 per cent of these new jobs will require vocational training.

Employment in manufacturing is however expected to grow at 4 per cent while construction and transport & communication are expected to grow at around 8.2 per cent and 7.6 per cent, respectively. The projected increase in total labour force during 11th Plan is 45 million. As against this, 58 million employment opportunities are targeted to be created during the Eleventh Plan. This is expected to reduce unemployment rate to below 5 per cent (Labour Bureau Report, 2009-10).

As the world becomes small and globally localized, education is the only means for a better standard of living and to build a sustainable economy in today's knowledge based society. Very often, when given a choice, people tend to move towards a general educational qualification rather than a specialized form of education. There may be varied reason for this and most importantly due to the lack of interest shown by people towards it.

Vocational education or Vocational Education and Training have also been termed called Career and Technical education. Despite the fact that the Indian educational system is the third largest in the whole world, it has yet to turn its focus on "practical aspects of education". The ASSOCHAM Report reveals the callous attitude of the government to this aspect of education. It reports that comparatively to the Western nations, the enrolment of students in India in the age group 15-25 is only 2%. The number of institutes and programmes is also inadequate. Though there is capacity for enrolling in the vocational course, yet the course shave yet to be utilized. Besides the lack of encouragement from the Government, the perception of the common people towards Vocational Education and Training (VET) is not satisfactory for attracting the attention of the youths or the employers.

The present form of educational system in India includes the primary education, secondary, senior secondary and higher education. Vocational Education remains out of the purview of the formal mode of education and hence it is not blended within the curriculum framework of the mainstream education. Hence, preference in terms of education leads for attaining degree/certificates/diplomas in such formal stages only. The step motherly attitude towards vocational education has ultimately led to the "wastage of human resources" that could have been able to reap more profits for the State and the nation.

II. DEFINITION AND HISTORICAL BASE

According to the World Employment Report (1998), the term 'skill' refers to an acquired and practiced for performing a job in a competent manner. "It is a multidimensional concept as most jobs require a combination of skills for adequate performance, ranging from physical abilities to cognitive and interpersonal skills." According to the Planning Commission's Committee on India Vision 2020 "skill" can also be perceived as the ability to direct human energy efficiently to achieve desired goals (NCEUIS, 2009).

Vocational education implies that aspect of education which prepares a person to enter the "world of work". 'Technical Education' is defined under AICTE Act 1987, which includes programme of education, research and training, engineering, technology, architecture, town planning, management, pharmacy and applied arts & crafts.

UNESCO defines Vocational Education as education designed to prepare skilled personnel at lower level of qualifications for one or group of occupations, traders or jobs. In South Africa and UK, Vet is known as "further education and training", whereas in Australia and Pacific it is termed as "Technical and Further Education or TAFE and "Technical and Vocational education and Training" respectively.

Vocational India in India existed long back from the time of the Aryan settlement. The literary sources, of the Vedic ages points to the presence of vocational education. The earliest form of education was mainly religious in nature; however there were certain form of education that fulfilled the non-religious aspect of the life during the Vedic Ages. The earliest subjects that were practical in nature were the course in Ayurvedic medicine, Military Science and other arts and crafts. These subjects were termed as Silpas or kalas. The Milinda Panha gives a list of 19 Silpas, while the contemporary Buddhist and Brahmanical put the total kalas at 64. The traditional learning system of "Gurukul" was prevalent and thus the pupils learnt the skill of the practical subject by observing the master's talent, secrets and skill. The collective interests of the arts and crafts were administered by Guilds and Shrenis.

As time passed, vocational education came to be associated with a particular caste and thus formed a caste based profession. A member of a particular profession passed on his skill to his son and this continued, like the lohaars (ironsmiths), the chamaars, etc. With the coming of the British and Industrialization, the vocational form of education could not meet the challenges and hence, arts, crafts, etc all disappeared from the Indian scene.

Vocational Education and Training was first introduced in its formal shape in the year 1976-77 under the higher Secondary Programme as given by NCERT. The Kothari Commission had emphasized on Vocational Education at lower (11-16yrs) and higher secondary stage (17-18yrs). A Centrally Sponsored scheme for Vocational Education was introduced in 1988 and was later revised by NCERT in 1992.

Women's Vocational Training Programme is also being offered for skill training by the State governments at the state level through a network of Women ITI's, private women ITI's and wings in General ITI's.

A. Attitude and Perception towards

Disturbingly, not many seem to be interested in pursuing vocational courses. The major lot of the youth population goes for higher education. The reasons vary from individual perspective to societal pressures. There is a common mindset among the people that vocational courses are specially tailor made for those who secure poor marks in their high school exams. Even though the private sector has entered the vocational education system, yet the enrolment has yet to be satisfying. As VET programme falls outside the purview of the formal schooling cycle and hence it fails to excite the learners to pursue it.

When the VE programme was launched in 1976-77, the progress was slow due to lack of trained personnel, infrastructure and equipment, etc.

Society also has a contributing factor in detracting the students for vocational course. Parents are usually seen to tell their wards to prepare for a career as a doctor, engineer, software professional, etc. Thus, vocational education finds no takers.

Even the employers are not happy with the products of the ITI's or the Polytechnics. The students coming out from the ITI's are not properly trained and hence perform qualitatively very poorly.

B. Status of Vocational education

Vocational Education comes under the joint purview of the Ministry of Human Resource Development and the Ministry of Labour. There are also 20 Ministries and Departments which run TVET Programmes. The All India Council for Vocational Education (AICVE) is responsible for planning, guiding and coordinating the programmes. In the States, it is the responsibility of the State Council for Vocational education and Trade Communities to assist the NCVT or the National council for Vocation Education. The NCVT manages the training aspect and advises the Central government on vocational measures. Under the Constitution of India the Central and the State Government share the responsibility of Vocational training.

The State (Assam) has 9 State Government Polytechnics and 2 Junior Technical schools in Assam under the supervision and control of the Director of Technical education, Assam. The state Polytechnics of Assam are affiliated to SCTE which advises the Government on all technical educational matter to the govt. In Assam, the All India Council for Technical Education has approved of 11 institutes for providing Vocational courses. The number of total State affiliated ITI's is 27 in Assam, of which 23 have been verified. There are 2 privately run ITI's too. There are 3 Government ITI's for women.

III. IMPORTANCE OF VOCATIONAL EDUCATION AND TRAINING

The liberalizing economy which started in India from the 1990s has brought a tremendous impact on the policies regarding the welfare of the people. However, no such impact fell on

Assam. Basically an agricultural state, with no industrial stronghold and no sign of foreign investment, the state has to depend more on its small service, and micro enterprise, agricultural sectors for providing employment to its people. NABARD has recently listed certain sectors that have the capacity to generate employment like the Handloom and Textile, Veterinary, Fish Rearing and processing, etc.

The importance of Vocational Education has been never felt as it is than today. The rapid change in economic structure of the market, which lays emphasis on knowledge and professionalism, has driven people to acquire and upgrade their technical skills to improve their performance as well compete in the global world.

Vocational Education will not only help the educated sections of the society to enhance their skill for employment, improve their job mobility and efficiency of labour, but it will also enable to illiterate section of the society to train themselves for self-employment and financial independence. The scope for Vocational Education has become urgent with the opening up of several placements in the industrial, service, manufacturing, farm/ non farms sector, etc. Similarly, Micro Enterprise Development and MNCs have emerged as the highest absorbers of employees. Thus such opportunity should be surely never given amiss.

Job generating service sectors (January-November 2010)

Sectors	Growth in %age as compare to the 2009	Share in %age
IT/ Enabled	31.9	40.3
Academics	85.5	12.4
Engineering	110.4	5.6
Insurance	19.9	5.0
Hospitality	38.2	3.3
Biotechnology	46.0	2.7
HR	16.7	2.5

Source: ASSOCHAM website

IV. DISTANCE EDUCATION OR LEARNING

The emergence of DE is a phenomenon with its expansion growing rapidly. Earlier deemed as "education for the drop outs and the idiots", today with its developing methodologies in pedagogy and use of ICT, "it has acquired a new form of legitimacy" (Perraton, 2000).

Distance Education has undergone many changes with the use of technologies and so has the definitions. Some of the most referred definitions are given by some of the best world class practitioners of Distance Education.

Holmberg has defined it as covering "the various aspects forms of study at all levels which are not under the continuous, immediate supervision of tutors present with the students at lecture rooms or on the same premises". To him, Distance Education implies the separation of space and time as well between the learner and the instructor.

Desmond Keegan defined it as a quasi-permanent separation of the teacher and the learner throughout the learning process, as well as the quasi-permanent absence of the learner group throughout the learning process.

Distance Learning in its earliest form was termed as Correspondence study, Postal Course, Home Study, etc. However, with the use of Technology, Distance education is no longer a correspondence course but it has been termed as Open and Distance Learning, Distance Learning, Virtual Learning, etc. Today we are more familiar to concepts like E-learning, virtual learning, Virtual University, etc.

The success of Distance Education is very much manifested in the number of enrolments in the DE Institutes. Today India boasts itself of the largest Distance Educational system in the globe with 13 state open universities, a national Open University (IGNOU) and 140 correspondence course institutes delivering distance education through dual mode establishments.

The following table reveals the rate of enrolment in Distance Education in India

Year	Conventional system	% of enrolment	ODL System	%of enrolment	Total Enrolment in Higher Education
1975-76	24,26,109	97.42	64,210	2.58	24,90,319
1980-81	27,52,437	94.30	1,66,428	5.70	29,18,865
1985-86	36,05,029	90.40	3,82,719	9.60	39,87,288
1990-91	49,24,868	88.53	6,38,231	11.47	55,63,099
1995-96	64,25,624	88.23	857,317	11.77	73,00,941
2000-01	82,68,717	83.26	16,06,736	16.27	98,75,453
2006-07	1,05,16,639	72.00	35,78,444	28.00	1,46,06,444
2007-08	1,19,39,246	68.00	38,20,128	32.00	1,57,59,374

Sources: Various UGC Annual Reports and DEC Reports (2007-08) Sharma D.C. (2005) Management of DE, as estimated by UGC.

V. DISTANCE EDUCATION IN ASSAM

Distance Education started in Assam with the external examinations or private examinations that the students opted for due to their inability to sit for regular education. Correspondence courses started as an extension of the earlier external system. With the setting up of a Regional Centre in Guwahati in 1996, Distance Education made its way to the soil of Assam. Prior to this IGNOU had introduced in service personnel training in Shillong, NEHU in 1986. (Patwari, Dowarah, et al, 2005).

The State has a few numbers of Distance Education Institute and Open Universities. One is the State Open University in Assam, the Krishna Kanta Handique State Open University which started functioning from 2006. Besides the National Open University (IGNOU), there are two dual mode Universities

(IDOL, G.U. and DDE, D.U.), one state Open University (Krishna Kanta Handique State Open University), there are many private institutes too, catering to the interests of the students.

The role of these DE Institutions in promoting Vocational Education is described in brief.

IGNOU: It was with the establishment of an IGNOU Regional Centre at Shillong, that Distance Education took a formal shape. In Assam, IGNOU established its first Regional centre in Assam at Guwahati in 1996. Starting off with a small number of students, IGNOU has become one of the most sought after destination for the distance learners. In 1998 the number of students was 3610 and in 2009 it was 15,263. The number of study centre has also increased manifesting the popularity and the desire of the education lovers in the Region. The University is functioning from 170 study centers' in Assam, with Guwahati as the main Regional Centre. The University provides 338 programmes for its learners. Most of the students opt for traditional subjects.

The table reveals the number of students against the programmes for the year 2009-10.

Programme	Year	Admission
Ph.D	2009-10	28
PG Diploma	2009-10	103
BPP	2009-10	20379
Bachelor Degree	2009-10	14,312
Certifcate	2009-10	529
TOTAL	2009-10	35351

Source: Manjulika and Srivastava, University News, 2010

VI. VOCATIONAL PROGRAMMES OF IGNOU

The Guwahati Regional Centre of IGNOU ha launched a Short term based competency Development programmes sponsored by EDNERU. So far, the programme has benifitted 800 youth. Anyone who has passed their class 8 exam can apply for it. IGNOU has also launched some need based course, particularly certificate course in Diabetes care of Community Workers, Interior Design, and Handmade Paper Items. It also organizes Vocational Training Porgrammes in Mobile Repairing, Conventional Lathe, Soft Skill, Developemnt Programmes, Motor Cycle Repairs, Screen Printing, and Fundamentals of Computer Application, Water harvesting, Integrated Farming System and Leadership Development Programmes. Most of the Programmes have been launched as a joint venture. The certtifiacte course in Motor Cycle Maintenance and Repair has been conducted by IGNOU in close collaboration with Tool Room and TrainignCentre and Hero Honda Ltd. Similarly, IGNOU Institute of Vocational education and Training has signed a Memorandum of Cooperation (MOc) with Central Institute of Plastic Engineering and Technology (CIPET) to organize skill development Programme of 3 weeks and a six month noncredit course. In Assam, the course is being started at the CIPET centre, Guwahati.

VII. KRISHNA KANTA HANDIQUI STATE OPEN UNIVERSITY

The University started to function from December 2006. It was established by an act of 2005 enacted by the State Legislature. The motto of the University itself demonstrates the purpose of the University, "Education beyond Barriers". The University aims to reach mostly the people from disadvantaged situations (whether place, race, sex, religion, ethnicity, etc).

The University offers Bachelor, BPP, PG Diploma, Certificate, and PhD programme to its learners. For the further development towards the cause of distance education, research and teaching assistantship under the KKHSOU-DEC collaborative project have been launched, whereby the scholars are required to assist in preparing and designing course materials as well as do research in the field of distance education. The number of RTA's in the University amounts to 6. The University will be soon launching Master's programme in social sciences as well as professional disciplines.

The University aims to give more emphasis on the vocational training of the students of the region. Training programmes are also held in different types of trades at separate places, at ITI's and polytechnics. The technical institutes are assigned by the University to conduct programmes. The training programmes are mostly in the areas of Weilding, Plumbing, Pump Installation, housewiring, 2/3 wheeler maintainance and repairing, computer application, beautician, AC motor rewinding, 4 wheeler servicing, repairing of domestic appliances, RCC masonry, etc. The skill and development training has been a priority for the University in order to build a sustainable economy by imparting vocational skills. There also has been some inititatives taken for introducing 1 year BPP programme as well certificate course on Scientific Piggery farming (CSPF), Commercial Goat Rearing (CCGR) and Commercial Layer farming (CCLF) and Commercial Duck Farming (CCDF). The University recently started a programme for training Security Guards. There were 25 students in the very first batch. The course will focus on basic education, law, first aid, fire fighting, IPC, etc. This programme is sure to gain more attention and more enrolments as the need for security guards has risen over the time.

The University has made a smart start with the use of Information and Communication Technology. The University has a multimedia studio with latest cameras and editing machineries. The studio is used for the production of audio and audio-video study materials. The University has created milestone with the launch of the first Community radio, Jnan Taranga in 2010. The radio broadcasts educational programmes as well as programmes for the welfare of the community, also regarding certain issues for the community awareness. Similarly, the university also provides for mobile services through which the learners can get university news and announcements. A Toll Free Interactive Voice Response System has been launched and it operates 24 * 7. The number is 1800 345 3613, which was launched on January 1, 2011 by Honourable Governor of Assam, Shri. J.B Patnaik. The University also has a multimedia studio which is used to produce audio video study materials for the distant learners of the University.

A. Suggestions

Distance Education has gained popularity and recognition throughout the world and more so in the developing country due to:

- Cost effectiveness (low fees)
- Flexibility in its approach (entry and exit)
- Student centric
- A strong network of student support services
- Wide Access and Coverage

These make Distance Education a viable mode of education for all. It suits the need of the learner, despite his/her geographical location, race, age, religion, caste etc.

Vocational Education is not attractive to the people and the attitude of the people towards it has been very negative and rather "derogatory" as they consider it to mean "manual labour" and hence it finds no takers.

B. A few suggestion sis being forwarded

- Vocational education and training should be made more attractive in order to capture the eyes of the learners.
- The Public Private Partnership (PPP) scheme should be enforced and encouraged in the ODL system.
- The VET programme should be made compulsory in the Secondary stage of Education, as it is the last stage of education in formal mode for most of the students.
- The National Institute of Open Schooling (NIOS) can also serve as a starting ground for giving vocational education.
- VET through Distance Education can be more attractive by providing the students with state of the art infrastructural facilities, latest equipment's, trained personnel, etc.
- The ODL system can play a more effective role in providing vocational education, if it can provide for scholarships and also placements/internships.
- NGO's can also work together with the Distance Education Institutes for providing vocational course and programmes.
- The ODL institutes can also provide training for the trainers of the ITI's, ITC's through its courses.
- The Open Universities can make use of radio, television, internet, etc to provide vocational courses through audio and audio visual study materials. Such steps will motivate the learner and keep him engaged.

VIII. CONCLUSION

Dr. A.P.J. Kalam had announced the shifting of focus from agricultural sector to the manufacturing and service sector, as very vital, for providing employment to millions of the people in India, in his Vision 2020 document. This means that more and more people should be trained up for the new economic splurge.

The National Knowledge Commission Report (2006-09), has also acknowledged vocational education as an important element of the nation's education initiative. In its recommendation, it has also proposed for a National Institute for Vocational Education Planning and Development, linking of Vocational Education with the mainstream education and also advised the Government to spend 10-15% of its total expenditure on education, especially vocational education. It recommends for replacing the term "vocational education" and re-branding it to "skill development" as the former gives the impression of manual labour while the term "skill development" gives a more positive edge. The Eleventh Plan has focused on inclusive growth to reduce poverty and aims to provide an opportunity to restructure policies. It has recognized the role of Distance Learning and hence in its report it has suggested for using Distance Education as a significant delivery model for imparting Vocational Education.

Looking into the scenario of the state the role of Distance Education is very significant for the socio-economic development of the region. Distance Education can no longer be considered as supplementary form of education in comparison to the traditional mode of higher education. Open Universities and DE Institutes have now a greater responsibility for producing a large number of productive human capitals. It has the power to empower the youth of the society, whether they belong to any remote areas or to any ethnic origins. Prof. Swaraj Basu in his article, "Open University – An Agent of Change", has discussed the potentiality of the OU for offering vocational courses. He was of the opinion that there has to be an interface between the OU and the industry and involvement of professionals should be encouraged for preparing the curriculum, policy regarding vocational education. He suggested that the apprenticeship programme the conventional mode should be extended to the distance mode.

The Prime Minister, too, in his speech in 2006 announced for the setting up of a Vocational Education Mission. However, such announcements and speeches will be of no use, if steps for its implementation are not taken up.So does the Twelfth Five Year Plan which has focused on the vocational and skill educational development.

"Higher education is no longer a luxury; it is essential to national, social and economic development" ---------- UNESCO

"…… A poor country cannot afford health and education, but without them it cannot even develop such economic resources as it has…." _____W.M.Macmillan (1938)

ACKNOWLEDGMENT

The preferred spelling of the word "acknowledgment" in American English is without an "e" after the "g." Use the singular heading even if you have many acknowledgments.

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Optimization of LS-SVM Parameters Using Genetic Algorithm to Improve DGA Based Fault Classification of Transformer- A Review

Ms. Aparna R. Gupta, Prof (Mr). V. R. Ingle

Abstract- This paper gives the comparison of different methodologies for the fault classification in transformer based on Dissolved Gas Analysis. This paper describes the Dissolved Gas Analysis based fault classification of Transformer using Least Square Support Vector Machine. The parameters of Support Vector Machine are optimized using Genetic Algorithm. Failure of a large power transformer not only results in the loss of very expensive equipment but it can cause significant collateral damage as well.

Index Terms- dissolved gas analysis, least square support vector machine, genetic algorithm, transformer

I. Introduction

Dissolved Gas Analysis:

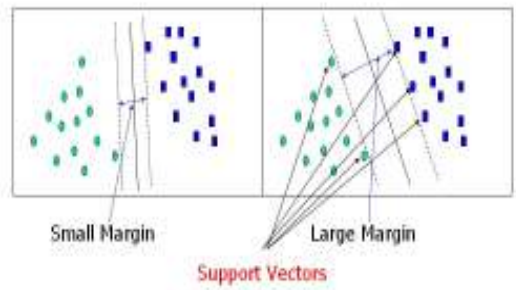
The transformer oil provides both cooling and electrical insulation. It baths every internal component and contains a lot of diagnostic information in the form of dissolved gases. Since these gases reveal the faults of a transformer, they are known as Fault Gases. They are formed in transformer oil, due to natural ageing and as a result of faults inside the transformer. The detection method is called Dissolved Gas Analysis (DGA). **DGA** is the study of dissolved gases in transformer oil. It is the most sensitive and reliable technique which gives an early indication of abnormal behavior of a transformer. Formation of fault gases is due to oxidation, vaporization, insulation decomposition, oil breakdown and electrolytic action.

The different types of gases in transformer oil are Hydrogen(H_2), Methane(CH_4), Ethane (C_2H_6) , Ethylene (C_2H_4), Acetylene(C_2H_2), Carbon Monoxide (CO), Carbon Dioxide (CO_2), oxygen, nitrogen. Also, gases such as propane, butane, butene and others can be formed as well, but their use for diagnostic purposes is not widespread. The concentration of the different gases provides information about the type of incipient-fault condition present as well as the severity. Different methods Rogers, fuzzy, neural, key gas method, duval, dornenburg ratio etc. are available for fault detection using DGA data.

B. Support Vector Machine

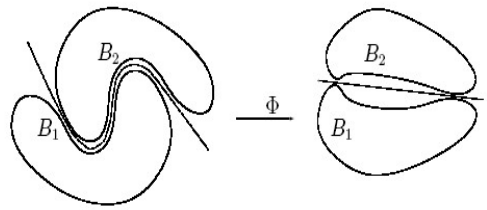
A support vector machine (SVM) is a concept in computer science for a set of related supervised learning methods that analyze data and recognize patterns, used for classification and regression analysis. The standard SVM takes a set of input data and predicts, for each given input, which of two possible classes the input is a member of, which makes the SVM a non-probabilistic binary linear classifier.

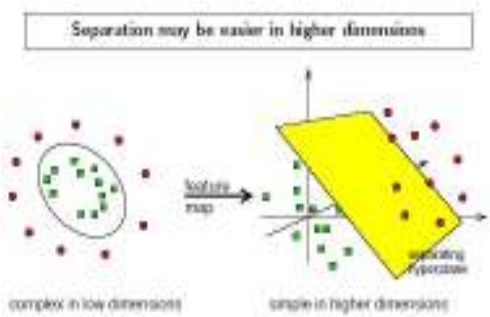
A SVM performs classification by constructing an *N*-dimensional hyperplane that optimally separates the data into two categories. One reasonable choice as the best hyperplane is the one that represents the largest separation, or margin, between the two classes.



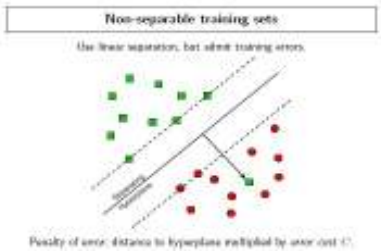
The simplest way to divide two groups is with a straight line, flat plane or an N-dimensional hyperplane. But what if the points are separated by a nonlinear region.

In 1992, Bernhard Boser, Isabelle Guyon and Vapnik suggested a way to create nonlinear classifiers by applying the kernel trick. The resulting algorithm is formally similar, except that every dot product is replaced by a nonlinear kernel function. The transformation may be nonlinear and the transformed space high dimensional; thus though the classifier is a hyperplane in the high-dimensional feature space, it may be nonlinear in the original input space.





Ideally an SVM analysis should produce a hyperplane that completely separates the feature vectors into two non-overlapping groups. However, perfect separation may not be possible, or it may result in a model with so many feature vector dimensions that the model does not generalize well to other data; this is known as *over fitting*.



To allow some flexibility in separating the categories, SVM models have a cost parameter, *C*, that controls the trade off between allowing training errors and forcing rigid margins. It creates a *soft margin* that permits some misclassifications. Increasing the value of *C* increases the cost of misclassifying points and forces the creation of a more accurate model that may not generalize well. The effectiveness of SVM depends on the selection of kernel, the kernel's parameters, and soft margin parameter C.

C. Genetic Algorithm

A genetic algorithm (GA) is a search heuristic that mimics the process of natural evolution. This heuristic is routinely used to generate useful solutions to optimization and search problems. Genetic algorithms belong to the larger class of evolutionary algorithms (EA), which generate solutions to optimization problems using techniques inspired by natural evolution, such as inheritance, mutation, selection, and crossover.

In a genetic algorithm, a population of strings (called chromosomes or the genotype of the genome), which encode candidate solutions (called individuals, creatures, or phenotypes) to an optimization problem, evolves toward better solutions. Traditionally, solutions are represented in binary as strings of 0s and 1s, but other encodings are also possible. The evolution usually starts from a population of randomly generated individuals and happens in generations. In each generation, the fitness of every individual in the population is evaluated, multiple individuals are stochastically selected from the current population (based on their fitness), and modified (recombined and possibly randomly mutated) to form a new population. The new population is then used in the next iteration of the algorithm. Commonly, the algorithm terminates when either a maximum number of generations has been produced, or a satisfactory fitness level has been reached for the population.

Selection: While there are many different types of selection. During each successive generation, a proportion of the existing population is selected to breed a new generation. Individual solutions are selected through a *fitness-based* process, where fitter solutions (as measured by a fitness function) are typically more likely to be selected. Certain selection methods rate the fitness of each solution and preferentially select the best solutions. Other methods rate only a random sample of the population, as this process may be very time-consuming.

Cross over: The next step is to generate a second generation population of solutions from those selected through genetic operators: crossover (also called recombination), and/or mutation. The most common solution is something called crossover, and while there are many different kinds of crossover, the most common type is single point crossover. In single point crossover, you choose a locus at which you swap the remaining alleles from one parent to the other. This is complex and is best understood visually.

As it can be seen, the children take one section of the chromosome from each parent. The point at which the chromosome is broken depends on the randomly selected crossover point. This particular method is called single point crossover because only one crossover point exists. Sometimes only child 1 or child 2 is created, but oftentimes both offspring are created and put into the new population. Crossover does not always occur, however. Sometimes, based on a set probability, no crossover occurs and the parents are copied directly to the new population. The probability of crossover occurring is usually 60% to 70%.

Mutation: After selection and crossover, a new population full of individuals is created. Some are directly copied, and others are produced by crossover. In order to ensure that the individuals are not all exactly the same, we allow for a small chance of mutation. You loop through all the alleles of all the individuals, and if that allele is selected for mutation, you can either change it by a small amount or replace it with a new value. The probability of mutation is usually between 1 and 2 tenths of a percent. A visual for mutation is shown below.

As you can easily see, mutation is fairly simple. You just change the selected alleles based on what you feel is necessary and move on. Mutation is, however, vital to ensuring genetic diversity within the population.

D. 1.4 Fault Classification procedure using GA and SVM

The SVM (support vector machine) uses the principle of minimization of structural risk to enhance the generalization

ability, solves the problems of less sample, non-linear, local minima, it is fit for the gas forecasting of the transformer oil chromatography faults. The LS-SVM is an extension of the standard SVM The LS-SVM is an extension of the standard SVM, the quadratic term is used as the optimization index entries, and it also use the equality constraints instead of inequality constraints of the standard SVM, namely, the quadratic programming problem is transformed into a linear equation groups, it reduces the computational complexity, increases the speed of the solving.

The selection of the parameters of the optimal model influences the algorithm performance greatly. Whether the parameters are appropriate or not, could bring great impact on the training error and the punishment of the ample data, so it is necessary to optimize the parameters. GA is applied to choose the parameters of LS-SVM. The GA uses the encoding mechanism; it generates the initial population randomly, expends the search space fast, realizes the LS-SVM parameters optimization, and improves the fault diagnosis accuracy.

II. DGA TRANSFORMER REVIEW

LS-SVM (least square support vector machines) is applied to solve the practical problems of small samples and non-linear prediction better and it is suitable for the DGA in power transformers [1]. But in this model, the selecting of the parameters, impact on the result of the diagnosis greatly, so it is necessary to optimize these parameters. The IGA (improved genetic algorithm) is applied in this paper to make an optimization of these parameters about LS-SVM. In this 5 types of gases for fault types were used.

LS-SVM (least square support vector machines) is applied to solve the practical problems of small samples and non-linear prediction better and it is suitable for the DGA in power transformers [2]. But in this model, the selecting of the parameters, impact on the result of the diagnosis greatly, so it is necessary to optimize these parameters. The IGA (improved genetic algorithm) is applied in this paper to make an optimization of these parameters about LS-SVM. In this 7 types of gases for forecasting results of the gas in oil were used.

III. COMPARATIVE STUDY

Data mining (DM) technology based on Fuzzy Rough Set (FRS) and Support Vector Machine (SVM) are presented to classify the Fault of power transformer [3]. In order to make full use of the classification ability of SVM and improve the fault classification accuracy, FRS is used to pre-classify the transformer fault and the multi-level power transformer fault diagnosis model based on FRS and SVM.

A fuzzy model based on genetic programming (GPFM) is proposed to diagnose the fault types of insulation of power transformers [4]. The proposed GPFM algorithm constructs the fuzzy relationship between input and output fuzzy variables by genetic programming algorithms.

A new prediction method combined variable weight Gray Verhulst model and gray integrated relation grade was proposed to solve the problem of power transformer fault prediction [5]. Variable weight Gray Verhulst model was proposed based on 2 improved Gray Verhulst models with 2 difference select rules of parameter ρ in background function. Genetic algorithm chose parameter ρ for variable weight Gray Verhulst model.

Genetic-based neural networks (GNNs) for the assessment of the condition of power transformers [6]. The GNNs automatically tune the network parameters, connection weights and bias terms of the neural networks, to yield the best model according to the proposed genetic algorithm. Due to the global search capabilities of the genetic algorithm and the highly nonlinear mapping nature of the neural networks, the GNNs can identify complicated relationships among the dissolved gas contents in the transformers insulation oil and hence the corresponding fault types.

Reference papers	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**	**[6]**
Methodology	IGA and LS-SVM	IGA and LS-SVM	FRS and SVM	GP and fuzzy	Grey Verhulst model and GA	GA and Neural Network
Samples required	Small samples	Small samples	large	large	Historical data (small samples, prediction)	Large
complexity	Reduced	Reduced	-	-	Two models(two GA each for posterior and prediction error)	-
accuracy	91.7%	-	91.7%	80.9%	93.7%	89.05% 92.22%

IV. PROPOSED METHODOLOGY

To increase the fault classification ability, LS-SVM parameters will be optimized using Genetic Algorithm. The Probable steps will be –

- Collection of DGA data
- Normalization of Data
- Classification of fault using LS-SVM
- Determine LS-SVM Parameters
- LS-SVM parameters will be Optimized using GA

Simulate the model to diagnose faults of the samples.

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Advancement in Electric Discharge Machining on metal matrix composite materials in recent: A Review

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Abstract- Existing manufacturing industries are fronting challenges from these advanced nasent materials viz. nano material ,ceramics, super alloys, and metal matrix composites, that are hard and difficult to machine, requiring high accuracy, surface quality excellence which affects and increases machining cost. To meet these tasks, unconventional machining processes are being used to achieve optimum metal removal rate, better surface finish and greater dimensional correctness, with a reduced amount of tool wear. Electric Discharge Machining (EDM), a unconventional process, has a extensive applications in automotive, defense, aerospace and micro systems industries plays an outstanding role in the development of least cost products with more consistent quality assurance. Die sinking EDM, Wire electrical discharge machining (WEDM),Dry EDM, Rotary disk electrode electrical discharge machining (RDE-EDM) are some of the alternates methods of EDM. This paper reviews the recent developments and advances in the field of high performance manufacturing environment using Die Sinking EDM, WEDM, Dry EDM and RDE-EDM. The review is based on prominent academic publications researches.

Index Terms- electro-discharge machining (EDM), die sinking EDM, metal matrix composites, tool wear, MRR.

I. Introduction

The advanced materials have striking properties i.e., high strength, high bending stiffness, good damping capacity, low thermal expansion, better fatigue characteristics which make them prospective material for modern industrial application. Present manufacturing industries are facing challenges from these advanced materials viz. super alloys, ceramics, and composites, that are hard and difficult to machine, requiring high precision, surface quality which increases machining cost **[1]**. To meet these challenges new processes with advanced methodology and tooling needs to be developed. The conventional machining of such advanced materials are often difficult due to the improved thermal, chemical and mechanical properties of new advanced materials. Conventional machining such as turning, milling and drilling etc shows ineffectiveness in machining of advanced materials, since it results in poor materials removal rate, excessive tool wear and increased surface roughness. Non-Conventional Machining processes are classified according to the type of energy used for the machining of the work materials. i.e. Mechanical Ultrasonic machining(USM), Water jet machining(WJM),Abrasive jet machining (AJM), Thermal Electrical discharge machining(EDM),Electron beam machining (EBM), Laser beam machining (LBM), and Chemical (Chemical machining (CHM) , Photo chemical machining (PCM) **[2]**.The Electric Discharge Machining (EDM), a thermal material removal process, has firmly established its use in the production of forming tools, dies, molds and effectively machining of advanced materials.

A. EDM Overview

In Electrical Discharge Machining the electrode is moved downward toward the work material until the spark gap (the nearest distance between both electrodes) small enough so that the impressed voltage is great enough to ionize the dielectric**[3]**. Short duration discharges (measured in microseconds) are generated in a liquid dielectric gap, which separates tool and work piece.EDM does not make direct contact between the electrode and the work piece where it can eliminate mechanical stresses chatter and vibration problems during machining **[4]**. The material in the form of debris is removed with the erosive effect of the electrical discharges from tool and work piece **[5]**. EDM is often included in the 'non-traditional' or 'non-conventional' group of machining methods together with processes suchas electrochemical machining (ECM), water jet cutting (WJ, AWJ), laser cutting and opposite to the 'conventional' group (turning, milling, grinding, drilling and any other process whose material removal mechanism is essentially based on mechanical forces)

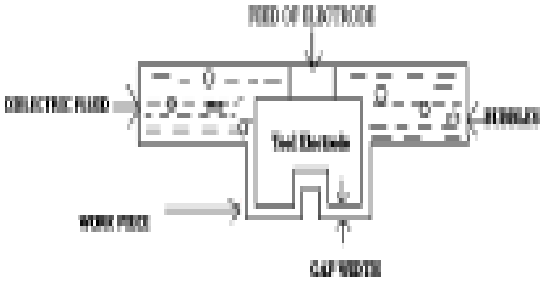

Fig 1.0 Schematic diagram of EDM

EDM is a non-conventional process based on removal of unwanted material in the form of debris from a job piece by means of a chain of recurring electrical discharges (created by electric pulse generators in micro seconds) between a tool called electrode and the work material in the presence of a dielectric fluid(like kerosene and distilled water). The history of EDM begins in 1943, with the creation of its principle by Russian scientists Boris and Natalya Lazarenko in Moscow. They were assigned by the Soviet government to investigate the wear caused by sparking between tungsten electrical contacts, a problem which was particularly critical for maintenance of automotive

engines during the Second World War. Putting the electrodes in oil, researchers found that the sparks were more uniform and predictable than in air. They had then the idea to reverse the phenomenon, and to use controlled sparking as an erosion method **[6]**. Lazarenkos developed during the war the first EDM machines, which were very useful to erode hard metals such as tungsten or tungsten carbide. In the 1950's, progress was made on understanding the erosion phenomenon **[7-9]**. During this period industries produced the first EDM machines. Owing to the poor quality of electronic components, the performances of the machines were limited at this time. In 1960's, the development of the semiconductor industry permitted considerable enhancements in EDM machines. Die-sinking machines became reliable and produced surfaces with controlled quality, whereas wire-cutting machines were still at their very beginning. During the following decades, efforts were principally made in generator design, process automatization, servo-control and robotics. Applications in micro-machining became also of interest during the 1980's **[10]**. It is also from this period that the world market of EDM began to increase strongly, and that specific applied EDM research took over basic EDM research**[11]**. Consequently, new methods for EDM process control emerged in the 1990's by using fuzzy control, neural networks, response surface methodology, central composite design, and Taguchi optimization etc.

II. ELECTRICAL DISCHARGE MACHINE (EDM)

In this the basic fundamentals of the EDM Method and the other unconventional methods for material removal are discussed.

A. EDM: Working principle

The material erosion mechanism primarily makes use of electrical energy and turns it into thermal energy through a series of discrete electrical discharges occurring between the electrode and work piece submerged in a dielectric liquid medium **[12]**. The thermal energy generates a channel of plasma between the cathode and anode **[13]** at a temperature in the range of 8000 to 12,000 °C**[14]**. When the pulsating direct current supply occurring at the rate of approximately 15,000–30,000Hz **[15]** is turned off, the plasma channel breaks down. Due to this sudden reduction in the temperature allowing the circulating dielectric fluid to implore the plasma channel and flush the molten material from the pole surfaces in the form of microscopic debris are observed.

Electrical Discharge occurs at higher frequencies since the metal removal rate for each discharge is very less in change in weight. For every pulse, electrical discharge occurs at a particular position where the electrode materials are melted and evaporated and finally ejected in the molten phase (in the form of debris) thus forming small crater on both tool electrode and work piece. The undesirable material is then cooled and re-solidified in the dielectric fluid forming large number of debris particles which will be flushed away from the gap by the flow of dielectric pressure. During each end of the discharge duration, the temperature of the plasma channel and the electrode surfaces that is in contact of the plasma rapidly drops, resulting in the recombination of ions and electrons. For maintaining stability in EDM process, every successive next pulse discharge occurs at a spot distanced sufficiently far from the previous discharge position. The pulse interval (known as pulse off time period) for the next discharge pulse should be not so much long and not too short .If it is long then the plasma channel that is generated by the previous discharge can be fully de-ionized and the dielectric breakdown strength around the previous discharge location can be recovered by the time the next voltage charge is applied and short pulse interval time produces more surface roughness and instability in machining **[16]**.

B. Fundamental EDM Settings

The polarity, pulse duration, pulse interval and peak current are the basic machine settings. These parameters can also be expressed as average current, pulse frequency and duty factor.

i. Average Current

It is the maximum current available for each pulse from the power supply/generator in the circuit. Average current is the average of the amperage in the spark gap measured over a complete cycle.It is calculated by multiplying peak current by duty factor.

Average Current (A) = Duty Factor (%) × Peak Current

ii. Pulse Frequency

It is the number of cycles produced across the gap in one second. The higher the frequency, finer is the surface finish that can be obtained. With an increase of number of cycles per second, the length of the pulse on-time decreases. Short pulse on-times remove very little material and create smaller craters. This produces a smoother surface finish with less thermal damage to the workpiece. Pulse frequency is calculated by dividing 1000 by the total cycle time (pulse on-time+ pulse off-time) in microseconds.

Pulse Frequency (kHz) = 1000/Total cycle time (µs)

iii. Duty Factor

Duty factor is a percentage of the pulse duration relative to the total cycle time. Generally, a higher duty factor means increased cutting efficiency. It is calculated in percentage by dividing pulse duration by the total cycle time (pulse on-time + pulse off-time).

Duty Factor (%) = [Pulse duration (µs)/Total cycle time (µs)] × 100

F.L.Amarim result out the effect of duty cycle on the machining of AMP-8000. The researchers concluded that increase of duty factor increases MRR. This is due to the reason that with increase of duty cycle a black layer was seen on the surface of work material and with further more increase of it, the machining becomes unstable**[32]**.MRR increases with increase in duty factor at constant current constant pulse on time. This is due to the reason that with increase in duty cycle, the intensity of spark increases resulting in higher MRR.

C. Basic EDM Process Parameters

i. Electrical Parameters

Pulse Duration (Ton): It is the duration of time measured in micro seconds. During this time period the current is allowed to through the electrode towards the work material within a short gap known as spark gap. Metal removal is directly proportional to the amount of energy applied during the on time period **[17]**.Pulse duration is also known as pulse on time and the sparks are produced at certain frequency. Material removal rate depends on longer or shorter pulse on time period. Longer pulse duration improves removal rate of debris from the machined area which also effects on the wear behaviour of electrode. As in EDM process erosion takes place in the form of melting and

vaporization of both the tool and work material at the same time period, so with longer pulse duration more material has to be melt and vaporize. The substantial crater produced will be broader as comparison to the shorter pulse on time. But, in some experimental research work it has been proved that optimal pulse duration gives higher performance measures **[18]**. It conclude all that MRR cannot be increased by increasing the Pulse on time, a suitable combination of peak current is also needed for increasing rate of removing unwanted material from the work piece. At constant current and constant duty factor, the MRR is decreased with increase in pulse on time **[19]**. This is due to the reason because of short pulses cause less vaporization, whereas long pulse duration causes the plasma channel to expand rapidly. This expansion of plasma channel cause less energy density on the work material, which is not sufficient to melt and vaporize the work material. It was also concluded by the researchers that with increase of pulse duration, surface roughness decreased, hardness of work material, crack length, crack width and the thickness of recast layer increased. The undesirable material is then cooled and re-solidified in the dielectric fluid forming large number of debris particles which will be flushed away from the gap by the flow of dielectric pressure. During each end of the discharge duration, the temperature of the plasma channel and the electrode surfaces that is in contact of the plasma rapidly drops, resulting in the recombination of ions and electrons.

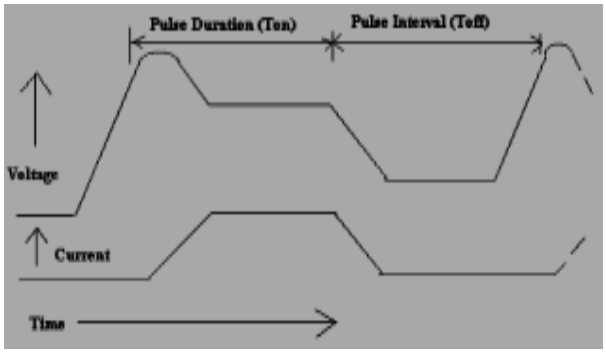

Fig. 2 Actual profile of single EDM pulse (Fuller, 1996)

Pulse Interval (Toff): This parameter is to affect the speed and the stability of the cut. If the off-time is too short, it improves MRR but it will because more sparks to be unstable in the machining zone. Kansal et al.[20] result out that increase in pulse interval time decreases the MRR. Saha et al.[21] reported out that for small value of pulse interval time period, the MRR was low, but with further increase MRR increases.MRR was dropped slowly with increase in pulse interval time. This is due to very short pulse interval the probability of arcing is larger because dielectric in the gap does not recover its dielectric strength.O.A.Abu Zeid investigated the role of voltage, pulse off time in the electro discharge machined AISI T1 high speed steel[22]. The researcher concluded that the MRR is not so much sensitive to pulse interval time changes at low pulse on time in finish machining.

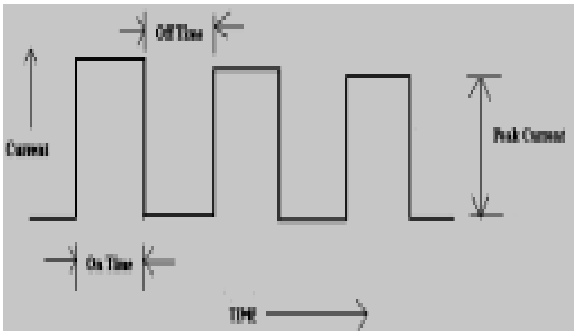

Fig. 3.0 Pulse wave form of pulse generator [28]

Electrode gap (spark gap): It is the distance between the electrode and the part during the process of EDM. An electro-mechanical and hydraulic systems are used to respond to average gap voltage. To obtain good performance and gap stability a suitable gap should be maintained. For the reaction speed, it must obtain a high speed so that it can respond to short circuits or even open gap circuits. Gap width is not measured directly, but can be inferred from the average gap voltage **[23]**.

Polarity: It may be positive or negative connected to tool electrode or work material. Polarity can affect processing speed, finish, wear and stability of the EDM operation. It has been proved that MRR is more when the tool electrodes are connected at positive polarity(+) than at negative terminal(-) .This may be due to transfer of energy during the charging process is more in this condition of machining. When an electrical discharge is generated electrons dispatch from the negative polarity collides with neutral molecules between the work piece and electrode which is responsible for ionization process in EDM. However, ionization is taken because the electron arrives at the positive terminal of the surface. The negative polarity is more desirable as compared to positive polarity **[24]**. The researcher concluded this is because the MRR is higher and better surface finish is produced as MRR is dependent on anode potential drop. It was experimentally worked on the micro slitting on titanium alloy with copper as rotating disk as an electrode. They concluded that MRR was lower with positive polarity of work piece as compared to negative polarity. This is due to the fact that with positive polarity of work piece, the dissociated carbon elements in the dielectric fluid tend to adhere to the anode, which result in forming a recast layer **[25]**.

D. Non Electrical Parameters

Non-electrical parameters such as the Rotational movement of electrode, flushing of dielectric fluid and aspect ratio (tool shape) together play a significant role in delivering optimal performance measures. This section discusses the effects of non-electrical parameters on the various performance measures.

i. Rotation of Tool Electrode

It is the rotational effect of cylindrical (pin shaped) or disc shaped electrode tool measured in revolution/minute. The rotational movement of electrode is normal to the work surface and with increasing the speed, a centrifugal force is generated causes more debris to remove faster from the machining zone.According to Mohan et al. **[18]**, the centrifugal force generated throws a layer of dielectric in to the machining gap, induces an atmosphere for better surface finish, prevent arching and improves MRR. Soni and Chakraverti **[26]** compared the

various performance measures of rotating electrode with the stationary electrode. The results concluded an improvement in MRR due to the better flushing action and sparking efficiency with little tool wear but the surface finish was improved.

ii. Injection flushing

Flushing removes eroded particles from the gap for efficient cutting and improved surface finish of machined material. Flushing also enables fresh dielectric oil flow into the gap and cools both the electrode and the work piece. Basic characteristics required for dielectric used in EDM are high dielectric strength and quick recovery after breakdown **[27]**.There variations of EDM processes can be classified according to the type of dielectric fluid used. Most dielectric media are hydrocarbon compounds and water. The hydrocarbon compounds are in the form of refined oil; better known as kerosene. While the fluid properties are essential, the correct fluid circulating methodology is also important. The dielectric fluid not only forms a dielectric barrier for the spark between the work piece and the electrode but also cools the eroded particles between the work piece and the electrode. The pressurized fluid flushes out the eroded gap particles and remove the debris from the fluid medium by causing the fluid to pass through a filter system**[28]**.During the investigation of EDM of Ti 6Al 4V, Chen et al. **[29]** found that the MRR was greater and the relative EWR is lower, when using 16 distilled water as dielectric solution.

iii. Tool Geometry

Tool geometry is concerned with the shape of the tool electrodes.ie. Square, rectangle, cylindrical,circular.etc. The ratio of length /diameter of any shaped feature of material. In case of rotating disk electrode the ratio becomes thickness/diameter. Murali et al **[30]** used graphite foil for straight grooving operation instead of pin shaped electrode. An aspect ratio of 2.3 was achieved by using FAST technique (Foil as tool electrode) which was improved to 8 by implementing GAME (Gravity assisted Micro EDM).Singh et al. **[31]** uses square and rectangular shaped electrodes having aspect ratio of 1.0 and 0.6 for machining 6061Al/Al2O3P composite .It concluded that shape of the electrode effects EWR. The tool having less aspect ratio gave higher value of EWR. Thus with increasing the size of electrode more good performance of ED Machining takes place.

iv. Tool Material (Electrode)

Engineering materials having higher thermal conductivity and melting point are used as a tool material for EDM process of machining . Copper, graphite, copper-tungsten, silver tungsten, copper graphite and brass are used as a tool material (electrode) in EDM. They all have good wear characteristics, better conductivity, and better sparking conditions for machining. Copper with 5% tellurium, added for better machining properties. Tungsten resist wear better than copper and brass .Brass ensures stable sparking conditions and is normally used for specialized applications such as drilling of small holes where the high electrode wear is acceptable (Metals Handbook, 1989). The factors that affect selection of electrode material include metal removal rate, wear resistance, desired surface finish, cost of electrode material manufacture and material and characteristics of work material to be machined.

III. EDM VARIANTS

In die sinking process the tool electrode is the replica of the machined profile of the work material shown in **fig 4.** Die sinking process solves the problem of manufacturing accurate and complex-shaped electrodes of three-dimensional cavities. According to the article "Advancing EDM through Fundamental Insight into the Process" by M. Kunieda Tokyo University of Agriculture and Technology, Japan), B. Lauwers (Katholieke Universities Leuven, Belgium), K.P. Rajukar (University of Nebraska-Lincoln, USA), B.M Schumacher (University of Applied Science St Gallen, Switzerland), the work piece can be formed either by replication of a shaped tool electrode or by 3-Dimensional movement of a simple electrode similar to milling or we can use the combination of both the methods.

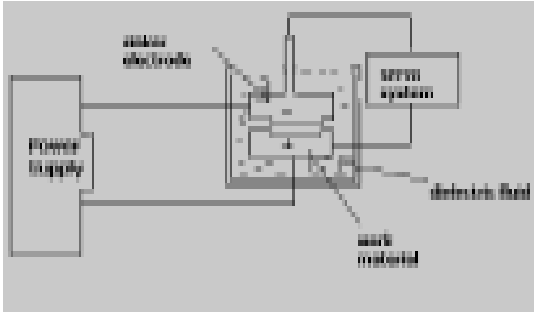

Fig. 4 Schematic diagram of Die-sinking EDM

A number of EDM variations based on this basic configuration have emerged in the industry to cope with the machining of smart materials or super alloys used exclusively in the manufacture of aeronautical and aerospace parts. Wire-cut EDM (WEDM) and Rotary Disk electrode electrical discharge machining process (RDE-EDM) are some of the most favourable variants owing to its ability to machine conductive, exotic and high strength and temperature resistive (HSTR) materials with the scope of generating intricate shapes and profiles **[33].**

A. Wire EDM process

WEDM was first introduced to the manufacturing industry in the late 1960s. In WEDM, material is eroded from the work material by a series of discrete sparks occurring between the work piece and the wire separated by a stream of dielectric fluid, which is continuously fed to the machining zone **[34].** The WEDM process makes use of electrical energy generating a channel of plasma between the cathode and anode **[35],** and turns it into thermal energy at a temperature in the range of 8000–12,000 ºC **[36]**. When the pulsating direct current power supply occurring between 20,000 and 30,000 Hz **[37]** is turned off, the plasma channel breaks down.This causes a sudden reduction in the temperature allowing the circulating dielectric fluid to implore the plasma channel and flush the molten particles from the pole surfaces in the form of microscopic debris.

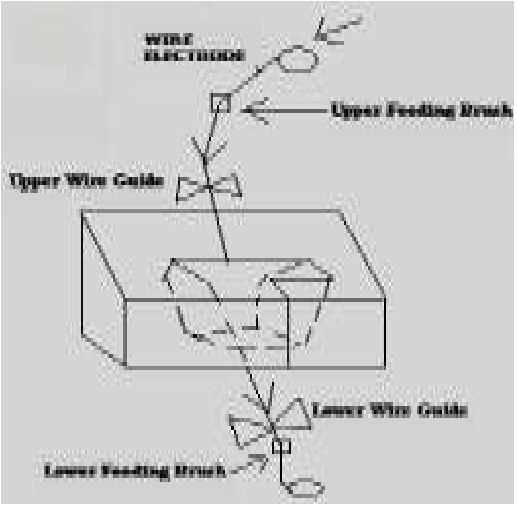

Fig. 5 Schematic diagram of Wire EDM process [2]

i. WEDM process monitoring and control of smart material

Lok et al. **[38]** presented the finding of processing two advanced materials Sialon and Al2O3-TiC by using WEDM. The author has taken MRR and surface finish as output parameters. The surface damage was evaluated by flexural strength data. The variability of flexural strength data was analyzed by weibull stastical method. The mean flexural strength drops from 32% to 67% due to thermal spalling erosion mechanism of wire-cut EDM process. Yan et al**. [39]** machined aluminium matrix composites (Al2O3p/6061 Al) using WEDM. The effect of pulse on time, cutting speed, width of slit, surface roughness was studied. The wire easily got broken while machining Al2O3p/6061 Al. It was observed that that the cutting speed, surface roughness and width of the slit significantly depend upon volume fraction of Al2O3 particles. Less volume percentage of reinforcement increases the surface finish, improves width of slit.Hascaly et al**. [40]** performed an experiment for finding out the machining characteristics of AISI D5 tool steel in WEDM. The author concluded that intensity of process energy affect the surface roughness as well as micro cracking. The wire speed and fluid pressure do not have much influence. Gokler et al**. [41]** experimented to optimized the cutting and offset parameter combination for WEDM process to achieve the desired surface roughness. The author has performed experiments on 1040 steel material of thickness 30, 60 and 80 mm and on 2379 and 2378 steel materials of thickness 30 and 60 mm. It was concluded that increase in the work piece thickness creates better surface roughness characteristic. Tarng et al**. [42]** used a neural network system to determine settings of pulse duration, pulse interval, peak current, open circuit voltage, servo reference voltage,electric capacitance, and table speed for the estimation of cutting speed and surface finish.

ii. Wire breakage in EDM

A wide variety of the control strategies preventing the wire from breaking are built on the knowledge of the characteristics of wire breakage .Saha et al**. [43]** developed a model that predicts the thermal distribution accurately, increase wire velocity and reduction in heat transfer coefficient. He has found that non uniform heating is the most important variable affecting the temperature stress. FE Model would help to prevent wire breakage. Tosun et al. **[44]** found that increasing pulse duration and open circuit voltage increase the wire wear rate.

Whereas the increasing wire speed and dielectric fluid pressure decreases the wire wear. Luo et al. **[45]**claimed that the wire material yielding and fracture contribute to the wire breakage, whilst an increase in temperature aggravates the failure process.

iii. Modelling of WEDM process

Tarng et al.**[42]** formulated a neural network model and simulated annealing algorithm in order to predict and optimize the surface roughness and cutting velocity of the WEDM process when machining of SUS-304 stainless steel materials. T.A. Spedding and Z.Q.Wang **[46]** attempted to model the cutting speed and surface roughness of WEDM process through the response-surface methodology and artificial neural networks (ANNs) and have found that the model accuracy of both the approaches were better. The same authors (T.A. Spedding and Z.G. Wang, 1997) attempted further to optimize the surface roughness, surface waviness and speed of the artificial neural networks that predicted values using a constrained optimization model. Lin et al. **[47]** proposed a control strategy based on fuzzy logic to improve the machining accuracy. Huang and Liao **[48]** presented the use of Grey relational and S/N ratio analyses, for determining the optimal parameters setting of WEDM process.The results showed that the MRR and surface roughness are easily influenced by the table feed rate and pulse on time.

IV. DIE SINKING EDM

A. Introduction

Die sinking electrical discharge machining (EDM) is one of the most widely used techniques for the fabrication of die and mold cavities which are finally used for mass production of metals and polymer products by replication such as die casting, injection molding, etc. In any replication process, it is expected that the quality mold will faithfully duplicate its shape and surface texture.Inaccurate duplications cause problems in assemblies,operations as well as lower the aesthetic view. In die sinking EDM the electrode produces exactly its opposite shape on the work material. For the case of complex shaped mold cavities, the machining effectiveness or performance of die sinking is not uniform all over the machining area.

The machining performance for the intricate areas such as sharp or pointed corner, flat or pointed areas of electrode, is obviously different because of different concentration of heat and current density.The performance of EDM is usually evaluated by the output parameters namely material removal rate (MRR),electrode wear rate (EWR), wear ratio (WR), machined surface roughness, etc.**[49-50]**. Ahsan etal discussed the performance of die sinking EDM due to the shape configuration of the electrode. The effect of electrode shape on material removal rate (MRR), electrode wear rate (EWR), wear ratio (WR), and average surface roughness (Ra) has been investigated for mild steel work material and copper electrode **[51]**.

Adapted from the article "Advancing EDM through Fundamental Insight into the Process" by M.Kunieda(Tokyo University of Agriculture and Technology, Japan), B.Lauwers (Katholieke Universiteit Leuven, Belgium), K.P.Rajukar (University of Nebraska-Lincoln, USA), B.M Schumacher (University of Applied Science St Gallen,Switzerland). The sinking electrical discharge machining is as shown in Figure 2.

The workpiece can be formed either by replication of a shaped tool electrode or by 3-Dimensional movement of a simple electrode similar to milling or we can use the combination of both the methods. Normally we use copper or graphite as the electrode material. The numerical control monitors the gap conditions and synchronously controls the different axes and the pulse generator. The dielectric liquid is filtrated to remove debris particles and decomposition products. Hydrocarbons dielectric is normally used since the surface roughness is better and tool electrode wear is lower compared to the de-ionized water.

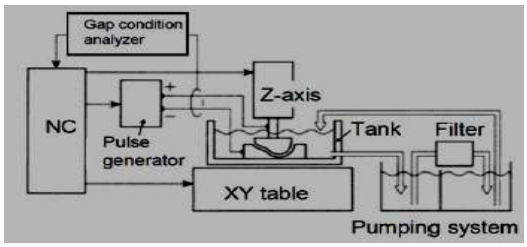

Fig. 6 Sinking Electrical Discharge Machining.

B. Researches in sinking EDM on metal matrix composites

i. SiC/aluminum matrix

Ramulu and Taya investigated machinability of 15 vol.% and 25 vol.% SiC whisker/2124 aluminum matrix (SiCw/Al) composites **[52]**. The material samples were cut at coarse, medium, and fine conditions using copper and brass tools. It was found that material removal rate increases with increase in power of electrode. MRR in 15 vol.% SiCw/2124 Al is >25 vol.% SiCw/2124 Al. Material removal rate obtained by using copper electrode is 5-10% less than that of obtained when using brass electrode. Machining time appears to be higher in 25 vol.% SiCw/Al than in 15% SiCw/Al composite. The micro-hardness tests on SiCw/Al composite have revealed that the machining causes surface softening at slower cutting speed. It was also found that higher cutting speed results in micro-damage in the surface and sub-surface area. However, in the study performance, measures were evaluated only for variation in average current. Effects of variation of other parameters have not been taken into account. Also, machinability of 25 vol.% SiCw/2124 Al was evaluated only for brass electrode, whereas the second sample material was evaluated for both brass and copper electrode. De Silva and Rankine studied the electro-erosion characteristic of SiC/Al and found that the Al matrix surrounding the reinforcing particles was melted **[53].** The SiC particles were then dislodged from the matrix and flushed away by the dielectric fluid **[54]**. Muller and Monaghan presented details and results of an investigation into the machinability of SiC particle reinforced aluminum matrix composites using different nonconventional machining processes such as electro discharge machining, laser cutting and abrasive water jet **[55]**.Objective of the research work was to investigate difference in surface quality, including surface roughness, surface topography, and sub-surface damage of machined workpiece. Furthermore, the effect of the reinforcement on the machining operation was investigated by performing comparative tests on non-reinforced aluminum alloy samples. The results obtained indicate that Al/SiC particle reinforced metal matrix composite (PRMMC) is machinable by using same non-conventional machining processes. The findings show that EDM process is suitable for machining PRMMCs, but the process is very slow. Machining results in a crater-like surface. The size of the craters increases with increased discharge energy. Also, relatively small amount of sub-surface damage is found on the cut surfaces after machining (depending on the chosen machining settings).The research work focuses mainly on influence of reinforcement on surface quality of machined material.Other performance measures have not been taken into account in much detail. Since different machining processes have different setup and different material removal mechanism therefore resulted in different surface integrities.

ii. Other Metal Matrix Composites

One recent work by Ahamed et al. has been found on hybrid-type MMC. Hybrid metal matrix composites are a class of materials, having two or more discrete particulate reinforcements. The objective of the research work was to investigate the effect of machining parameters namely current, pulse on-time, pulse off-time, and flushing pressure on the material removal rate and surface roughness while machining hybrid composites Al–5%SiC–5% B4C and Al–5%SiC–5% glass prepared by stir casting. The effect of inclusion of B4C and glass on machining of aluminum–SiC composite was investigated. Presence of ceramic particulate reinforcements impedes the machining. A trade-off has to be made between the levels of parameters for achieving the combined objective of maximizing material removal and minimizing surface roughness. A fairly long spark is required to remove material which has embedded in it hard particles such as B4C and SiC. Longer spark duration is essential to remove the SiC and glass particles which are, however, easily flushed away by the fluid at a fairly lower pressure of flushing. This is because of the lower density of glass when compared to B4C. The white layer, which is a characteristic of machined surfaces,is seen prominently on both materials.The research work is devoted to find the effect of machining parameters on material removal rate and surface roughness. Electrode wear has not been taken into account in this research work. There is a lot of scope for future research work in EDM of such kind of materials **[56].**

V. MATERIAL REMOVAL MECHANISM (MRM)

It is well established that MRM is the process of transformation of material elements between the work-piece and electrode. These elements diffuse from the electrode to the work-piece and vice versa, and are transported in solid, liquid or gaseous state, and then alloyed with the contacting surface by undergoing a solid, liquid or gaseous phase reaction **[57].**Phase of sparking of MRM (breakdown, discharge and erosion) is highly influenced by the types of eroded electrode and work-piece elements together with disintegrated products of dielectric fluid.

VI. TOOL WEAR

Tool wear process is similar to MRM as the tool and work-piece are considered as a set of electrodes in EDM Some useful applications exploiting both the advantages and disadvantages of electrode wear have been developed. Marafona etal introduced a wear inhibitor carbon layer on the electrode

surface by adjusting the settings of the process parameters prior to normal EDM conditions**[58]**. Although the thickness of the carbon inhibitor layer made a significant improvement on the TWR, it had little effect on the MRR. Similar tool wear compensation strategies have also been applied to micro-EDM, which is commonly executed in thin layers using simple cylindrical or tubular electrodes. It was introduced that a uniform tool wear machining method compensating the longitudinal tool wear by applying an overlapping to to-and-fro machining motion**[59]**. Bleys etal initially evaluated the reduction of tool length based on pulse analysis and subsequently compensated the toolwear by controlling the machining downward feeding movement in real-time**[60]**. Dauw and Snoeys derived the measurement of tool wear from the study of pulse characteristics based on discharge voltage fall time. The different methods of simulating the EDM process also provide a good opportunity of understanding and compensating the tool wear**[61]**. Dauw (1988) developed a geometrical simulation of EDM illustrating the development of tool wear and part geometry.The simulation algorithm is largely based on MRR, TWR and spark gap. However, the simulation of discharge location and spark gap, which are dependent on the distribution of debris concentration, was reported to yield a more realistic representation of the sparking phenomenon**[62]**.Other methods include a reverse simulation of EDM obtaining the shape of the electrode based on the desired work-piece shape**[63]**.

VII. CONCLUSION

EDM has emerged as the most cost effective and high precision machining process in past years. The machining capacity to remove hard and difficult to machine parts has made EDM as one of the most important machining processes. The review of the research trends in EDM on die sinking, wire EDM, and their applications with metal matrix composites have been presented. In each topic, the development of the methods for the last 50 years is discussed.EDM has been employed in the tool, die and mold making industries. It also plays a significant role in medical, optical, jewellery, automotive and aeronautic industry. Such applications require machining of HSTR materials, which demand strong research and development and prompt EDM machine tool manufacturers to improve the machining characteristics. Hence, even after 65 years a continuous research is required to explore effective means of improving the performance of the EDM process.

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Agriculture Credit in India: An Integrated Rural Credit Approach

N.T. Krishna Kishore

ORIENTAL BANK OF COMMERCE

Abstract- This paper is aimed at strengthening policy reforms in the area of agriculture credit delivery system for the sustainability of agriculture for food security and rural development. In India strengthening of agriculture is important for elimination of rural poverty, food insecurity, unemployment and sustainability of natural resources. But till today strengthening of agriculture was meant to be increasing productivity by introduction of high yielding seeds, application of chemical fertilizers and pesticides, mechanization and making availability of institutionalized credit for purchasing the preceding inputs, as result the Indian agriculture has become commercialized but not profitable to the producer. This commercialization has attracted more number of middle men making the marketing channels inefficient by delivering the produce at inflated prices to the consumer and negligible margin to the producer making him indebt. This is discouraging the farmer to move towards capital intensive commercialized agriculture practices which only can serve the future food requirements of the country. This has assumed added importance to integrate efficient marketing and rural credit systems. The time has come to redefine agriculture as the integrated activities relating to production, processing, marketing, distribution, utilization and delivered at each level individually. Agricultural credit development strategy till today was addressing institutionalization of credit at farmers' level in marketing, trade, processing and agribusiness. As a result of efforts in the agriculture credit delivery system, the share of private money lenders (non institutional credit) has decreased substantially from 93 percent in early 1950's to 31 per cent by 1991. But showing their presence as an important and most attracted source of credit by increasing there share to 39 percent by 2002. One main reason for this is they have been always integral part of rural supply chain for inputs and marketing channels. The All India Rural Credit Survey (1954) has quoted that agriculture credit in India fell short of the right quantity , was not of the right type, did not serve the right purpose and often failed to go to the right people, even today this spells right rural credit with infrastructural requirements for production (input) , processing, marketing , distribution, utilization , trade with value added service like technology transfer at single point to form the rural credit hubs or virtual integration by utilization of the information technology create new Indian sustainable agriculture for food security.

Index Terms- agriculture credit, rural credit, integrated credit.

I. Introduction

Indian agriculture has been always in need for credit and dependent on traditional credit with high interest rates. This norm of high interest rate for agriculture credit has caused serious exploitation resulting in rural indebtness causing serious concern over a century. This problem of providing cheap and institutionalized credit has called attention of the British government in early 1870s. The government has started providing credit in the form of Takkavi loans during the drought years. The first step for institutionalization has begun with the cooperative societies act in 1904. Based on the report of the Maclagan Committee on Cooperation in 1915 by the end of 1930 a 3-tier cooperative credit structure has been established in all provinces. Even The Royal Commission on Agriculture in 1926-27 emphasized on access to rural credit. The Reserve Bank of India Act, 1934 was passed leading to establishment of the Reserve Bank of India in 1935 like any other central banks it has specific provision for agricultural credit. As a first step towards rural institutionalized credit Reserve Bank of India has conducted different studies in 1936 and 1937 and found that major share of the credit required by the rural community was financed by the non institutional and share of institutional credit was negligible. Until 1950 the Reserve bank has taken several steps to strengthen the cooperative societies to provide institutionalized credit to the rural community, a new structure was evolved to provide two types of time bound credits namely short term and loan term credit. Despite of many measures till 1951 the institutional credit stood at 4.2 per cent of total agriculture credit, out of which 3.3 per cent contributed by cooperatives, and 0.9 per cent by commercial banks. The All India Rural Credit Survey (1954) has observed in its survey that agricultural credit fell short of the right quantity, was not of the right type, did not serve the right purpose and often failed to go to the right people. The nationalization of major commercial banks in 1969 (and in 1980) has encouraged the commercial banking system to involve in extending agricultural credit. To encourage the neglected sectors the concept of priority sector was introduced in 1969 which included agriculture. Even today the RBI is insisting for target of 40 percent net bank credit towards priority sector with a sub sector target for agriculture with 18 percent (out of which 13.5 per cent for direct agriculture and 4.5 per cent for indirect agriculture). To have better planning at the ground level the lead bank scheme was introduced under which each district is a unit and a commercial bank with highest number of branch coverage is appointed as District lead bank to monitor and report the performance in the targeted sectors like agriculture. The green revolution has called for high credit requirement for the purchase

of high yielding seeds, irrigation systems, fertilizers and chemical pesticides. Along with crop yields the cost of production has raised drastically calling huge credit requirement. This huge credit requirement was not met by the cooperatives or commercial banks for there own limitations.

II. TRANSFORMATION TO MULTI-AGENCY APPROACH

The green revolutions has commercialized the Indian agriculture were the farmers started to depend on the inputs purchased calling for huge credit requirement but the co-operatives lacked resources to meet the expected demand and commercial banks were not ready to lend to small and marginal farmers. This called for a separate banking structure combining the local feel of co-operatives and the professionalism and large resource base of commercial banks. Following the recommendations of the Narasimham Working Group (1975), Regional Rural Banks (RRBs) were set up. Thus, by the end of 1977, there emerged three separate institutions for providing rural credit transforming the Agriculture credit form Institutionalized approach to 'multi-agency approach'. Following the recommendations of the "Committee to Review Arrangements for Institutional Credit for Agriculture and Rural Development", the National Bank for Agriculture and Rural Development (NABARD) was set up in 1982 promotion of Agriculture credit. The 1991 reforms, the rural credit delivery system was again found to be in a poor shape (R.V. Gupta Committee, 1998). The Report of the Committee on the Financial The Report of the Committee on the Financial System (Chairman: Shri M. Narasimham, 1991) provided the blue print for carrying out overall financial sector reforms during the 1990s. Furthermore, weaknesses in the performance of rural financial institutions since 1991 resulted in setting up of various committees/working groups/task forces to look into their operations such as: "The High-level Committee on Agricultural Credit through Commercial Banks" (R. V. Gupta, 1998), "Task Force to Study the Functions of Cooperative Credit System and to Suggest Measures for its Strengthening" (Jagdish Capoor, 1999), "Expert Committee on Rural Credit" (V.S. Vyas, 2001), and "The Working Group to Suggest Amendments in the Regional Rural Banks Act, 1976" (M.V.S. Chalapathi Rao, 2002). These committees/working groups/task forces made far reaching recommendations having a bearing on agricultural credit. All the committees/ Task forces/ working groups have made recommendations in institutionalization and restructuring different institutions for effective rural credit delivery systems.

III. WHAT MAKES NON INSTITUTIONAL CREDIT SO ATTRACTIVE?

From the 1870 till today many committees working groups and task forces have made their efforts to provide institutionalized credit at lowest possible interest rates and structural development of source of credit. But the statistics show that the even after these many efforts the share of non institutional credit has decrease from 92.7 % in 1951 to 30.6 % during 1991 but questioning our efforts it has showed a importance of its presence in 2002 by having a significant share of 38.9 %. But its time to question what makes non institution agriculture credit so attractive to the farmer?, So, who are these traditional sources of credit they are none other than the input dealers, village traders, commission agents, and even some times the exports and processors who are always having forward or back ward integration with agriculture marketing channels. But only institutional credit or multi agency approach is not sufficient to withstand against the impressive geographical spread and functional reach of informal sources of credit. The demand for rural/agricultural credit with respect to interest rate is negative but inelastic. The elasticity is positively related to the level of interest rate. However, the demand for credit is highly elastic to input and output prices (Singh and Sagar, 2004). Only the cheap source of credit is not so significant as compared to timely and integrated credit. We have to focus to provide integrated credit than institutional credit because for farmer the agency or interest rates makes no difference the product features makes difference.

Table 1: Relative Share of Borrowing of Cultivator Households from Different Sources

(Per cent)

Sources Credit	1951	1961	1971	1981	1991	2002
1	2	3	4	5	6	7
Non-Institutional	**92.7**	**81.3**	**68.3**	**36.8**	**30.6**	**38.9**
of which						
Money Lenders	69.7	49.2	36.1	16.1	17.5	26.8
Institutional	**7.3**	**18.7**	**31.7**	**63.2**	**66.3**	**61.1**
of which						
Cooperatives Societies / Banks	3.3	2.6	22.0	29.8	23.6	30.2
Commercial Banks	0.9	0.6	2.4	28.8	35.2	26.3
Unspecified	–	–	–	–	**3.1**	–
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source : All India Debt and Investment Survey and NSSO.

There was were little development in agriculture credit products the cooperative banks have divided based on term to short term credit and long term credit. The introduction of Kissan Credit Card (KCC) during the budget of 1998 has played a significant role in delivering the variable credit requirements in a flexible, easy, and timely credit. The warehouse receipt act has made step advancement by making the farmer to avail institutional credit to stored produce. Chart 1 shows comparison of fulfillment of the farmer credit requirements at different levels. It is clear from the chart that the traditional money lenders are providing single point credit for all needs were as if the farmer has to fulfill different credit needs he has to approach the institutions separately for each credit requirement and has to spend lots of time in providing all the requirements to meet the formal procedure of the institutions due to his finance illiteracy.This is because there are different schemes for different requirements in financial institutions, but kissan credit card has tackled the problem up to some extent but there is large gap.

IV. INTEGRATED PROBLEM OF AGRICULTURE CREDIT, MARKETING AND PROFITABILITY

The commercialization of agriculture in India not only increased the productivity and food security but also attracted more and more middle men making the agriculture channels inefficient by delivering the produce at inflated prices to the consumer and negligible margins to the producers as part of their exploitation. The middle men are using the weakness of the producer in search of huge timely credit requirements with simple procedures due to financial illiteracy and are lending at high interest rates. During the harvest the produce is purchase at the farm gate by arranging transportation facility and after

deducting all the charges and interest the left over is given to the farmer. The services provided by the middle men are attracting the farmers as most of his burden search for different sources of credit is reduced, but in the process the middle men are exploiting the farmer by creating a situation of pressure for repayment during the harvest season leading to forced sale. In the process the time, place, and form utility is transferred to the middlemen and there by profits. The main reason is insufficient funds at farmer level. The credit is involved at all the levels that is from production, processing, storage, marketing, trading, but institution or non institutional credit is available or confined to farmers at Production and consumption requirements only but the middle men has access to cheaper credit at processing, storage, marketing and trading. It can be better understood that a trader has more convenient, easy flexible, cheaper credit for storage of same agriculture produce than a farmer who wishes to store the same produce under ware house receipt scheme. Some of the major reason found at ground level is that of the traders having more financial literacy than the farmer. The reason might be small but it is affecting the farmer's profitability and making him more prone to indebtness. Till today all the policy measures have been dealing the problem of institutional credit, inefficient marketing channels and profitability separately but this is an integrated problem discouraging the farmers to continue in agriculture and malnutrition on other side, leading to a large problem so called food security.

Chart 1: showing the comparison of credit fulfillment of non institutional credit to Institutional products

Farmer Credit Requirement	Traditional Money lender Cum Trader	Crop Loans	Term Loans	Kisan credit cards	Ware House Receipt	Integrated Continuous Credit
Credit Long term /developmental Investments	●	○	●	○	○	●
Credit Inputs for crop production	●	●	○	●	○	●
Credit for Allied Activities	●	○	●	●	○	●
Credit for Consumption Needs	●	○	○	●	○	●
Credit for Indeptness	●	○	○	●	○	●
Credit for Nonfarm Activities	●	○	○	●	○	●
Credit for Processing	●	○	○	●	○	●
Credit for Transportation	●	○	●	○	○	●
Credit for Marketing	●	○	○	○	○	●
Credit for Storage	●	○	○	○	●	●

V. INTEGRATED RURAL CREDIT APPROACH FOR FOOD SECURITY AND SUSTAINABILITY IN AGRICULTURE

Agriculture credit in India is integrated with marketing, storage, processing and trading. The reforms in agriculture credit have been confined to institutionalized credit. Similarly, in marketing only in regulate to create efficient and effective marketing channels. Different public sector organizations, cooperatives and other formal/informal bodies have been involved in the process. There have been many Public sector organizations which include Food Corporation of India (FCI); Cotton Corporation of India; Jute Corporation of India; Commodity Boards; APEDA; STC; MPEDA; Commission for Agricultural Costs and Prices; Directorate of Marketing and Inspection; Departments of Food and Civil Supplies; State Agricultural Marketing Boards; Central and State Warehousing Corporations; and Agricultural Produce Market Committees. The role and functions of each of these differ and include policy formulation, implementation, supervision, facilitation and direct entry in the market. In spit of such structural regulated markets the farmers are being exploited in all means. The integrated rural credit approach is focusing on providing credit for all the requirements of the farmer through an institutional credit to all his requirements at all the levels so that time, place, and form utilities are passed to the farmers depending on the produce. But this is not an easy task as operating these many credit limits by financially illiterate farmer. To overcome these problems new avenues in information technology have to be used for the purpose. The major principle in this approach is to provide all the credit requirements of the farmer as per the produce cultivated and level of his credit requirement depending on the extent he want to go for storage or processing or both this will change according to produce and farmers knowledge and Environment. Once these things get decided the farmer has flexible to use the credit requirement as per the environment he is operating from time to time. To smoothen the process the total financial transactions are done through single account.

VI. INFRASTRUCTURAL REQUIREMENTS

In this approach a credit hub is formed by integrating all the requirements of the farmer. The hub consists of consumables & input supplies, a regulated market with processing facility and ware house. Additional service provider like veterinary services and extension services are added advantage to the hub. All these are interlinked and integrated with tie ups with credit provider. The facilities vary form hub to hub depending on the crop produced in the area. But this requires huge credit investments for infrastructure development. This can be achieved by public private partnership. This constitutes to form physically integrated credit hubs. Information Technology also provided avenues to create virtually integrated credit hubs. These require low investments than the physically integrated credit hubs because in these hubs all the service providers are located at different locations and integrated through common software.

VII. OPERATION MODALITIES AT INTEGRATED CREDIT HUB

All the operational knowledge required for the farmer to operate the credit is simplified by providing all the credit required through single account. Once the customer avails the credit then his biometric identifiers are recorded and he operates all the credit transactions through this biometric identifiers. This is as simple as the thumb impression is used for all the transactions at each level. Once the farmer avails the integrated credit he will go to the service provider like input and consumer stores having tie ups and purchase all the daily needs and payment is made through the integrated credit account and the transaction is authenticated by the thumb impression of the

farmer. To prevent the exploitation tie ups to be made with many suppliers. The credit limit is fixed as per the scale of finance of the particular crop and an additional 30 percent of the total production is to be lent for consumption needs. On harvest the farmer uses the transportation facilitator having tie up with the hub and payment is made directly to the transporter from the same integrated credit account. The farmer has a choice to sell the produce if he feels the price is good in market at the credit hub but if he feels he would get good price in future he can go for storage at the ware house facility at hub. Where the ware house service provider will check for quality and stores the product and gives feed back to the credit service provider at the hub. The 80 percent value on the produce on the day of storage is credited to the integrated credit account. And farmer can meet his immediate credit requirements and prevent forced sale. Depending on the produce farmer has choice to go for processing at the processing provider at the hub. The owner ship of the produce lies at the farmer and only processing charges are paid to the processor directly from the credit provider with the authentication from the farmer.

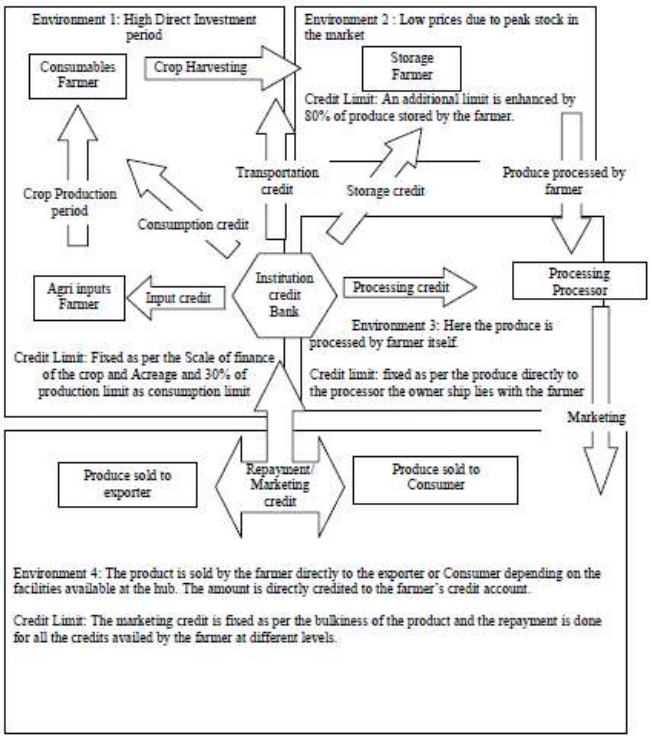

Fig. 1 shows the flow diagram of operations at intergraded credit hub.

To prevent monopoly the many number of service provider should be made available to make choice available at farmer. Once the farmer feels he would get a better price he can go for marketing in the whole sale market/ retail market at the credit hub and the same amount is credit in the integrated credit account. The interest is served to the credit service provider in regular intervals. The credit facility should be a continuous credit. The facilities, modalities change from hub to hub depending on the produce. A retail market is more advantages in perishable products like vegetable and fruits. A packing and forwarding agent is suitable at export oriented products like spices and condiments. The hub facilitates the farmer at each level by providing the knowledge required to the farmer. That is knowledge center is available to provide online prices of the produce in different markets. E-commerce facilities like online trading can also be created at the hub so that far away traders can also bid for better price discovery. The farmer should have choice to store, process and market depending on his environment. All the utilities like time, form and place may not be possible at all the hubs and for all the produces but step by step up gradation is possible. Because many private player like ITC are putting individual efforts to aggregate the produce but once credit hubs get established there is more scope to large private player to involve in infrastructure development along with government organizations. The Figure 1 shows a model how a integrate credit hub is operated.

VIII. CONCLUSION

In India strengthening of agriculture is important for elimination of rural poverty, food insecurity, unemployment and sustainability of natural resources. But till today strengthening of agriculture was meant to be increasing productivity by introduction of high yielding seeds, application of chemical fertilizers and pesticides, mechanization and making availability of institutionalized credit for purchasing the preceding inputs, as result the Indian agriculture has become commercialized but not profitable to the producer. This commercialization has attracted more number of middle men making the marketing channels inefficient by delivering the produce at inflated prices to the consumer and negligible margin to the producer making him indebt. This is discouraging the farmer to move towards capital intensive commercialized agriculture practices which only can serve the future food requirements of the country. This has assumed added importance to integrate efficient marketing and rural credit systems. The time has come to redefine agriculture as the integrated activities relating to production, processing, marketing, distribution, utilization and delivered at each level individually. Agricultural credit development strategy till today was addressing institutionalization of credit at farmers' level in marketing, trade, processing and agribusiness. As a result of efforts in the agriculture credit delivery system, the share of private money lenders (non institutional credit) has decreased substantially from 93 percent in early 1950's to 31 per cent by 1991. But showing their presence as an important and most attracted source of credit by increasing there share to 39 percent by 2002. One main reason for this is they have been always integral part of rural supply chain for inputs and marketing channels. The All India Rural Credit Survey (1954) has quoted that agriculture credit in India fell short of the right quantity , was not of the right type, did not sever the right purpose and often failed to go to the right people, even today this spells right rural credit with infrastructural requirements for production (input) , processing, marketing , distribution, utilization , trade with value added service like technology transfer at single point to form the rural credit hubs or virtual integration by utilization of the information technology create new Indian sustainable agriculture for food security.

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Effect of Load and Sliding Speed on Wear and Friction of Aluminum– Silicon Casting Alloy

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Abstract- The effect of load and speed on sliding friction coefficient and performance tribology of aluminum–silicon casting alloy was evaluated using a pin-on-disc with three different loads (10, 20, and 30 N) at three speeds (200, 300, and 400 r/min) and relative humidity of 70%. Factors and conditions that had significant effect were identified. Experiments showed that the load and the speed affect the coefficient of friction and wear rate of the alloy. The results showed that the wear rate increased with increasing load and decreased with increasing sliding distance, whereas the friction coefficient decreased with increasing sliding speed before a stable state was reached. The friction coefficient also decreased with increasing load.

Index Terms- friction coefficient, dry sliding, speed, load

I. Introduction

Tribology is the science of friction, lubrication, and wear and deals with a diverse array of man-made and natural systems of interacting bodies in relative motions [1]; it literally means the "science of rubbing." Wear is the most recent important implication of this science, as it is the latest among the three pillars, and has carefully been considered at the present time. Its importance could be significant, and it can be defined as the result of full interaction between surfaces in relative motion [2].

In general, several factors affect the wear equations, such as operational parameters, topography of the surface contact, geometry, speed, load, and coefficient of sliding friction. In addition, material and environmental parameters, various material hardness, temperature, elasticity, breakage, as well as thermal properties, also affect wear. Further, the type and amount oflubrication and surface cleanliness also affect wear, which can cause stoppage in operation [3]. The ideal term would be for the moving solids to reduce the coefficient of friction and the shear stresses at the interface when contact between surfaces is initiated [4]. The coefficient of friction effect can be readily known but is difficult to understand, although it has been used for a long time in engineering and scientific applications, because it is dependent on the type of grain, bulk density, and roughness of the wall surface [5]. The degree of wear is the result of several common factors applied in certain cases, particularly the relationship among the rate of corrosion and load, speed, coefficient of friction, and adhesion, as well as hardness and tensile strength. The factors that affect wear have been grouped under the following headings [6, 7]. The load greatly affects the rate of wear, which is dependent on the direction of load application, either up or down [8].

Chowdhury et al. [9] researched the effect of normal load and sliding speed of friction and wear on the property of an aluminum disk against stainless steel pin. Results showed that the value of the coefficient of friction increased with increasing sliding speed in normal for aluminum. The wear rate was also found to increase with the increase in sliding speed and normal load. Ramachandra et al. [10] found that wear increased with increase in normal load and sliding velocity. Hardness increases with continuous or intermittent increase in SiC particles and is related to friction and adhesion. Thus, the wear rate for each metal is affected by heavy load conditions and is not associated with resistance to corrosion under less severe conditions. In sliding wear, the increased load and a long and unwritten sliding distance clearly affects the rate of wear. The parameters that affect wear are loads, speed, temperature, contact type, type of environment, and so on. Kumar et al. [11] researched the wear behavior of zinc–aluminum (ZA-27). The wear increased with increase of reinforcement in load and sliding speed. The wear resistant increased with increase in garnet content, considered one of the factors affecting the oxide layer. In some cases, it also affects the loading from the highest to the lowest, or vice versa. In addition, continuity or intermittence has a direct effect on the wear in the metal and is linked to the speed and other factors, such as lubrication, and the degree of heat generated by friction and environmental conditions surrounding the process. In a few cases, the effect of speed on the rate of wear is due to the circumstances mentioned and their connection to the velocity of these factors [12]. Wear is the loss of material and is expressed in terms of volume. Fig. 1 shows some of the common wear mechanisms, such as abrasion, adhesion, and erosion, as well as surface fatigue.

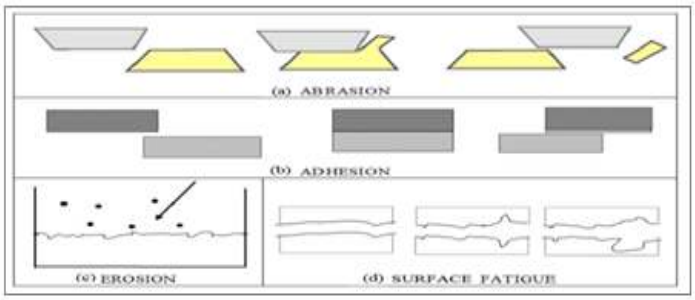

Fig. 1 Different types of wear mechanisms: (a) Abrasion, (b) Adhesion, (c) Erosion, (d) Surface fatigue

II. MATERIALS AND EXPERIMENT

Observation of surface roughness of aluminum–silicon alloy (A390) on the friction and wear of samples was made using the pin-on-disc type friction and wear tool, designed according to ASTM specifications. The tool consists of the engine and a fixed pin. Micrographs showing before and after wear surface in Fig.2.

In addition, density, hardness, and tensile strength were studied due to their wide application in industry, particularly in pistons and cylinders. Result of the chemical analysis is given in Table 1, and testing of mechanical properties are presented in Table 2. The surface pattern was unidirectional.

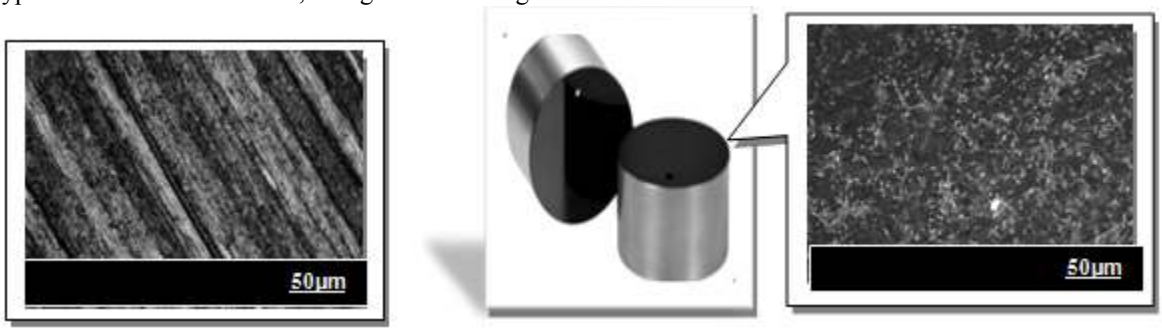

Fig. 2 Micrographs showing before and after wear surface load 10N& 400 rpm

Table 1: Compositional analysis of Al-Si casting alloy.

Si	Mg	Cu	Fe	Ni	Mn	Sn	Pb	Zn
16.69	1.176	1.304	1.130	1.224	0.024	0.012	0.026	0.012

Table 2: Investigated hardness, density and tensile strength of Al-Si casting alloy.

Hardness	112.65 VHN
Density	2.72 gm/cc
Tensile strength	250 MPa

To examine the microscopic structure and to know the composition of microscopic samples as shown in Fig. 3, we have used the following materials manifesting:

- 190 ml of water distil
- 3 ml from hydrochloric
- 2 ml from hydrofluoric acid

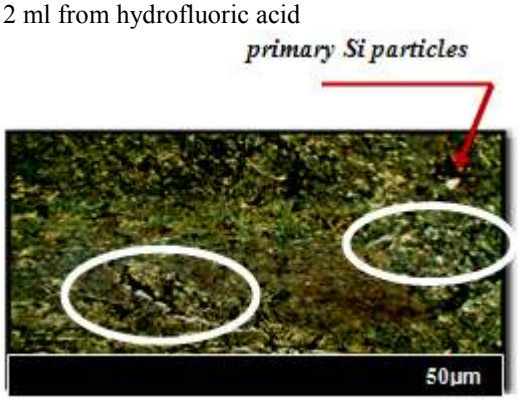

Fig. 3 Shows the process of preparing for installation of micro-alloy.

A. Wear Testing

A pin-on-disk tribological test rig was used for the investigation, as shown in Fig. 4. The upper specimen was a 10 mm-diameter Al–16Si casting alloy (Ra = 2 ± 0.05 µm; Hv= 112.65±12 kg/mm^2), and the disk was made of AISI 1045 steel (Ra = 0.15±0.05 µm; Hv= 312±20 kg/mm^2. The applied loads were 10, 20, and 30 N, and the sliding speeds were 200, 300, and 400 r/min. The wear tests were run for 360 min. Before wear testing, the aluminum silicon disk sample was cleaned and dried using cotton and acetone, and the weight of the samples was measured using a digital balance. The values before and after the test were recorded, and the sliding distance was calculated. Wear rate was estimated by measuring the mass loss (ΔW) after each test. Cares have been given after each test to avoid entrapment of wear debris. It is calculated that ΔW to sliding distance *(S.D)* using:

$$W.R = \Delta W / S.D \quad (1)$$

The volumetric wear rate (Wv) of the composite is related to density (ρ) and the abrading time (t), using:

$$Wv = \Delta W / \rho t \quad (2)$$

The friction force was measured for each pass and then averaged over the total number of passes for each wear test. The average value of friction coefficient, (μ) of composite was calculated from

$$\mu = Ff / Fn \quad (3)$$

where Ff is the average friction force and Fn is the applied load with an assumption that the temperature is constant at 31 ^{O}C.

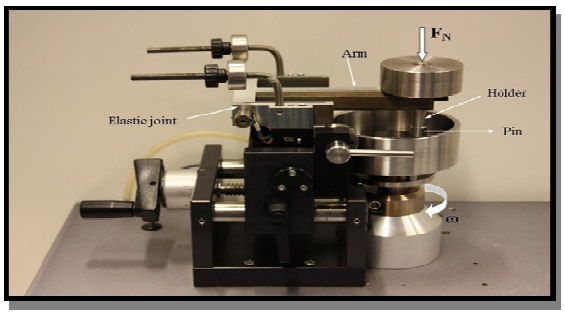

Fig.4. Pin-on-Disc wear testing machine

III. RESULT AND DISCUSSION

Fig. 5 shows the variation in wear rate with the variation of the normal load and the duration of rubbing at different sliding speeds for the aluminum–silicon casting alloy. The curve shows the result for speeds of 200, 300, and 400 r/min. All curves show similar trends. Other parameters, such as normal load (10, 20, and 30 N), surface roughness (2 µm), and relative humidity (70%) are identical for these three curves. The sliding movement occurs in very small areas at the peaks and over time. The ruptures or breaks at the peaks increase the contact area and results in rise in temperature. The increase in the load causes rise in friction. These findings are in agreement with the findings of Chowdhury and Khalil [13] for aluminum, in general for surface comprising (i) moisture, (ii) oxide of metals, and so on. Aluminum–silicon casting alloy readily oxidizes in air in the initial duration of rubbing. An increase in the load leads to increased wear and loss of the metal. The initial rubbing duration breaks the surface layers, which cleans and smoothens the surfaces and increases the strength of the connections and contact between the surfaces. The friction force due to the tillage effect between the surfaces increases the temperature between them. This effect results in adhesion and increases the deformation at the surface layers, leading to further loss of the metal. This result is consistent with the results obtained by Miroslav and Slobodan [14].

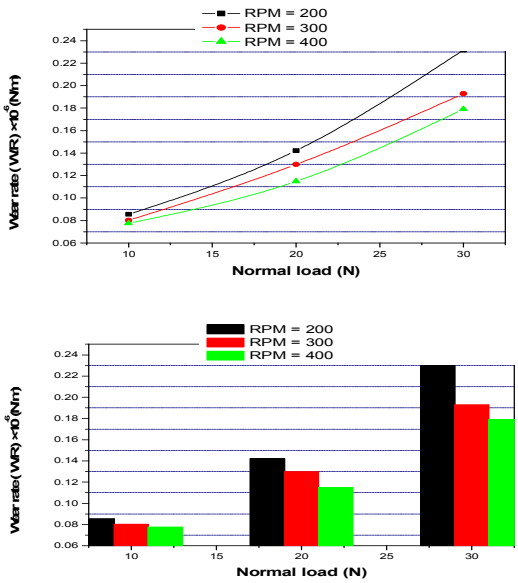

Fig. 5 Variation of wear rate with the variation of normal load (Relative humidity =70%, Sliding Speed =200,300,400 rpm).

The curve in Fig. 6 shows that the low coefficient of friction results from increasing load and sliding speed due to the change in shear rate. This event affects the mechanical properties of materials and in turn increases the destruction and wear of the surfaces, reduces the contact area, and breaks the oxide layer, thereby causing adhesion. The wear from one stage to another depends on the test conditions, and the slide speed leads to the formation of membrane protector that reduces the contact between the surfaces, consistent with the findings of Alias and Hague [15].

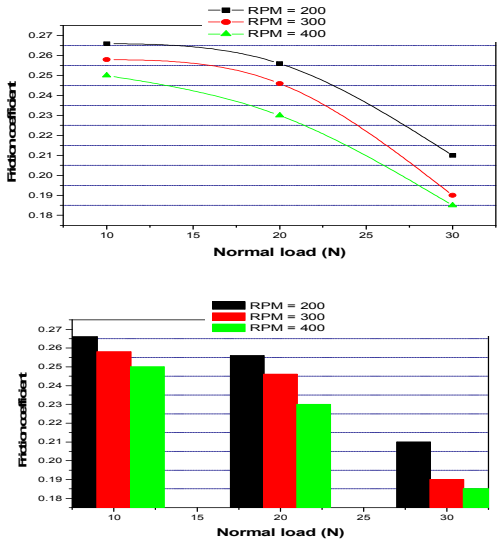

Fig. 6 Variation of friction coefficient with the variation of normal load (Relative humidity =70%, Sliding Speed = 200,300,400 rpm).

Fig. 7 shows the increase in volumetric wear with the increase in normal load within the observed range. Increased surface roughness and a large quantity of wear debris are believed to be responsible for the decrease in friction with the increase in normal load. Several experiments were conducted to investigate the effect of normal load and sliding speed on the wear rate of the aluminum–silicon casting alloy.

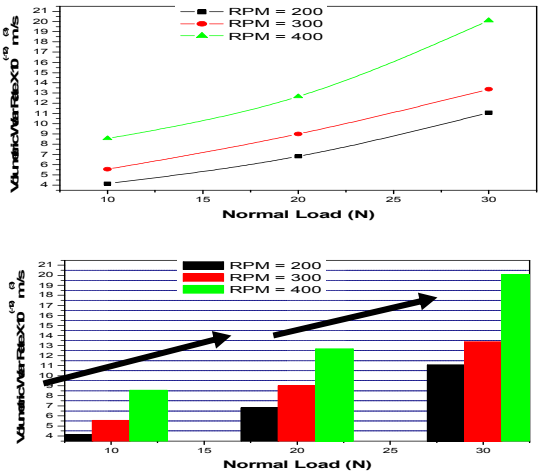

Fig. 7 Variation of wear rate with the variation of normal load (Relative humidity =70%, Sliding Speed =200,300,400 rpm).

The wear adhesion mechanism draws the high precision of tribology behavior in addition to many influencing factors An increase in load was noted to lead to increased wear and loss of the metal. The rubbing duration results in the initial surface layers to become clean and increases the strength of connections, the friction force due to the tillage effect between the surfaces, the temperature, the adhesion, and the surface layer deformation, which lead to increase in the loss of metal. Therefore, the findings confirm that the increase in wear rate is due to heavy load and sliding speed. In addition, sliding over long distances causes hardening of the surface layer composition of the waste debris and reduces wear. The increase in volumetric wear and wear rate, as well as the roughness surface, is due to the increasing load throughout the tests. These findings are in agreement with the findings of Singla and Singh [16] that shows that plastic flow along the sliding surfaces increases the real area of contact, causing an increase in space connections and increased friction force. The increase in surface temperature leads to gradual flattening of the protrusions, resulting in steady state and higher slide speed at high temperature, which reduce the shear force, reduce the coefficient of friction, and attain low roughness. As the normal load increases, frictional heat is generated at the contact surface, hence the decrease in the strength of materials.

IV. CONCLUSION

The load and the sliding speed affect the amount of friction force. The wear rate significantly increases when the load increases. On the other hand, small coefficient of friction values, together with increase in sliding speed, loading, and sliding over long distances, reduce wear rate. Thus, maintaining appropriate sliding speed and normal load levels can reduce frictional force and wear and improve the mechanical processes.

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Visual Cryptography Using Two Factor Biometric System for Trust worthy Authentication

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Abstract- Authenticity of the user is the major issue in today's internet applications such as online transaction. Password has been the most used authentication mechanism which is subjected to online attacks. Due to unavoidable hacking on the internet, it is difficult to trust the User Identity on the internet. To solve this problem this paper proposes a BIOMETRIC based Visual Cryptography scheme to address the authentication issues. This methodology proposes the finger print image which is obtained from the user is Steganographed with PIN NUMBER of the user and the Steganographed image which in turn is divided into two shares. One share is stored in the bank database and the other share is provided to the customer. Hash code is generated for the customer share and it is stored in the bank database. One Time Password(OTP) is used every time to ensure the trusted submission of shares. The system not only ensures the secured transaction of process but also verifies the true identity of the person through one time password. The customer has to present the share during all of his/her transactions after entering the OTP. When the customer presents his share the hash code is generated and compared with the database value. If it matches, the shares are stacked to get the original Steganographed image. Again, the Desteganography process is carried on to obtain the original finger print image and the PIN NUMBER. The user is allowed to proceed further only after this authentication. This process ensures proper security scheme.

Index Terms- Visual Cryptography, authentication issues, finger print image, steganographed image

I. Introduction

Trusting User Identity on the internet is quite difficult due to hacking of User identity on the internet. So it is nearly impossible to be sure whether a user connected to the internet is authenticated or not. In Online transaction there is a possibility of encountering forged Identity for transaction. In the Online transaction system, the password of the customer may be hacked and misused. This paper proposes a technique to improve security during transaction. An idea based on Steganography and Visual Cryptography is used. Visual Cryptography introduced by Naor and Shamir [1] is a method used for encrypting a secret image into shares, such that stacking the shares reveals the secret image. The main advantage of Visual Cryptography is the decryption of the message which does not involve more process. The decryption time is very less when Visual Cryptography technique is used. Visual Cryptography is used to check a person for his/her authentication.

Visual Cryptography provides a very powerful technique by which one secret can be distributed in two or more shares. When the shares on transparencies are superimposed exactly together the original secret can be discovered without computer participation.

BIOMETRICS is the science of establishing the identity of an individual based on physical or behavioral traits such as face, fingerprints, iris, gait, and voice. A biometric authentication system operates by acquiring raw biometric data from a subject (e.g., thumb impression), extracting a feature set from the data, and comparing the feature set against the templates stored in a database in order to identify the subject or to verify a claimed identity.

Steganography is the art and science of writing hidden messages in such a way that no one, apart from the sender and intended recipient, suspects the existence of the message, a form of security through obscurity. Steganography can be applied to different types of media including text, audio, image, video, etc. However, text steganography is considered to be the most difficult kind of steganography due to the lack of redundancy in text as compared to image or audio

One Time Password uses information sent in an SMS to the user as part of the login process. One scenario is where a user either registers (or updates) their contact information on a website. During this time the user is also asked to enter his or her regularly used telephone numbers (home, mobile, work, etc). The next time the user logs in to the website, they must enter their username and password; if they enter the correct information, the user then chooses the phone number at which they can be contacted immediately from their previously registered phone numbers. The user will be instantly called or receive an SMS text message with a unique, temporary PIN code. The user then enters this code into the website to prove their identity, and if the PIN code entered is correct, the user will be granted access to their account

A hash function is any well-defined procedure or mathematical function that converts a large, possibly variable-sized amount of data into a small datum, usually a single integer that may serve as an index to an array. The values returned by a hash function are called hash values, hash codes, hash sums, or simply hashes.

In cryptography, SHA-1 (Secure Hashing Algorithm) is a widely used cryptographic hash function with a 160-bit hash value. As an Internet standard (RFC 3174), In theory no two messages would ever share the same message digest. What this

means is that the message digest can serve as a fingerprint for a file or other source of data. SHA-1 is used by Digital Signature Standard (DSS), which is a standard used for digitally signing documents or other data.

II. RELATED WORK

This section provides a brief description of Visual Cryptography and its applications. Although introduced and studied in the late 1970's and early 1979's Visual Cryptography have become increasingly popular in the last several years. Visual Cryptography schemes were independently introduced by Shamir[2] and Blakely[3].

In Visual Cryptography each pixel appears in n modified shares. The shares are a collection of m black and white sub pixels arranged closely together. This is described as an n x m Boolean matrix. When the shares are superimposed and the sub pixels are correctly aligned the original image is obtained. Since the individual shares gives no idea of whether a specific pixel is black or white it become impossible to decrypt the shares, no matter how much computational power is available.

Visual Cryptography scheme (VCS) proposed by Feng Liu and ChuanKunWu [4] can be applied to avoid largest pixel expansion. This paper gives details about the (2; n) VCSXOR can achieve smaller pixel expansion and larger contrast than that of (2; n) VCSOR.

Visual Cryptography scheme introduced by Naor and Shamir, explains about secret sharing. Secret sharing is an algorithm in cryptography where a secret is divided into n parts, giving each participants a unique part, where some of the parts or all of them are needed to reconstruct the secret.

A segment based Visual cryptography proposed by Jithesh, Dr. A. V. Senthil Kumar [5] used blend steaganography and visual cryptography. Steganography and Visual Cryptography are two sides of a coin. Visual cryptography has the problem of revealing the existence of the hidden data where as Steganography hides the existence of hidden data

Visual Cryptography scheme proposed by W-QYan et al., [6] can be applied only for printed text or image. The shares of Visual Cryptography are printed on transparencies which need to be superimposed. A Visual Cryptography method proposed by T.Monoth et al.,[7] uses random basis column pixel expansion technique. The encoded shares are further encoded into number of sub shares recursively which is computationally complex. Similarly a technique proposed by H.J.Kim et al., [8] explains an algorithm for secret sharing scheme that allows a group of participants to share a secret among them. In this paper we propose a Visual Cryptography scheme based on BIOMETRIC image. Shares are created for the steganographed thumb image generated using the pin number.(2,2) Visual Cryptography is used to create the shares. One share is in the server database and the other is with the user. When shares are superimposed , original steganographed thumb image is recovered which is further desteganographed to split the the thumb image and PIN Number which authenticates the user.

III. ARCHITECTURE AND MODELLING

Visual cryptography is a cryptographic technique Which allows visual information (pictures, text, etc.) to be encrypted in such a way that the decryption can be performed by humans (without computers).

It involves breaking up the image into n shares so that only someone with all n shares could decrypt the image by overlaying each of the shares over each other. In this technique n-1 shares reveals no information about the original image. We can achieve this by using one of following access structure schemes [8].

1:(2, 2) – Threshold VCS: This is a simplest threshold scheme that takes a secret image and encrypts it into two different shares that reveal the secret image when they are overlaid. No additional information is required to create this kind of access structure.

2 :(2, n) – Threshold VCS: This scheme encrypts the secret image into n shares such that when any two (or more) of the shares are overlaid the secret image is revealed.

3 :(n, n) – Threshold VCS: This scheme encrypts the secret image into n shares such that only when all n of the shares are combined the secret image will be revealed.

4:(k, n) – Threshold VCS: This scheme encrypts the secret image into n shares such that when any group of at least k shares are overlaid the secret image will be revealed.

Basic visual cryptography is based on breaking of pixels into some sub pixels or we can say expansion of pixels. There are two approaches for (2, 2) –Threshold VCS. In this first approach shows that each pixel is broken into two sub pixels. Let B shows black pixel and T shows Transparent (White) pixel. Each share will be taken into different transparencies. When we place both transparencies on top of each other we get following combinations, for black pixel BT+TB=BB or TB+BT=BB and for white pixel BT+BT=TT or TB+TB=TT. Similarly second approach is given where each pixel is broken into four sub pixels. We can achieve 4C2 =6 different cases for this approach.[8].

The model for creating shares[9] is explained here.

Let P = {1,..., n} be a set of elements called *participants,* and let 2^P denote the set of all subsets of P. Let $\Gamma_{Qual} \subset 2^P$ and $\Gamma_{Forb} \subset 2^P$, where $\Gamma_{Qual} \cap \Gamma_{Forb} = \emptyset$. The members of Γ_{Qual} are *qualified sets* and members of Γ_{Forb} are *forbidden sets*. The pair (Γ_{Qual}, Γ_{Forb}) is called the *access structure* of the scheme.

Let Γ_0 consists of all the minimal qualified sets:

$\Gamma_0 = \{A \in \Gamma_{Qual} : A' \notin \Gamma_{Qual}$ for all $A' \subset A\}$.

A participant $P \in P$ is an essential participant if there exists a set $X \subset P$ such that $X \cup \{P\} \in \Gamma_{Qual}$ but $X \notin \Gamma_{Qual}$. If a participant P is not essential then we can construct a visual cryptography scheme giving him a share completely white or even nothing as his share. In fact, a non-essential participant does not need to participate actively in the reconstruction of the image since the information he has is not needed by any set in P in order to recover the shared image. In any VCS having non-essential participants, these participants do not require any information in their shares. We assume all participants as essential.

In the case where Γ_{Qual} is monotone increasing, Γ_{Forb} is monotone decreasing, and $\Gamma_{Qual} \cup \Gamma_{Forb} = 2^P$, the access structure is said to be strong, and Γ_0 is termed a basis. In a strong access structure,

$\Gamma_{Qual} = \{C \subset P : B \subset C$ for some $B \in \Gamma_0\}$,

and we say that $\overline{\Gamma}_{Qual}$ is the closure of Γ_0 .

We assume that the message consists of black and white pixels. Each pixel appears in n versions called shares, one for each transparency. Each share is a collection of m black and white subpixels. The resulting structure can be described by an n x m Boolean matrix $S=[s_{ij}]$ where $s_{ij}=1$ iff the j th subpixel in the ith transparency is black. Therefore the grey level of the combined share, obtained by stacking the transparencies $i_1, ..., i_s$, is proportional to the Hamming weight w(V) of the m-vector $V=XOR(r_{i1,...,}r_{is})$ where r_{i1} , ..., r_{is} are the rows of S associated with the transparencies we stack. This grey level is interpreted by the visual system of the users as black or as white in according with some rule of contrast.

Definition: Let $(\Gamma_{Qual}, \Gamma_{Forb})$ be an access structure on a set of n participants. Two collections (multisets) of nxm boolean matrices b_0 and b_1 constitute a visual cryptography scheme $(\Gamma_{Qual}, \Gamma_{Forb}, m)$-VCS if there exist the value α(m) and the set $\{(X, t_X)\} x \epsilon \Gamma_{Qual}$ satisfying:

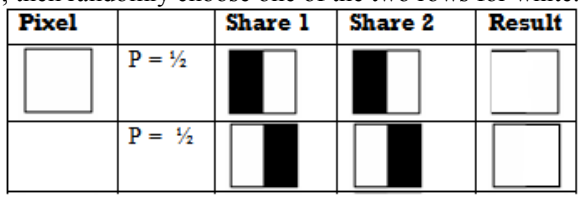
1. Any (qualified) set X= {i1, i2, ..., ip} $X \epsilon \Gamma_{Qual}$ can recover the shared image by stacking their transparencies. Formally, for any $M \epsilon b_0$, the "or" V of rows i1, i2, ..., ip satisfies $w(V) \leq t_x - \alpha(m).m$; whereas, for any $M \epsilon b_1$ it results that $w(V) \geq t_x$.
2. Any (forbidden) set $X= \{i_1, i_2, ..., i_p\} \epsilon \Gamma_{Forb}$ has no information on the shared image. Formally, the two collections of p x m matrices Dt , with t ϵ {0, 1}, obtained by restricting each n x m matrix in b_t to rows i_1 , i_2 , ..., i_p are indistinguishable in the sense that they contain the same matrices with the same frequencies.

Each pixel of the original image will be encoded into n pixels, each of which consists of m subpixels. To share a white (black, resp.) pixel, we randomly choose one of the matrices in b_0 (b_1 , resp.), and distribute row i to participant i. The chosen matrix defines the m subpixels in each of the n transparencies. Notice that in the previous definition $b_0(b_1)$ is a multiset of n x m Boolean matrices, therefore we allow a matrix to appear more than once in b_0 (b_1). Finally, observe that the sizes of the collections b_0 and b_1 do not need to be the same.

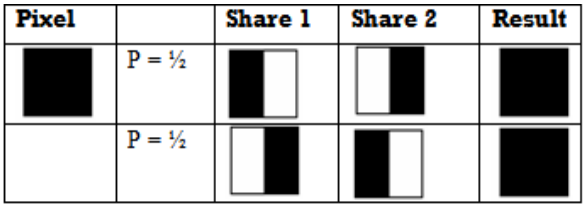
The first property is related to the contrast of the image. It states that when a qualified set of users stack their transparencies they can correctly recover the shared image. The value α(m) is called relative difference, the number α(m) .m is referred to as the contrast of the image, the set $\{(X, t_X)\}_{X \epsilon \Gamma Qual}$ is called the set of thresholds, and t_X is the threshold associated with $X \epsilon \Gamma_{Qual}$. We want the contrast to be as large as possible and at least one, that is, α(m)≥1/m. The second property is called security, since it implies that, even by inspecting all their shares, a forbidden set of participants cannot gain any information useful in deciding whether the shared pixel was white or black.

2 out of 2 Scheme : (2 sub pixels)

In Black and white image each pixel is divided into two sub-pixels. Randomly pixels are chosen between black and white. If white, then randomly choose one of the two rows for white.



If black, then randomly choose between one of the two rows for black.



IV. OUR WORK

Overview of this paper consists of five processes.

1. Obtaining the Thumb Image
2. Steganographing the PIN number
3. Share creation process.
4. Hash code generation
5. Authentication process.

A. Obtaining the Thumb Image

During the creation of new account a user need to provide all his/her details. In addition to this we obtain the thumb image of the user which is the unique identification each user that has been stored in the database. The obtained thumb image is used for the further process.

Fig. 1Thumb Image

B. Steganographing the Pin Number

Steganography is art of hiding information inside information. In our process the pin number of the user is hidden into the user thumb image which avoids the weak links of the bio-metric system.

Fig. 2 Steganographed Thumb image

C. Share Creation Process

Overview of share creation process is shown in Figure 4.3.User registers to the server by providing their details such as Name, Date of birth, Occupation Address and Thumb image which will be stored in the server database. The secret pin number of the user is Steganographed with the thumb image. The generated Steganographed thumb image is divided into two shares. One share is stored in the server database and for the other share Hash code is generated and stored in the database. After that the share is given to the customer.

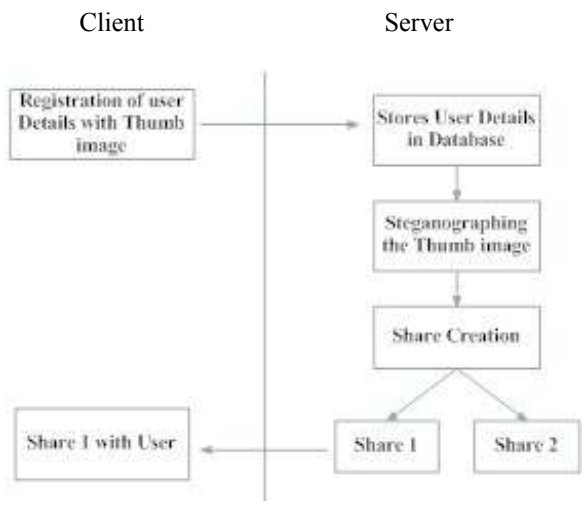
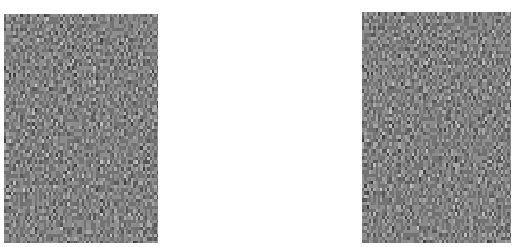


Fig. 3 Share Creation

i. Creation of Shares

The basic assumption here is that the thumb image is a collection of black and white pixels and each pixel is handled separately. Each original pixel appears in *n* modified versions, one for each share. Each share is a collection of *m* black and white sub-pixels that are printed in close proximity to each other so that the human visual system averages their individual black/white contributions. The resulting structure can be described by an *nxm* Boolean matrix S = [sij] where sij =1 iff the j th sub-pixel in the i th share is black. Sij=0 iff the j th subpixel in the i th share is white. Figure 4.3 shows the shares of a image.



(a) Share1 (b) Share2

Fig. 4 Two shares obtained for a image in 2 out of 2 Scheme.

The algorithm for creation of shares is the BIOMETRIC image is converted to its Boolean matrix values. This matrix shows the black pixel and white pixel of the BIOMETRIC image. Initialize the S_0 matrix value and S_1 matrix values in which S_0 shows white pixel and S_1 shows black pixel.

$$S_0 = \begin{pmatrix} 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 \end{pmatrix}$$

$$S_1 = \begin{pmatrix} 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{pmatrix}$$

If the image value is white then, put the values of first row of S_0 to share1 and second row of S_0 to share2.Similarly continue for all pixels of the BIOMETRIC image. So each pixel is represented using four subpixels which represent two shares. Thus the (2, 2) shares are generated

D. Hash Code Generation

Hashing is a process which includes the conversion of the Crypto graphed image into the hash code bytes. This conversion is done by using SHA-1 algorithm. Where SHA stands for Secure Hashing Algorithm. SHA-1 is a widely used cryptographic hash function with a 160-bit hash value. As an Internet standard (RFC 3174). SHA-1 uses output size and internal state size of 160bits. The block size is of 512 bits. The maximum message size for for an SHA-1 algorithm is 2^64-1 bits. Word size is of 32 bits and 80 rounds. The operations are add, and, OR , XOR.

E. Authentication Process

When the customer types the One Time Password and enters into the system to presents his/her share for Online Bank Transaction, Hash code is generated for that share and compared with the hash code in the database. If it matches then further process carried out by reconstructing the shares to obtain the original steganographed image and desteganography process is carried on to reveal the original pin number and thumb image. It verifies the authentication of the true person.

i. One Time Password (OTP)

An One Time Password is generated to ensure the true identity of the person before the user gives the the share. When user login to the system for a transaction an One Time Password is sent to his/her mobile when the user enters the OTP he/she allowed for the further process else the process truncated.

ii. Stacking

The original image is reconstructed by stacking the transparencies[1]. When transparencies i1 , i2,…., ir are stacked together in a way which properly aligns the sub-pixels, one can see a combined share whose black sub-pixels are represented by the Boolean X*OR* of rows i1, i2 , …., ir in *S*.

- The grey level of the combined share is interpreted by the visual system:
  1. as black if $H(V) \geq d$
  2. as white if $H(V) < d - \alpha m$
- $1 \leq d \leq m$ is some fixed threshold and $\alpha > 0$
  Is the relative difference.
- H(V) is the hamming weight of the " XOR "
  Combined share vector of rows $i_1,\ldots i_n$ in S vector.

When we are stacking the shares the following procedure is followed for each subpixels of share1 and share2. If the value of share1 is black then have the value as 1 in an output matrix1.If the value of share1 is white then have the value as 0 in an output matrix1.Do the process for share2 in output

matrix2.Finally XOR the output matrix1 and matrix2 which gives the original image.

V. CONCLUSION

In this paper TWO FACTOR BIOMETRIC system based Visual Cryptography scheme for secure authentication in online transaction has been proposed. Earlier approaches use the signature of the customer for creation of shares. This involves manual intervention and the integrity of the user is not ensured. This approach is efficient by utilizing the BIOMETRIC image from the user and steganographing it with pin number. As the amount of data to be stored in the database increases, the risks associated with database misuse increases. As a result, the issue of database security and integrity continues to cause several challenges and it is necessary that further research be conducted in this direction and using a separate gateway to send OTP.

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Exploitation of Natural Products as an Alternative Strategy to Control Postharvest Fungal Rotting of Citrus

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Abstract- Two alcoholic extracts from *Capsicum frutescence* L. (Chilly) and *Zingier officinale* L. (Ginger) (ranging between 500 and 3000 ppm) were tested for antifungal activity *in vitro* on *Penicillium digitatum*, *Aspergillus niger* and *Fusarium sp* isolated from naturally infected citrus fruit. The water extracts served as control and it was observed that the alcoholic extracts concentrations were more effective than the water extract control in showing antifungal activity ($P<0.05$) against the test pathogens. Results show the alcoholic extract concentrations were more effective than the water extract control in showing antifungal activity ($P<0.05$) against test pathogens. All 3000ppm concentration from *Capsicum frutescence* L. and *Zingier officinale* L. showed a 100% and 85% inhibition zone for all the three fungi respectively. Work is currently focusing on the mechanisms underlying the impacts of plant extracts on disease development with a major contribution to limiting the spread fungi to control post-harvest diseases in fruits.

Index Terms- natural products, *Capsicum frutescence* L., **post**-harvest pathogens, disease management

I. Introduction

Postharvest diseases, such as soft rot of fruits, due to fungal infections cause significant economic losses for the citrus industry during storage, transport and marketin. The predominant pathogens causing the most important postharvest disease of fruits worldwide according to Poppe *et al* ;(2001), are *Penicillium digitatum, Aspergillus niger* and *Fusarium sp.,* respectively.

Traditionally, plant disease control is achieved mainly through the use of fungicides such as Imazalil, Guazatine and Prochloraz. The use of fungicides is becoming more restricted due to health concerns (Ragsdale *et al*; 1994). It is therefore necessary to develop alternatives to synthetic chemical control to reduce environmental risks and raise consumer confidence. In this respect, derivatives from plant agents tend to show a potential alternative to synthetic fungicides (Zhang *et al*; 2005).

Environmentally friendly plant extract agents have shown great potential as alternatives to synthetic fungicides (Janisiewicz and Korsten, 2002; Zhang *et al*., 2005). Recently, the antimicrobial activity of biodegradable and safe higher plant products Kumar *et al* (2008) has attracted the attention of microbiologists. However, the actual use of these products to control postharvest pathogens of fruits, particularly citrus pathogens, is still limited. The purpose of the current research is to test the possibility of using extracts from chilly and ginger to control or inhibit post-harvest diseases causing pathogens in citrus fruits.

II. Methods and Method

A. Collection of diseased fruits

Wet markets at Kangar (Perlis) and Georgetown (Penang) were surveyed in December 2010, to observe common post-harvest disease symptoms in oranges, lemons, and grape fruits. The prominent symptoms observed were the growth of green, black, white colored molds on the fruits. Random samples were collected from citrus fruits and brought to the Microbiology laboratory of the School of Bioprocess Engineering, University Malaysia Perlis for further studies. The fruits were washed with water, disinfected with 10 % sodium hypochlorite, and cultured in sterilized PDA media under aseptic lamina conditions, for identification, single-spore isolation, and propagation under laboratory conditions at 25°C.

B. Pathogens

The pathogens identified using the taxonomic and morphological references were *Aspergillus niger, Penicillium digitatum,* and *Fusarium sp*. Highly aggressive, single-spore isolates of *P. digitatum, A.niger and Fusarium sp.* originally isolate from citrus fruits were grown on potato dextrose agar (PDA) at 25°C for 7 days. The spores were harvested by flooding the media surface with distilled water and gently agitating the plate to dislodge spores (Obagwu and Korsten, 2002). The spores were then refrigerated for further studies.

C. Plants for extractions

Chilly (fruits) were collected from a kitchen garden housing-estate Kangar. Ginger (rhizomes), collected from the local wet market of Kangar. The collected samples were washed under running water, to get rid of dirt, insects and plankton. Subsequent they were dried overnight in the laboratory-electric oven at 40°C. One 100g of the material (fruits and rhizomes) was pulverized using an electric mixer, and preserved in labeled glass which were sealed until use.

D. Preparation of plant extracts

The extraction technique used was a modification of Ruch's (2001) method. Up to 50g each of the oven dried and pulverized powered material from chilly and ginger were treated with 500 ml of 95% alcohol with constant stirring for 30 min. After stirring, the solutions were filtered through 2 layers of cheese-cloth gauze and Whitman's (No.2) filter paper before the filtrates were subjected to evaporation through Rotary Evaporator at 60°C degree for 60 min. The dark spongy materials from the Rotary evaporator were removed and dried in an oven at 37°C for 2 days. The dried powder was stored in small and

sterilized 5ml screw-capped glass bottles they were refrigerator (4°C) until further use.

E. Preparations of plant extract dilutions

The chilly a ginger powder extracts were removed from the refrigerator and were brought to the lab for the preparation of extract dilutions. Aliquots of 0.5 g, 1.0g, 2.0g and 3.0g from each powder (plants) were mixed with organic solvent dim ethyl sulfoxide (DMSO) to obtain the concentrations required after the complete volume with distilled water to make dilutions of 500, 1000, 2000, and 3000 ppm.

III. In vitro screening

PDA media was incorporated in forty-five 50 ml glass flasks and autoclaved for 20 min. After autoclaving, the flasks were cooled to about 45°C. Approximately 5ml of plant extract,(500, 1000, 2000, and 3000 ppm) were taken form the Suicide tree, Clove, and Mahogany. They extract were pipette into four of the forty-five 50 ml flasks and were gently agitated by hand for 2 min for a proper mixing of extract. Up to 20 ml aliquots of the mixed media were dispensed into 9cm petri-dishes. Subsequently Chloramphenicol (250 mL/g per petri dish) was added to the medium to prevent bacterial growth (Nikos *et al.*, 2007). The experiment was performed under aseptic lamina conditions and replicated thrice. Approximately 1mLfrom *P.digitatum, A.niger* and *Fusarium.sp* (conc.1×10^6 spores/mL) were pipette on the center of the amended PDA extracts. The inoculated plates were then incubated at 25°C for 10 days. The petri-dishes inoculated without the extract concentrations served as control. Moreover colony diameter was determined by measuring the average radial growth. The inhibition zone (P), was measured using the formula of Francisco (2010):

The inhibition zone **(P)**, was measured using the formula of Francisco (2010):

$$P = \frac{(C - T)}{C} \times 100$$

Where C is the colony cm^2 of the control and T is of the treatments (three replicates).

IV. Statistical analysis

The experimental data was subjected to analysis of variance (ANOVA). Significant differences between mean values were determined using Duncan's Multiple Range test ($P< 0.05$) following ANOVA. Statistical analyses were performed using SPSS (SPSS Inc., Chicago, USA).

V. Result

Culture PDA media with chilly and ginger extracts - enrichment resulted in significant ($P<0.05$) reduction on subsequent colony development *P. digitatum. , A.niger* and *Fusarium. Sp.* Mixing culture PDA media with all concentration, 0 (control) , 500, 1000, 2000, and 3000ppm of the plant extracts of the *Zingier officinale* showed significant results ($P<0.05$,Fig.1) when compared with the control . *Penicillium digitatum* showed a reduction in colony development ranging from an average of 51.5% .69.2%, 74. %, and 83.1% at concentration of 500, 1000, 2000, and 3000ppm respectively.

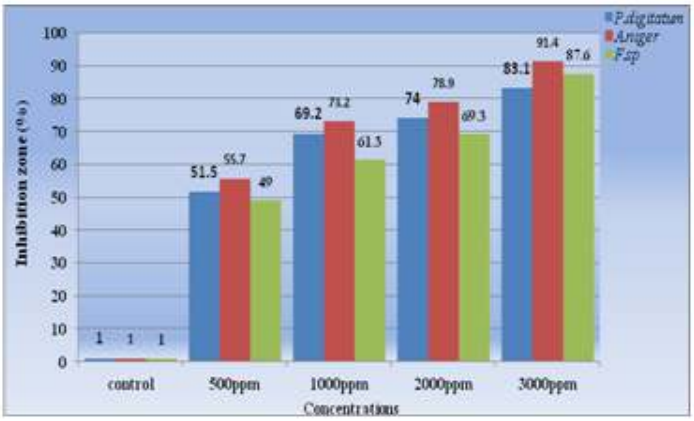

Fig. 1 Impacts of ethanolic extract of *Zingier officinale* L. (Ginger) expressed as % of inhibition zone on colony growth (cm^2) of *Penicillium digitatum, Aspergillus niger* and *Fusarium sp* raised on PDA and incubated at 25°C.

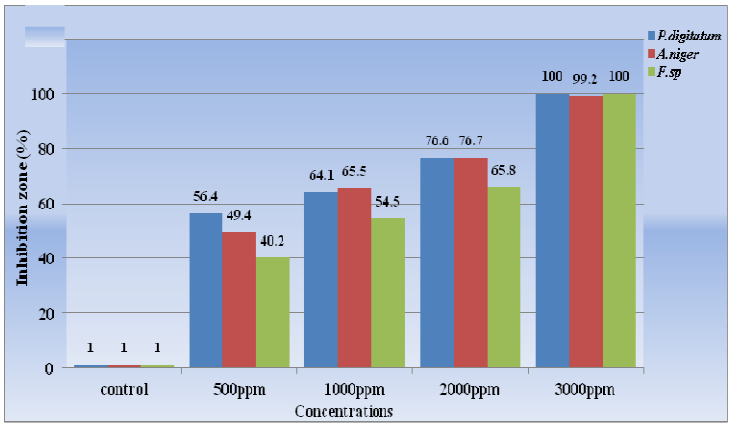

Fig. 2 Impacts of ethanolic extract of *Capsicum frutescence* L. (Chilly) expressed as % of inhibition zone on colony growth (cm^2) of *Penicillium digitatum, Aspergillus niger* and *Fusarium sp* raised

Aspergillus niger recorded inhibition zone of 55.7%.73.2%, 78.9% and 91.4% at similar plant extract concentration respectively. The inhibition zone observed in *Fusarium sp* were 49%,61.3%,69.3% and 87.6% respectively at concentration in the ascending order. From (Figure1), it is also observed that the 3000 ppm showed the best result in inhibiting the mycelial growth in all the three fungi studied .

Result on the efficacy of chilly extract on the post-harvest in citrus is presented in Figure2. A similar trend as the zinger extract was observed in its microbial inhibition activity ($P<0.05$), except that at 3000ppm, all the 3 fungi, namely *Penicillium digitatum, Aspergillus niger* , and *Fusarium sp*. recorded almost 100% inhibition zone.

The impacts of different zinger and chilly concentrations on the inhibition diameters of the fungi are presented in Table 1. From the data, it is observed that, the concentration of 3000 ppm gave the best inhibition zones with both the extracts.

Table 1: Impacts of extracts of *Capsicum frutescence* L.(Chilly) and *Zingier officinale* L. (Ginger) plant extracts on colony growth (cm^2) of *Penicillium digitatum , Aspergillus niger* and *Fusarium sp* raised on PDA.

Tret(ppm)	*Capsicum frutescence* L.			*Zingier officinale* L.		
	P.digitatum *CD (cm2	*A.niger* CD (cm2)	*F. sp* CD(cm_2)	*P. digitatum* CD(cm_2)	*A.niger* CD(cm_2)	*F. sp* CD(cm_2)
Control	9.033 ±0.033	9.033 ±0.179	7.033 ±0.177	8.467 ±0.120	9.333 ±0.088	6.733 ±0.176
500	3.933 ±0.328	4.567 ±0.189	4.200 ±0.153	4.100 ±0.115	4.133 ±0.115	3.433 ±0.100
1000	2.969 ±0.285	3.100 ±0.100	3.200 ±0.100	2.600 ±0.115	2.500 ±0.066	2.600 ±0.066
2000	2.100 ±0.285	2.100 ±0.115	2.400 ±0.057	2.200 ±0.057	1.966 ±0.088	2.066 ±0.484
3000	0.00 ±0.00	0.033 ±0.333	0.00 ±0.00	1.430 ±0.057	0.800 ±0.176	0.833 ±0.888

*CD refers to colony diameter

VI. DISCUSSION

The plant extracts of chilly and ginger of this study was to evaluate the efficacy of botanicals in controlling three fungal pathogen (mycelia growth)of , *Penicillium digitatum*, *Aspergillus niger* and *Fusarium sp* that are pathogens for the post-harvest diseases of citrus as reported by Eckert & Sommer, (1967), and Adaskaveg *et al*, (2002). These diseases could cause a loss of up to 10-30% decrease in crop yield and marketing quality (Agrios, 2005, and Serrano *et al*, 2005).

In vitro studies of oregano, thyme, lemongrass, and cilantro vapours (500–1000 ppm) showed complete growth inhibition of B. *cinerea* and *Alternaria arborescence*. Geotrichum candidum was more sensitive to lemongrass oil vapours than to thyme or oregano oils (Plotto *et al*., 2003).

The plant extracts reported effective against the fungi *Penicillium digitatum* include garlic (Obagwa, 2002), neem (Mossini*,.et al*,2009), *Withania somnifera* L. and *Acacia seyal* L. Samson, 1984), mustard and horseradish (McOnie,1964).

Aspergillus niger is noted for its carcinogenic aflatoxin production in diseased plants. Montes and Carvjal (1998) in their research for screening of more than 280 plant species for their inhibitory effect on the toxin reported that about 100 of these plants had some activity on growth of toxin production by fungi. Clove completely inhibited the mycelia growth of *A. flavus* and aflatoxin formation (Karapynar, 1989).

Saxena and Mathela (1996) in their study on the inhibitory effect of plant extracts on *Fusarium* reported that, *Azadirachta indicia* L., Artemisia *annua* L.*, Eucalyptus globules* L.*, Ocimum. Sanctum* L. and *Rheum emodi* L.*,* showed significant reduction of the pathogen. Garlic extract had a positive effect on the *Fusarium* inhibition (Anjorin.*et al*, 2008).

VII. CONCLUSION

Most plant derivatives, phenols and alkaloids tend to show positive effect on the inhibition of postharvest fungal or bacterial pathogens. Amidst an increasing global environmental pollution, these plant extracts or botanicals have great replace potential replacing conventional synthetic pesticides in the future.

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Issues of Consumerism in Bangladesh: Present Status and Challenges

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Abstract- Consumerism is the organized movements of conscious consumers against the sellers to protect their rights. Extant consumerism literature mainly focused on developed countries while the conditions of developing countries are largely ignored by the researchers. This paper is an effort to explore the present status, related issues and challenges of consumerism in Bangladesh, i.e. from a developing country perspective. Empirical data, however, evidence that 85 percent of the sample respondents are away from consumerism. The collected data reveals that the areas of consumer deception are adulteration, miss-branding, poor sales service, deception in advertising and poor marketing information system etc. Further, the survey results identified that the factors of consumer deception are - illiteracy, lack of consumer consciousness, absence of consumer legislation, inadequate role of consumer interest groups and indifference of law enforcing agencies, etc. Finally, the paper recommends in support of healthy growth of consumerism global context in general and in Bangladesh in particular.

Index Terms- consumerism, prospect and challenges, Bangladesh

I. Introduction

Consumerism has emerged as an issue of considerable importance affecting managerial decision in the marketplace (e.g. Ede and Calcich, 1999; Day and Aaker, 1997; Quazi, 2002). It is an organized movement of consumers whose aim is to improve the rights and powers of consumers in relation to sellers (Kotler et al. 1998) and thus emphasizes on how to diminish dominance of sellers in the market and enhance customer satisfaction. Business organizations consider customer satisfaction a top priority, enhance customer knowledge, beef up service support and field linkages and implement a customer oriented philosophy (Bailey, 1991). Customer satisfaction requires understanding the buyers' requirements and developing a total organizational commitment to meeting these needs. Management must build an organizational culture committed to understanding and meeting the needs of customers (Cravens, 1991). However, there is general allegation that sellers' market is prevailing in the developing counties of the world and which is true in the case of Bangladesh, too (Quazi, 2000). During the early stage of the development of consumerism, consumers usually voiced their grievances individually on the individual seller. The focus of organized movement got impetus based on the vigorous activities different consumer activists such as Ralph Nader (Quazi 1998; 2002) and former US President John F. Kennedy (Ede and Calcich, 1999; Day and Aaker, 1997; Quazi 2002). Late President John F. Kennedy announced in his "Consumer Bill of Rights" of 1962 that consumer had the right to safety, the right to be informed, the right to choose, and the right to be heard. This consumer bill of rights is the main ground of establishing consumer rights in the market against sellers' domination, which also guide the expansion of consumer movement or consumerism across the world. Consumerism involves the widened range of activities of government, business, social and voluntary organizations that are designed to save buyers/users from malpractice that infringe upon their rights 'as consumers. Consumerism compels marketers to consider relevant factors from viewpoint of consumers instead of producers.

In Bangladesh, absence of competitive marketing norms, human values, business ethics, rules, regulations have also created marketing inefficiency, which in turn, may lead to adverse impact on consumerism and the overall economy of the country. However, in developing countries like Bangladesh, corporate attitude and actions are relatively less concerned about the consumers and the pressure arising from the consumer movement is generally low (Quazi, 2002). Because, most of the least developed countries' (LDC) consumers place greater emphasis on the satisfaction of the psychological needs of the general public. In addition the prevalence of seller's market conditions in most LDCs has also contributed to the low response from business. Consumers of such market conditions accept whatever they are offered as they have little voice in the marketplace (Reddy and Campbell 1994; Quazi 2002). Previous research did focus on the condition of consumerism in general in Bangladesh perspective. In this backdrop, the purpose of this paper is to pinpoint the areas of consumer deception and relevant issues for development of consumerism is Bangladesh.

II. Methodology

The paper is based on both desk study and empirical survey. In desk study, extant literature have been reviewed to ascertain the relevant factors associated with the development of consumerism in Bangladesh. Further, this paper presents the information collected through a survey of 500 sample respondents which were selected from 10 different professional groups, such as-consumers: male and female, manufacturers, intermediaries, marketers, government, officials, social workers, academicians, legal practitioners, CAB (Consumer Association of Bangladesh) representatives and Chamber of Commerce representatives on

the basis of random sampling. Data were collected from respondents regarding consumerism by questionnaire through direct interview method. The questionnaire had three features: open ended ness, check-lists and 5-points scaling which were specially related to factors adversely offering growth of consumerism in Bangladesh.

III. CONSUMERISM – WORLD PERESPECTIVE VIS-A-VIS BANGLADESH PERESPECTIVE

Consumerism refers to the movement through which rights and powers of consumers are ensured is known as consumerism. This process generally includes consumer education, consumer safety, consumer choice, consumers' rights to be heard and the responses of business to consumer issues (Evans and Berman, 1982). The consumer movement has been originated in the USA during early 1900's subsequently fueled by depression and writings of intellectuals on the conditions in specified industries like Sinclar's. The movement further flourished in 1930 in the contexts of deceptive advertising, performance standards, product safety, misrepresentation and growth of relevant government legislation's. The third phase of the development of consumerism was sparked up by better consumer education, emergence of complex and hazardous products, wasteful and unethical practices of big businesses and public dissatisfaction with marketing organizations. However, the consumer movement which started in the USA rapidly assumed international dimensions and grew very strong in Scandinavian countries. The processes of development of consumerism since 1900 to date have been characterized by the selected events such as portrayed below:

(i) President John F. Kennedy delineated four fundamental consumer rights is a message to congress : right to be informed, right to safety, right to choose, and right to be heard. In addition, he established a Consumer Advisory Council with the objective of examining and providing advice to government on issues of macro economic policies, governmental policies protecting consumer needs and needed improvements in the flow of consumer research material for the public.

(ii) In 1968, President Johnson, in a special message to Congress, proposed an eight-point program to protect consumers and honest business people against fraud and indifference.

(iii) In 1969, President Nixon affirmed consumer rights pertaining to choice information, health and safety, and complaints.

(iv) In 1979-80 American congress moved to limit the powers of the Federal Trade Commission to investigate and act against deceptive or unfair business practices.

Protection of consumers' rights is an imperative in the developed countries as well as in the developing countries. The consumerism movement started in Asia in the mid 1960s (Hrick and Scammon, 1993). As Allain (1988) explained, consumerism movement in the developing countries have typically followed the model of developed countries. Further, from a third-world point of view, the most important consumers' right is the right to satisfy basic needs - a right which, according to a recommendation of the International Organization of Consumers' Union (IOCU), 1990 Bangkok conference, should be added to the UN guidelines for consumers' protection. In addition, identification of areas of consumers' deception is important for development of consumerism as consumers not only have the right but also the responsibility to protect themselves.. Consumers' deception is a state of affairs wherein consumers do not get proportionate goods and services as they pay for them (Kotler, 1992).

During the recent years issues relating to the protection of consumers' rights have drawn attention of the proponents of human rights, social reformers, public policy makers, environmentalists and the likes. But unlike the situations prevailing in this respect in the developed countries of the world, protection of consumers' rights is not adequately taken care of in Bangladesh. As a result, consumers, marketers and the manufacturers are suffering unlimitedly, and thereby, adversely affecting the marketing efficiency in Bangladesh. Consumerism in Bangladesh is yet to assume full-fledged dimension and serve the interests of consumers. Voluntary organization like CAB (Consumers Association of Bangladesh) plays a positive role in this direction. CAB is playing its role amdist manyfold hadicapts in order to organize the consumers of Bangladesh as regard their rights and privileges as well as consumer consciousness. Farther, as a result of motivation extended by CAB, other voluntary organizations like 'Consumers' Interest Protection Association, 'Health for All', 'Anti-Smoking Association' and 'Adunik' have come out in the consumers field and started contributing substantially towards the developing the consumer consciousness and protection of consumer welfare along with extension of legal adice in the area concerned. Further, government agencies like BSTI (Bangladesh Standard and Testing Institution) and various Acts such as Bangladesh Control of Essential Commodities Act 1956 Essential Commodities Price and Distribution Order, 1970, Bangladesh Pure Food Ordinance, 1959, Agricultural Produce Markets Regulation Act, 1964, Bangladesh Government Hats and Bazars (Management) Order, 1972, The Standards of Weightsand Measures Ordinance, 1982 and Law enforcing agencies, e.g., Bangladesh Rifles and Police also contribute significantly to safeguard the interest of consumers.

The concept of consumer protection centers around ensuring seven R's of consumer rights, such as- (a) right to safety (b) right to be informed (c) right to be heard (d) right to redress (e) right to consumer education and (f) right to healthy environment (Quddus and Ali, 1986). Consumerism induces the government to act to protect and safeguard the interest of consumers by influencing marketing decision and operations of companies (Gandhi, 1985). In Bangladesh, consumerism movement is still in initial stage. However, Government of Bangladesh has adopted some legislative measures in order to protect consumers from the malpractice of the dishonest businessmen/marketers. The important legislation with regard to this include (a) The Patents and Design Act, 191 1, (b) Trade Marks Act, 1940, (c) Prevention of Adulteration Act, 1954 (d) Pure Food Ordinance, 1959 (e) Bangladesh Drugs Act, 1982, etc. Further consumer organization like CAB (Consumer Association of Bangladesh) has come into being and it concerned with promoting consumer awareness, providing consumer education, setting consumer

deputies and complaints, conducting consumer research and the likes.

IV. CONSUMER DECEPTION AREAS

Marketers sometimes are accused of deceptive practices that lead customers to believe they will get more value than they actually do. Deceptive practices fall into three groups: deceptive pricing, promotion and packaging (Kotler, 1995). More important, unhappy customers negatively affect business. However, the data and information collected in this regard have been shown in Table-2.

Table 2: Consumer Deception Areas as Opined by Samples

Consumer Deception Areas	No. of Samples	Frequency in Percentage
Adulteration	311	62.20%
Misbranding	294	58.80%
Poor sales service	217	43.40%
Deception in advertising	201	40.20%
Poor marketing information system	198	39.60%
Shortage in weights and measures	196	39.20%
Quoting highly inconsistent price	187	37.40%
Deceptive packaging	171	34.20%
Misbehaviors of sales force	166	33.20%

[Note: Total exceeds 100 because the respondents mentioned more than one area]

Table-2 reveals that 62.20 percent out of 500 sample respondents have identified adulteration as an area deception, followed by 58.80 percent who have earmarked misbranding of goods as the deceit area. The table further depicts that the areas of deception ranges from misbehavior of sales force 33.20 percent at the lowest to deception in adulteration 62 20 percent in the highest. The table further shows that the other area of deception are poor sales service, deception in advertising, poor marketing information system shortage in weights and measures, quoting highly inconsistent price and deceptive packaging and in terms frequency are 43.40 per cent, 40.20 per cent, 39.60 percent, 39.20 percent, 37.40 percent and 34.20 percent respectively, This finding is also corroborated by other research works (Gupta 1985).

V. CAUSES OF CONSUMER EXPLOITATION

Consumerism is a protest against perceived business injustices, combined with the efforts to remedy these situations. It stemmed from cultural changes and from consumer discontents and frustrations (Stanton, 1987). Further, illiteracy, increased tolerance by customers, limited consumer interest groups and customer legislation are causes responsible for customer exploitation (Bhatt, 1985). However, the data collected in this regard have been shown in Table- 3

Table 3: Causes of Consumer Exploitation

Causes of' Exploitation	Frequency in Percentage
Illiteracy	100
Absence of consumer consciousness	100
Increased tolerance by consumers	84.66
Limited number of consumer interest groups	84.66
Lack of consumer legislation	70.50
Inflation	56.55
Limited consumer choices	50.40
Scarcity of essential commodities	30.30
Absence of marketing audit	25.25

Note: Total exceeds 100 because the respondents mentioned more than one cause.]

Table-3 portrays that the most important causes are illiteracy and of consumer consciousness which in fact leading to consumer exploitation. Consumers and limited number of interest groups has further gathered. This makes the dishonest marketers free from their social accountability. Lack of consumer legislation reportedly creates a heavenly environment for the exploiters. Inflation was reposed by some sample respondents to be one of the causes that affect efficient marketing process as a whole. The table further shows that marketers due to limited consumer choices exploit consumers, scarcity of essential commodities and absence of marketing audit etc. This

has also been corroborated by the findings of the similar types of research works (Thomas, 1978)

VI. ATTITUDES OF THE SAMPLE RESPONDENTS TOWARDS CONSUMERISM

Attitudes are mental states used by individual to structure the way they perceive their and guide the way they respond to it (Aaker and Day, 1980). The information was collected from the sample respondents regarding whether the respondents done anything for consumerism or not. Table-4 shows the opinions expressed by the samples in this regard.

Table 4: Attitudes of the Sample Respondents regarding Consumerism

Response Patterns	**No. of Samples**	**Frequency in Percentage**
Claimed to have done something for consumerism	50	10%
Done nothing for consumerism	425	85%
No response	25	5%
Total	**500**	**100%**

Source: Field Survey

The survey data (Table- 4) portrays that 85 per cent of the sample respondents are away from consumerism. It further reveals that 10 per cent of the samples claimed to have done something for communism. In such a context, we were interested to know from the samples about the areas of consumer deception in the study area.

VII. MECHANISM OF CONSUMERISM

Mechanism of consumerism refers to the tools and techniques at the disposal of the consumer groups that are majorly used by them in creation of mass markets. An understanding of the different mechanisms as aids to consumer ism is non-the-less essential in so far as the future programmes in connection with consumerism are concerned. This, in turn, assist the concerned people in the detainment of some of the existing effective tools rejection of the others and discovery of the newer ones. In an over-all manner, mechanisms used in consumerism at home and abroad are letters to the editor, frequent issuance of press releases by different authorities, submission of litigation against the fraudulent marketers, setting up of consumer organizations, extending legal protection, frequent marketing inspection, setting up of mobile courts, publication of market reports in the news papers, periodical announcement of market bulletins through Radio and Television and playing of increased role by the govt. agencies. These tools, though not all-exhaustive, are adequately suggestive and can go along way to implement the objectives aimed at by consumerism. In Table-5, an attempt has been made to accommodate the collected data from the sample respondents regarding what mechanisms they adopted while involving in consumerism.

Table 5: Mechanisms of Consumerism

Mechanisms of Consumerism	*Number*	**Percentage**
Consumer Organizations	50	10%
Legal Protection	90	18%
Marketing Inspection	60	12%
Mobile Court	50	10%
Letters to the Editor	70	14%
Marketing Press Release	40	8%
Market Reports Published in News Papers	50	10%
Periodical Radio-TV Market Bulletin	50	10%
Role of Govt. Agencies	40	8%
Total	**500**	**100%**

Table-5 portrays that 90 (18%) out of 500 (100%) sample identify extension of legal protection to the consumers community by authorities concerned as the mechanism number one being closely followed by 70 (14%) in favour of 'Letters to the Editor", 60(12%) for marketing inspection, concurrently by 50 (10%) for establishing consumer organizations, setting up of mobile courts, publishing market reports in news papers and publicizing periodical market bulletins through Radio and Television. Again, 40 (8%) of the respondents simultaneously mention issuance of marketing press release and playing of increasing role by government agencies as the mechanisms of consumerism.

VIII. ATTITUDES TOWARDS THE EFFECTIVENESS LEVEL OF THE CURRENT TOOLS OF CONSUMERISM

Implementation of the programmes aimed at by consumerism depends upon the level of efficiency demonstrated by the mechanisms used for the purpose. In this connection, the

attitudes of sample respondents towards effectiveness and efficiency of mechanisms of consumers have been evaluated. Attitudes are mental states used by individuals to structure the way they perceive their environment, and guide the way they respond to it. Against this theoretical background, the data and informations were collected as to the effectiveness and efficiency of mechanisms of consumerism from the sample respondents. Table- 6 reveals the opinions expressed by the samples regarding the factors of efficiency in the area concerned processed through 7-point Likert scale. In this scale, + 3 indicates full satisfaction, + 2 medium satisfaction and + 1 least satisfaction and, on the contrary, — 3 indicates complete dissatisfaction,-2 moderate dissatisfaction and-1 least dissatisfaction.

Table 6: Effectiveness and Efficiency Level of Mechanisms of Consumerism'

Variables	**Average score**	**Remarks**
'Legal Protection" is effective	1 .8	Insignificant
"Letters to the Editor" is efficient	2.0	Significant
"Marketing Inspection" is purposeful	1.5	Insignificant
"Role of Mobile Court' serves the desired purpose	1.4	Insignificant
"Role of consumer Organizations" is effective	1.0	Insignificant
"Role of Govt. Agencies" is significant	1.2	Insignificant
"Periodical Radio TV Market Bulletion" is frequent	2.0	Significant
'Marketing Press Release' is regular	1 .8	Insignificant
'Publication of Market Reports in News Papers" is regular	2.0	Significant
Total	**1.63**	**Insignificant**

Table 6 reveals that the aggregate over all score as per opinions of the respondents based on 9 sub-variables is 1.63 and the range of score is from 1.8 to 2.0. This signifies the ineffective and inefficient application of consumerism mechanisms in sample areas. It is further asserted that the mechanisms of consumerism, such as "Letters to the Editor" and "Publication of Market Reports in News Papers" indicate significance which denotes effectiveness and efficiency. This has also been corroborated by the findings of the similar research studies conducted abroad.

IX. FACTORS AFFECTING GROWTH OF CONSUMERISM IN BANGLADESH

Consumerism is the organized efforts of consumers seeking redress, restitution and remedy for and dissatisfaction they have accumulated in their standard of living (Buskirk and Rothe, 1970). However, the growth and development of consumerism movement depends to a great extent on environmental factors. Although there are many factors, the most important ones are societal, political, technical and governmental factors seemed to be important in this regard. The attitude of sample respondents towards the growth and development of consumerism have been evaluated. In such a context, the data and information were collected as to the growth and development of Consumerism from sample respondents. Table-7 shows the opinions expressed by the sample respondents regarding the factors of efficiency in the area concerned processed through Likert type 5-points bi-polar scale system. In this scale, + 2 or more would indicate very favorable impact, score falling between 1-2 would indicate favorable impact and 'O' would indicate no comment.

Table 7: Factors Affecting Growth and Development of Consumerism

Factors	**Average Score**	**Remarks**
Social Factors:		
Ineffective human resource development process	1.9	Insignificant
Lower rate of social responsibility of business houses	2.0	Significant
Unawareness of people	1.8	Insignificant
Insignificant role of social institutions	1.8	Insignificant
Limited number of consumer interest groups	1.7	Insignificant
Economic Factors:		
Poor role of re-dressing consumer complaints	2.0	Significant
Negligible assistance of business community	1.9	Insignificant
Lack of consumer orientations	1.8	Insignificant
Increased tolerance of consumers	1.7	Insignificant
Absence of consumer consciousness	1.7	Insignificant
Poor conversant of political leaders with consumer education	2.0	Significant
Absence of democratic norms	2.0	Significant
Lower rate of public accountability	1.9	Insignificant

Lack of Political culture	1.9	Insignificant
Decreased tolerance of political leaders	1.8	Insignificant
Technical Factors:		
Poor investment in R and D	2.0	Significant
Lack of data bank	1.9	Insignificant
Lower rate of technological advancement	1.8	Insignificant
Outdated technology of production	1.8	Insignificant
Poor quality of products	1.7	Insignificant
Governmental Legal Factors:		
Absence of ideal government governance	1.7	Insignificant
Lower rate of accountability of government agencies	1.7	Insignificant
Lack of administrative transparency	1.8	Insignificant
Inadequate consumer protection legislation	2.0	Insignificant
Ineffective role of law enforcing agencies	1.8	Insignificant
Average Score:	**1.8**	**Insignificant**

Source: Field Survey

Table-7 reveals that the average over-all score as per opinions of the samples based on 25 sub-variables is 1.8. The range of score is 1.7 to 2.0 for different elements indicating the adverse impact on growth and development of consumerism in the study areas. This has also been corroborated by the findings of the similar research studies conducted abroad (Gupta 1985).

X. CONCLUSION AND RECOMMENDATIONS

The evaluation of consumerism mechanism efficiency of the sample areas through Likert scale indicates that the efficiency of the use of tools concerned has been poor. Such poor efficiency and effectiveness level of the tools has adversely affected the consumerism movement in contexts of purity, weightage accuracy, consistent price quotation, truthfulness in advertising, honesty in packaging and branding, amicable sales force behavior, congenial environment in transactions, efficient sales service, effective marketing information system, existence of consumer safety, choice and hearing and effective service from purchased goods. This, in turn, has impeded the desirable development of consumerism. Hence, the following specific steps may be worth mentioning in order to streamline the improvement of consumerism of the sample areas in Bangladesh:

i) Effective Communication Linkage

An ideal communication net-work may be set upto minimize the communication gap between the marketers and the consumers. A better communication system between the two paves the way for increased attention to consumer grievances, complaints and suggestions.

ii) Providing Mass-Media-Based Consumer Education

An effective mass-media-based education system implemented through the use of posters, publications, radio, television, documentary and other films accompanied by lectures, seminars, training course and adult education programmes, may go a long way to educate consumers and assist consumerism. Consumer education may also be ensured through drams folk arts and street plays.

iii) Consumer Protection Legislation

Legal coverage for consumer protection may also be given attention in order to ensure smooth consumerism. Enforcement of the existing laws and enactment of new laws in this direction may be considered with priorities.

iv) Role of Voluntary Organizations

Social cultural, humanitarian and voluntary organizations can play an effective role in the development of consumerism movement in the Country. Voluntary social and cultural organizations such as Lions' club, Rotary club, Apex club, Jaycees and other within country NGO's can play an effective role in the development of consumer consciousness in the country. Therefore, more and more consumer organizations may be formed and federation of consumer interest groups may be created and thereby have a national approach to consumerism.

v) Social Responsibility of the Business Organizations

Business organizations may accept consumer protection as their social responsibility. Again government, business institutions and other funding agencies may motivate research works by concerned experts in order to safeguard the interest of consumers and thereby have an innovative approach in the growth and development of consumerism in global context in general and in Bangladesh in particular.

vi) Government Encouragement:

Government may forward to encourage growth of consumerism in the country. A democratically-elected govt. may even consider the point of consumer movement a fulfillment of its commitment to the nation.

vii) Growth of Consumer Organizations and Groups:

Growing number of consumer organizations and consumer groups might be an affirmative factor towards the development of consumerism. Organizations such as CAB (Consumers Association of Bangladesh) may be set up by and large in this connection.

viii) Settlement of Marketers-Consumers Disputes:

Acceptance of disputes between marketers and consumers and their settlement through formal and informal judicial machineries may play an effective role in the development of consumerism in Bangladesh.

ix) Introduction of Consumerism Courses in the Syllabi of the Educational Institutions

The issue of introducing academic courses on and about consumerism such as consumer economics, consumer protection, consumer legislation etc.; may be considered for inclusion in the syllabi of the educational institutions at different levels.

x) Motivation to Research on Consumerism:

Consumerism is a social movement. Public accountability in this regard may be ensured by conducting extensive research on different dimensions of consumerism. Such research may be motivated in different ways.

xi) Adopting a Global Approach to Consumerism:

Establishment of federation of consumer interest groups at local, national, regional and global levels through the patronage of government, non-government and social organizations and thereby evolving a global approach to consumerism may be actively taken into account in this perspective. Forums such as SAARC, Common Wealth, OIC (Organization of Islamic Conference) and Non-Aligned Conference may play a positive role in this perspective.

Consumerism is an area which is yet to receive adequate attention from relevant interest groups and quarters concerned in Bangladesh. The marketing system in our country is in the processes of continuous changes. The role of the actors in such a context may render the same more effective and efficient. Consumers-the most influential among the relevant actors might play a formidable role in this direction. Moreover, the present government is stressing much emphasis on a switchover to a market economy-based on the free interaction of the forces of demand and supply. Such an economy is, among others, dependent on an effective and sound marketing system. Thus it can be concluded that the implementation of the above recommendations may create more consciousness in consumer's community in the country which might lead to the development of congenial atmosphere in the marketing environment. This may, in turn, assist the growth and development of consumerism in the country.

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Emphasis on Education in Jane Austen's Novels

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"Education is the manifestation of the perfection already in man" ***– Swami Vivekananda***

Abstract- This paper intends to show how Jane Austen the novelist was always aware of the importance of education in an individual's life. Women of Austen's time did not have a proper education and as a result they lacked professional status and were completely dependent on matrimony for securing their financial needs. This paper highlights Austen's acute awareness of the inadequacies of the kind of education young woman of her age received. The attempts to compare and analyze Jane Austen's thought's on education with that of Mary Wollstonecraft. Through her characters Austen depicts how an educational system isn't worth a great deal if it teaches young people how to make a living but doesn't teach them how to make a life. On the contrary "education is an ornament in prosperity and a refuge in adversity."- Aristotle

Index Terms-, Eighteenth century education, Jane Austen, Mary Wollstonecraft, Women Education,

INTRODUCTION

Education in the largest sense is any act or experience that has a formative effect on the mind, character or physical ability of an individual. In its technical sense, education is the process by which society deliberately transmits its accumulated knowledge, skills, and values from one generation to another.

Etymologically, the word education is derived from educare (Latin) "bring up", which is related to educere "bring out", "bring forth what is within", "bring out potential" and ducere, "to lead". (Wikipedia)

Jane Austen's own formal education had been quite as extensive as that of most women of her class and day. Austen was first taught by her father who took in other pupils besides his children and then sent them to boarding schools in Oxford and Southampton. Austen was subsequently educated at home, except for a short stint at a boarding school, Jane and Cassandra had returned home because the Austen's could not afford to send both of their daughters to school. Austen acquired the remainder of her education by reading books, guided by her father and her brothers James and Henry. George Austen apparently gave his daughters unfettered access to his large and varied library, was tolerant of Austen's sometimes risqué experiments in writing, and provided both sisters with expensive paper and other materials for their writing and drawing. When Austen remarked of Jane Fairfax; "Living constantly with right- minded and well-informed people, her heart and understanding had received every advantage of discipline and culture. . . " (Emma Ch. 20) she seems to be looking back on her own upbringing and at the same time emphasizes the need of education for women. According to Park Honan, a biographer of Austen, life in the Austen home was lived in". . . an open, amused, easy intellectual atmosphere," (Pp. 211-212) where in the ideas of those with whom the Austen's might disagree politically or socially were considered and openly discussed. After returning from school in 1786, Austen never again lived anywhere beyond the bounds of her immediate family environment. Subsequently she seems to have taught herself like the Bennett girls in *Pride and Prejudice* (1813). Reading and learning the proper response to what was read were a large part of the content of her self education as her novels testify. She was well read in Shakespeare and eighteenth century literature, and her favorite authors being Richardson and Johnson. Private Theatricals were also a part of Austen's education. From when she was seven until she was thirteen, the family and close friends staged a series of plays, including Richard Sheridan's *The Rivals* (1775) and David Garrick's *Bon Ton*. While the details are unknown, Austen would certainly have joined in these activities, as a spectator at first and as a participant when she was older. Most of the plays were comedies, which suggest one way in which Austen's comedic and satirical gifts were cultivated.

A bookish family atmosphere was familiar to her is evident from the novels. There might also be lessons with outside "**masters**" or specialists such as piano teachers, etc. Some local "Grammar" schools did exist, teaching the educational basics including Greek and Latin to higher-class or upwardly mobile boys, but did not admit girls. Women were not allowed to attend the institutionalized rungs on the educational ladder: "**public**" schools such as Eton which Edmund Bertram in *Mansfield Park* attends, and the universities Oxford and Cambridge. The prime symbol of academic knowledge, and more-or-less exclusively masculine educational attainments, was the Classical languages Greek and Latin, to which a great deal of time was devoted in "**genteel**" boys' education, but which few women studied. Austen sometimes shows a wistful regret that women are debarred from these privileges, but her views of the exclusively male portals of higher education are not always respectful. In *Sense and Sensibility* (1811), Edward Ferrars, brought up to be a gentleman of leisure confides, ". . . I was therefore entered at Oxford and have been properly idle ever since" (*Sense and Sensibility* Ch 19) which shows the inadequacy of the education system. Austen astutely gauges that an educational system isn't worth a great deal if it teaches young people how to make a living but doesn't teach them how to make a life. Women were in a worse situation in such a patriarchal society. Since women did not usually have careers as such, and were not "**citizens**" in the sense of being directly involved in politics, there was little generally-perceived need for such higher education for

them, and most writers on the subject of "**female education**" preferred that women receive a practical and religious training for their domestic roles. In *Pride and Prejudice* (1813) Caroline represents this attitude when she remarks:

A woman must have a thorough knowledge of music, singing, drawing, dancing, and the modern languages, to deserve the word". To which Darcy's replies " To all this she must yet add something more substantial, in the improvement of her mind by extensive reading.(*Pride and Prejudice* Ch 8)

For women of the "**genteel**" classes the goal of non-domestic education was thus often the acquisition of "**accomplishments**", such as the ability for needlework, simple arithmetic to draw, fine hand writing, sing, play music, or speak modern i.e. non-Classical languages generally French and Italian. Though it was not usually stated openly, the purpose of such accomplishments was often only to attract a husband; so that these skills then tended to be neglected after marriage. Until well into the nineteenth century education was not considered necessary, in fact it was felt to be rather a hindrance to their settlement in life. It was all the more cumbersome for women as academically oriented young girls were not preferred in matrimony, Jane Austen was well aware of this attitude, and wrote in Northanger Abbey:

". . . where people wish to attach, they should always be ignorant. To come with a well informed mind, is to come with an inability of administering to the vanity of others, which a sensible person should always wish to avoid. A woman especially, if she has the misfortune of knowing anything, should conceal it as well as she can." (*Northanger Abbey* Ch 14)

In Jane Austen's day, there was no centrally-organized system of state-supported education. There were local charity or church-run day schools such as the one set up by St. John Rivers in Charlotte Bronte's later novel *Jane Eyre*, but these were not attended by the children of the "genteel" social levels that Jane Austen writes about.

More or less the same is true of apprenticeships, another relatively less "respectable" mode of education. Some local "Grammar" schools did exist, teaching the educational basics including Greek and Latin to higher-class or upwardly mobile boys, but did not admit girls. The type of education depended on the preferences and financial resources of the parents in each family. Thus without Darcy's father's help, Wick ham's father ". . . would have been unable to give him a gentleman's education."(*Pride and Prejudice* Ch. 35) Education for boys in her novels is more elaborate than that of girls and usually proceeds from a private tutor to public school and university. Instead, "genteel" children specially girls would be educated at home by their parents, particularly when young as the Morland children are in Northanger Abbey; or by live-in governesses such as Miss Taylor in *Emma* or tutors; or by going off to a private boarding school or to live with a tutor as Edward Ferrars went to Mr. Pratt's in *Sense and Sensibility (1811);* as several boys went to Steven ton to be tutored with Jane Austen's father. Lady Catherine de Bourgh is quite understandably shocked when Elizabeth tells her that they never had any governess, so Elizabeth had to admit "Compared with some families, I believe we were; but such of us as wished to learn never wanted the means. We were always encouraged to read, and had all the masters that were necessary. Those who chose to be idle, certainly might." (Ch. 29 *Pride and Prejudice*)

It can be deducted that Austen was thinking of her own education when she makes Elizabeth Bennett defend the want of a governess at Longbourn. Perhaps no masters came to Steventon from Basingstoke; but with such parents and brothers, Jane hardly wanted them. She had an acute awareness of the inadequacies of the kind of education young women of her age received and also of the standards of their upbringing. Thus Anne Elliot's remark in Persuasion (1817)

". . . Men have had every advantage of us in telling their own story. Education has been theirs in so much higher a degree; the pen has been in their hands. I will not allow books to prove anything."(Ch. 23 *Persuasion*)

The creator of a lively and intelligent character as Elizabeth Bennett could not tolerate such inequality and hence this statement by the writer reflects the condescending attitude of men of her times.

Austen agrees with Mary Wollstonecraft the author of *A Vindication of the Rights of Woman and the Wrongs of Woman* (1792), who states in her preface that ". . . my main argument is built on this simple principle, that if [woman] be not prepared by education to become the companion of man, she will stop the progress of knowledge and virtue; for truth must be common to all."(p 2)

Wollstonecraft further contends that society will degenerate without educated women, particularly because mothers are the primary educators of young children. Wollstonecraft attributes the problem of uneducated women to men, and ". . . a false system of education, gathered from the books written on this subject by men who, consider females rather as women than human creatures." (p 7)

Thus Wollstonecraft advocates education for women as it will enable them to pursue careers should they so choose:

". . . women might certainly study the art of healing, and be physicians as well as nurses. And midwifery, decency seems to allot to them . . . they might, also, study politics . . . Business of various kinds, they might likewise pursue."(p 162)

In addition to her broad philosophical arguments, Wollstonecraft also lays out a specific plan for national education to counter Talleyrand's. In Chapter 12 of *A Vindication of the Rights of Woman and the Wrongs of Woman*, "On National Education", she proposes that all children be sent to a "country day school" as well as given some education at home "to inspire a love of home and domestic pleasures". She also maintains that schooling should be co-educational, contending that men and women, whose marriages are "the cement of society", should be "educated after the same model. In her national plan for education, she retains class distinctions (with an exception for the intelligent), suggesting that:

"After the age of nine, girls and boys, intended for domestic employments, or mechanical trades, ought to be removed to other schools, and receive instruction, in some measure appropriated to the destination of each individual . . . The young people of superior abilities, or fortune, might now be taught, in another school, the dead and living languages, the elements of science, and continue the study of history and politics, on a more extensive scale, which would not exclude polite literature."(p187) Consequently Ms Austen rightly remarks,

of Ms Elliot, "She had been forced into prudence in her youth, she learned romance as she grew older - the natural sequence of an unnatural beginning."(Ch 1 *Persuasion*)

The patriarchal society as depicted by Jane Austen in the character and conduct of her novels clearly reveal the discrimination meted out to the women who comprise a major section of the society. Austen has always been considered a writer who writes on domestic issues. This paper shows how on the contrary, Jane Austen does not reject Wollstonecraft's ideas and tries to portray in her novels that women are crucial to the development of the nation & Emphasis on women education will lead to emancipation.

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Analysis of electromagnetic Whistler mode instability for relativistic plasma: Lorentzian Kappa

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Abstract- Whistler mode instability in interplanetary space at 1AU(Astronomical Unit) is investigated using an anisotropic Lorentzian Kappa distribution with perpendicular AC electric field for relativistic plasma. The method of characteristic solutions using the perturbed and unperturbed particle trajectories have been used to determine the perturbed distribution function. The conductivities and dielectric tensors are then determined and used to obtain the dispersion relation. The special case of whistler mode dispersion is then use to determine the growth rates for various plasma parameters. Present studies are helpful in making estimates on high energetic plasma particles and properties of whistler mode waves and thus contribute to a better understanding of the auroral activity in the planetary atmospheres.

Index Terms- Whistler mode instability for relativistic plasma Lorentzian Kappa

I. Introduction

Whistler mode waves have been a common feature of spectrum wave observations at Earth's bow shock for many years [Heppner et al. 1967; Fair 1974]. It has been shown that whistler wave can be excited through the application of electron beams gyro phase bunching ions [Gurgiolo et al., 1993] and wave steeping [Hoppe and Russell 1980]. Whistler waves at spacecraft frequency between 1 and 7 Hz have been reported upstream of Earth [Hoppe et al., 1982]. While there are observations of whistler waves propagating parallel to the interplanetary magnetic field, most reported whistler wave observations and generation theories involve highly oblique propagation. Whistler mode waves have also been observed in commentary foreshocks and are thought to arise from the same mechanisms as above [Tsurutani et al., 1987]. It is also reported that the whistler mode can be driven by electron temperature anisotropy [Kennel and Petschek 1966].

Higher frequency whistler wave activity has also been observed upstream of the Earth's bow shock by plasma wave analysis. These waves possess spacecraft frame frequencies from approximately 10 to 100Hz and are generally synchronous with plasma oscillations at the electron plasma frequency [Anderson et al., 1981; Greenstadt et al., 1981; Toker et al., 1984]. Tokar and Gurnett [1985] argued that these waves, when observed with the shock ramp result from electron beams with high thermal anisotropy and beam velocities directed towards the magnetosheath [Feldman et al., 1983]. Similarly high frequency whistler waves have been observed by (International Sun Earth Explorer) ISEE 3 in the distant upstream plasma [Kennel et al., 1985]. These waves are also coincident with electron plasma oscillations and they possibly result from streaming electrons with a solar wind, rather than a bow shock origin in accordance with the instability analysis of Gary and Feldman [1977]. Orlowski et al [1990] suggest that whistler waves observed in planetary foreshocks may not be the result of in situ generation, but rather these observations may simply result from propagation away from the shock.

Whistler waves excited by an electron using kappa distribution and an anisotropic bi-maxwellian distribution functions in space plasma have been studied by using the one dimensional particle simulation technique and confirmed the result of linear and non-linear theory [Lu Quanming et al., 2010; 2004]. The study of thermal velocity of superathermal electron has been done by Vasyliunas [1968] using the observation of satellite data of OGO1 and OGO3 in the magnetosphere.

Electric field measurements at magnetospheric heights and shock region have given values of AC electric field along and perpendicular to Earth's magnetic field [Mozer et al., 1978 ;Wygant et al., 1987; Lindquist and Mozer 1990; Pandey et al., 2008; Misra and Pandey 1995]. Various authors have discussed the role of parallel DC and AC electric fields on the whistler mode instability in the magnetosphere by generally adopting plasma dispersion function which is based on anisotropic Maxwellian distributions to describe the resonant population [Misra and Singh 1980; Pandey et al., 2002A Pandey et al., 2002B]. However in the natural space environment, plasma is generally observed to possess a non-Maxwellian high-energy tail that can be well modeled by a generalized Lorentzian (Kappa) distribution function containing a spectral index κ. The Maxwellian and kappa distributions differ substantially in the high-energy tail but differences become less significant for higher values of Kappa [Pandey et al., 2008; Pandey et al., 2001]. Motivated by these studies whistler mode instability has been analyzed in this paper for relativistic plasma in the presence of perpendicular a.c. electric field using kappa distribution in the interplanetary space at 1AU.

II. Dispersion Relations and Growth Rate

Homogeneous anisotropic collisionless plasma in the presence of an external magnetic field $B_0 = B_0 \hat{e}_z$ and an electric field $E_{0x} = E_0 \sin \upsilon t \; \hat{e}_x$ is assumed. The in- homogeneity is assumed to be small in interaction zone. In order to obtain the particle trajectories, perturbed distribution function and dispersion relation, the linearised Vlasov-Maxwell equations are used. Separating the equilibrium and non equilibrium parts, neglecting the higher order terms and following the techniques of

Pandey et. a1 [2005] the linearized Vlasov equations are given as:

$$v.\frac{\delta f_0}{\delta r}+\frac{e_s}{m_e}\left[E_0\sin\upsilon t+\frac{(v\times B_0)}{c}\right].\frac{\delta f_0}{\delta v}=0 \quad (1)$$

$$\frac{\delta f_1}{\delta t}+v.\frac{\delta f_1}{\delta r}+\left(\frac{F}{m_e}\right).\frac{\delta f_1}{\delta v}=S(r,v,t) \quad (2)$$

Where $f_0 =$ Unperturbed distribution function. f_1=perturbed distribution function and the force

$$F=e\left[E_0\sin\upsilon t+\frac{(v\times B_0)}{c}\right]=m\frac{dv}{dt} \quad (3)$$

Where υ is AC field frequency, E_0 = magnitude of AC electric field and

$$S(r,v,t,)=-\left(\frac{e_s}{m_e}\right)\left[E_1+\frac{(v\times B_0)}{c}\right].\left(\frac{\delta f_1}{\delta v}\right) \quad (4)$$

where s denotes the type of electrons. Subscript '0' denotes the equilibrium values. The perturbed distribution function f_1 is determined by using the method of characteristic, which is

$$f_1(r,v,t)=\int_0^\infty S\{r_0(r,v,t,),v_0(r,v,t),t-t'\}dt$$

Transformed the phase space coordinate system for (r, v, t) to (r_0, v_0,t - t').The relativistic particle trajectories that have been obtained by solving equation (3) for given external field configuration are

$$X_0=X+\left(\frac{P_\perp\sin\theta}{\omega_c m_e}\right)-\left[P_\perp\sin\left\{\frac{\theta+\left(\frac{\omega_c t}{\beta}\right)}{\omega_c m_e}\right\}\right]+\left[\frac{\Gamma_x\sin\upsilon t}{\beta\left\{\left(\frac{\omega_c}{\beta}\right)^2-\upsilon^2\right\}}\right]-\left[\frac{\upsilon\Gamma_x\sin\left(\frac{\omega_c t}{\beta}\right)}{\omega_c\left\{\left(\frac{\omega_c t}{\beta}\right)-\upsilon^2\right\}}\right]$$

$$Y_0=Y-\left(\frac{P_\perp\cos\theta}{\omega_c m_e}\right)-\left[P_\perp\cos\left\{\frac{\theta+\left(\frac{\omega_c t}{\beta}\right)}{\omega_c m_e}\right\}\right]+\left(\frac{\Gamma_x}{\upsilon\omega_c}\right)-\frac{\left\{1+\upsilon^2\beta^2\cos\left(\frac{\omega_c t}{\beta}\right)-\omega_c^2\cos\upsilon t\right\}}{\beta^2\left\{\left(\frac{\omega_c}{\beta}\right)^2-\upsilon^2\right\}}$$

$$z_0=z-\frac{P_z}{\beta m_e} \quad (5)$$

Where $\theta=$ angle of projection, $P_\perp$ *and* P_z are being perpendicular and parallel momentum and the velocities are

$$v_{xo}=P_\perp\cos\left\{\theta+\frac{\left(\frac{\omega_c t}{\beta}\right)}{\beta m_e}\right\}+\left[\frac{\upsilon\Gamma_x}{p\left\{\left(\frac{\omega_c}{\beta}\right)^2-\upsilon^2\right\}}\right]\left\{\cos\upsilon t-\cos\left(\frac{\omega_c t}{\beta}\right)\right\}$$

$$v_{yo}=P_\perp\sin\left\{\theta+\frac{\left(\frac{\omega_c t}{\beta}\right)}{\beta m_e}\right\}+\left[\frac{\Gamma_x}{\beta\left\{\left(\frac{\omega_c}{\beta}\right)^2-\upsilon^2\right\}}\right]\left\{\left(\frac{\omega_c}{\beta}\right)\sin\upsilon t-\upsilon\sin\left(\frac{\omega_c t}{\beta}\right)\right\}$$

$$v_{zo}=\frac{P_z}{\beta m_e},\quad v_x=\frac{P_\perp\cos\theta}{\beta m_e},\quad v_y=\frac{P_\perp\sin\theta}{\beta m_e},$$

$$v_z=\frac{P_z}{\beta m_e}$$

$$\Gamma_x=\frac{eE_o}{m_e},\quad m_e=\frac{m_s}{\beta},\quad \beta=\sqrt{1-\frac{v^2}{c^2}},$$

$$\omega_c=\frac{eB_0}{m_e} \quad (6)$$

Using equation (5), (6) and the Bessel identity then performing the time integration, following the technique and method of Misra and Pandey [1995] and Pandey et al.,[2008], the perturbed distribution function is found after some lengthy algebraic simplifications as :

$$f_1=-\left(\frac{ie_s}{m_e\beta\omega}\right)\sum J_s(\lambda_3)\exp i(m-n)\theta\left[\frac{J_mJ_nJ_pU^*E_{1x}-iJ_mV^*E_1+J_mJ_nJ_pW^*}{\omega-\left(\frac{k_\parallel P_z}{\beta m_e}+p\upsilon-\frac{(n+g)\omega_c}{\beta}\right)}\right] \quad (7)$$

Due to the phase factor the solution is possible when m = n.

Here.

$$U^*=\left(\frac{c_1P_\perp n}{\beta\lambda_1 m_e}\right)-\left(\frac{n\upsilon c_1 D}{\lambda_1}\right)+\left(\frac{p\upsilon c_1 D}{\lambda_2}\right),$$

$$V^*=\left(\frac{c_1P_\perp J_nJ_p}{\beta\lambda_1 m_e}\right)+c_1DJ_pJ_n\omega_c,$$

$$W^*=\left(\frac{n\omega_c F m_e}{k_\perp P_\perp}\right)+\left(\frac{\beta m_e P_\perp\omega\partial f_0}{\partial P_z}\right)+G\left\{\left(\frac{p}{\lambda_2}\right)-\left(\frac{n}{\lambda_1}\right)\right\},$$

$$C_1 = \left\{\frac{(\beta m_e)}{P_\perp}\right\}\left(\frac{\partial f_0}{\partial P_\perp}\right)\left(\omega - \frac{k_\parallel p_z}{\beta m_e}\right) + k_\parallel \beta m_e \left(\frac{\partial f_0}{\partial P_\perp}\right),$$

$$D = \left[\frac{\Gamma_x}{\beta\left\{\left(\frac{\omega_c}{\beta}\right)^2 - \upsilon^2\right\}}\right],$$

$$F = \frac{Hk_\perp P_\perp}{\beta m_e},$$

$$H = \left\{\frac{(\beta m_e)^2}{P_\perp}\right\}\left(\frac{\partial f_0}{\partial P_\perp}\right)\left(\frac{P_z}{\beta m_e}\right) + \beta m_e\left(\frac{\partial f_0}{\partial P_z}\right),$$

$$G = \frac{Hk_\perp \upsilon \Gamma_x}{\beta\left\{\left(\frac{\omega_c}{\beta}\right)^2 - \upsilon^2\right\}}, \quad J_n(\lambda_1) = \frac{dJ_n(\lambda_1)}{d\lambda_1},$$

$$J_n(\lambda_2) = \frac{dJ_p(\lambda_2)}{d\lambda_2}$$

and the Bessel function arguments are defined as

$$\lambda_1 = \frac{k_\perp P_\perp}{\omega_c m_e}, \quad \lambda_2 = \frac{k_\perp \Gamma_x}{\beta\left\{\left(\frac{\omega_c}{\beta}\right)^2 - \upsilon^2\right\}},$$

$$\lambda_3 = \frac{k_\perp \upsilon \Gamma_x}{\beta\left\{\left(\frac{\omega_c}{\beta}\right)^2 - \upsilon^2\right\}}$$

The conductivity tensor $\|\sigma\|$ is found to be

$$\|\sigma\| = \frac{-i\sum\left(e^2/\beta m_e\right)^2 \omega \int d^3P J_g(\lambda_3)\|s\|}{\left[\omega - \left(\frac{k_\parallel P_z}{\beta m_e}\right) - \left((n+g)\frac{\omega_c}{\beta}\right) + p\upsilon\right]}$$

where

$$\|S\| = \begin{vmatrix} P_\perp J_n^2 J_p\left(\frac{n}{\lambda_1}\right)U^* & iP_\perp J_n V^* & P_\perp J_n^2 J_p\left(\frac{n}{\lambda_1}\right)W^* \\ P_\perp J_n J_n J_p\left(\frac{n}{\lambda_1}\right)U^* & iP_\perp J_n V^* & P_\perp J_n J_p\left(\frac{n}{\lambda_1}\right)W^* \\ P_z J_n^2 J_p\left(\frac{n}{\lambda_1}\right)U^* & iP_z J_n V^* & P_z J_n^2 J_p\left(\frac{n}{\lambda_1}\right)W^* \end{vmatrix}$$

By using these in the Maxwell's equations we get the dielectric tensor,

$$\varepsilon_{ij} = 1 + \sum\left\{\frac{4\pi e_s^2}{(\beta m_e)^2 \omega}\right\}\int \frac{d^3P J_g(\lambda_3)\|S\|}{\left(\omega - \frac{k\|Pz}{\beta m_e}\right) - \left\{\frac{(n+g)\omega_c}{\beta}\right\} + p\upsilon}$$

For parallel propagating whistler mode instability, the general dispersion relation reduces to $\varepsilon_{11} \pm \varepsilon_{12} = N^2$,

$$N^2 = \frac{k^2c^2}{\omega^2}$$

The dispersion relation for relativistic case with perpendicular AC electric field for g= o, p = 1, n = 1 is written as:

$$\frac{k^2c^2}{\omega^2} = 1 + \frac{4\pi e_s^2}{(\beta m_e)^2\omega^2}\int \frac{d^3P}{\beta}\left[\frac{P_\perp}{2} - \frac{\upsilon\Gamma_x m_e}{2\left(\frac{\omega_c^2}{\beta^2} - \upsilon^2\right)}\right]\left[\left(\beta\omega - \frac{k_\parallel P_\parallel}{m_e}\right)^2 \frac{\partial f_0}{\partial P_\perp} + \frac{P_\perp k_\parallel}{m_e}\frac{\partial f_0}{\partial P_\perp}\right]\frac{1}{\beta\omega - \frac{k_\parallel P_\parallel}{m_e} - \omega_c + \beta\upsilon} \tag{9}$$

The bi-Lorentzian Kappa distribution function is given as

$$f_0 = \frac{n_0}{\pi^{3/2}k^{1/2}\theta_\perp^2\theta_\parallel}\frac{\Gamma(\kappa+1)}{\Gamma(\kappa+1/2)}\left(1 + \frac{P_\parallel^2}{\kappa\theta_\parallel^2}\frac{P_\perp^2}{\kappa\theta_\perp^2}\right)^{-(\kappa+1)} \tag{10}$$

$\theta_\parallel$ and $\theta_\perp$ are respective thermal speeds parallel and perpendicular to the background magnetic field and is defined as

$$\theta_\perp = \left(\frac{2k-3}{k\theta_\perp^2}\right)^{1/2}\left(\frac{k_B T_\perp}{m}\right)^{1/2},$$

$$\theta_\parallel = \left(\frac{2k-3}{k}\right)^{1/2}\left(\frac{k_B T_\parallel}{m}\right)^{1/2}$$

Substituting and using equation (13), (14) and doing integration by parts the dispersion relation is found as:

$$\frac{k^2c^2}{\omega^2}=1+\frac{\omega_p^2}{\omega^2}\int\frac{d^3P}{\beta}\left[1-\frac{\upsilon\Gamma_x m}{P_\perp\left(\frac{\omega_c^2}{\beta^2}-\upsilon^2\right)}\right]\left[\frac{\left(\beta\omega-\frac{k_\parallel P_\parallel}{m}\right)}{\left(\beta\omega-\frac{k_\parallel P_\parallel}{m}\right)}-\frac{P_\perp^2}{2m^2c^2}\frac{\left(\omega^2-k_\parallel^2c^2\right)}{\left(\beta\omega-\frac{k_\parallel P_\parallel}{m}-\omega c+\beta\upsilon\right)^2}\right]f_0 \quad (11)$$

Doing some lengthy integrals the general dispersion relation becomes

$$\frac{k^2c^2}{\omega^2}=1+\frac{\omega_p^2}{\omega^2\beta\theta_\perp^2}\left[X_i\frac{\beta m\omega}{k_\parallel\theta_\parallel}\left(\frac{\kappa-1}{\kappa-3/2}\right)Z_{k-1}\left\{\left(\frac{\kappa-1}{\kappa}\right)^{1/2}\xi\right\}+\left(X_2-X_5\frac{\omega^2}{k^2c^2}\right)\right.$$

$$\left.\left\{1+\xi\left(\frac{\kappa-1}{\kappa}\right)^{1/2}\left(\frac{\kappa-1}{\kappa-3/2}\right)\right\}Z_{k-1}\left\{\left(\frac{\kappa-1}{\kappa}\right)^{1/2}\right\}\xi\right] \quad (12)$$

Where,

$$X_1=\theta_\perp^2-\frac{\upsilon\Gamma_x m}{\left(\frac{\omega_c}{\beta}\right)-\upsilon^2}\sqrt{\pi\theta_\perp}$$

$$X_2=\theta_\perp^2A_{kT}-\frac{\upsilon\Gamma_x m}{\left(\frac{\omega_c}{\beta}\right)-\upsilon^2}\sqrt{\pi\theta_\perp}\left(\frac{\theta_\perp^2}{\theta_\parallel^2}\frac{1}{2}-1\right)$$

$$X_3=\frac{\theta_\perp^2}{\theta_\parallel^2}\left[\theta_\perp^2-\frac{\upsilon\Gamma_x m}{\left(\frac{\omega_c}{\beta}\right)-\upsilon^2}\sqrt{\pi\theta_\perp}\left(\frac{\theta_\perp^2}{\theta_\parallel^2}\frac{1}{2}-1\right)\right]$$

$$A_{kT}=\frac{\theta_\perp^2}{\theta_\perp^2}-1,\quad \xi=\frac{\beta m\omega-m\omega_c+\beta m\upsilon}{k_\parallel\theta_\parallel} \quad (13)$$

For real k and substituting

$$\frac{k^2c^2}{\omega^2}>>1$$

And using the expression of modified dispersion function Summers &Thorne [1991] $Z^*_k(\xi)$ in the limit

$$Z_\kappa^*(\xi)=\frac{\kappa!\kappa^{\left(\kappa-\frac{1}{2}\right)}\sqrt{\pi}}{\Gamma_{(\kappa-1/2)}\xi^2(\kappa+1)}\left\{1-\frac{\kappa(\kappa+1)}{\xi^2}+.....\right\}-\left(\frac{2\kappa-1}{2\kappa}\right)\frac{1}{\xi}\left(1+\frac{\kappa}{2\kappa-1}\frac{1}{\xi}+.....\right) \quad (14)$$

For $|\xi|\to\infty$

The expression for growth rate for real frequency ω_r in dimensionless form is found to be

$$\frac{\gamma}{\omega_c}=\frac{\frac{\sqrt{\pi}(k-1)\kappa^{\kappa-1/2}}{\beta(k-3/2)!\tilde{k}}\left(\frac{X_2}{X_1}-k_3\right)k_4^3\left\{-\left(\frac{k_4}{\tilde{k}}\right)\right\}^{-2k}}{1+\beta X_4+\frac{\kappa}{\kappa-3/2}\frac{\tilde{k}^2}{2}\left(\frac{1+\beta X_4}{k_4^2}+\frac{2X_4X_3\theta_\parallel^2}{X_1\tilde{k}^2c^2}\right)-\frac{\tilde{k}^2}{k_4}\left(\frac{x_2}{x_1}-k_3\right)} \quad (15)$$

$$X_3=\frac{\tilde{k}^2}{\delta\beta_1}\left[(1+\beta X_4)+\frac{X_2}{X_1}\frac{\beta_1}{1+\beta X_4}\right] \quad (16)$$

Where

$$k_3=\frac{\beta X_3}{k_4}+\frac{X_4}{X_1}\frac{X_3^2}{\tilde{k}^2}\frac{\theta_\parallel^2}{c^2},$$

$$\tilde{k}=\frac{k_\parallel\theta_\parallel}{m_e\omega_c},$$

$$k_4=1-\beta X_3+\beta X_4,$$

$$X_3=\frac{\omega_r}{\omega_c},\quad X_4=\frac{-\beta\upsilon}{\omega_c},\quad \beta_1=\frac{k_BT_\parallel\mu_0n_0}{B_0^2} \quad (17)$$

When the relativistic factor is not considered, that is when the velocity of plasma does not approach velocity of light, Then $m_s = m_e$ and the expressions for Growth rate and real frequency reduce to Pandey et al.,[2005].

III. RESULTS AND DISCUSSION

For numerical evaluation of normalized growth rate and real frequency of relativistic whistler mode in the presence of perpendicular AC electric field has been analyzed for Kappa distribution function of electron density for inter planetary space at 1AU.

Following plasma parameters have been taken from Pandey et al [2005] $B_0 = 8 \times 10^{-9}$T, $A_T = [(T_\perp/T_\parallel) - 1] = 0.25, 0.5, 0.75$, $\kappa = 2,3,4$, relativistic factor $b_1 = v/c = 0.3, 0.6, 0.9$, $E_0 = 20$ mV/m. AC field frequency υ varies from zero to 400 Hz. According to this choice of plasma parameters, the explanations and details of results are given as follows. Fig. 1 depicts the variation of normalized growth rate and real frequency with respect to normalized $\bar{k}$ for various values of temperature anisotropy for kappa distribution index $\kappa = 2$. At this location the growth rate as well as the bandwidth increases with the increase of the temperature anisotropy and maxima is shifted towards the higher $\bar{k}$ values. It is clear from the figure that the temperature anisotropy is the main source of energy to drive the excitation of the wave. Lorentzian (Kappa) plasma series expansion brings

change in perpendicular thermal velocity $\theta_\perp$. Therefore any change in $\theta_\perp$ shall affect marginally $T_\perp$, affecting temperature anisotropy terms. Temperature anisotropy being the primary source of instability gets further modified by Lorentzian (Kappa) distribution function, giving rise to further increase in growth rate. Recently it was found that suprathermal electron in Kappa distribution modifies the intensity and Doppler frequency of electron plasma lines. The inclusion of temperature anisotropy in Lorentzian (Kappa) plasma can explain the observed higher frequencies spectrum of whistler waves [Pandey et al.,2008]. Figure 2 shows the variation of growth rate and real frequency for various values of number density and other fixed plasma parameters. The growth rate increases as density increases. The maxima shifts to higher values of k. Fig. 3 exhibits variation of normalized growth rate and real frequency versus $\bar{k}$ for various values of the thermal energy of electron at other fixed plasma parameters. The depressive's properties of the whistler waves are known to dependent sensitivity on the density and composition of thermal energy of plasma it is clear as the growth rate as well as the band width increases with the increase of thermal velocity of electron. Fig. 4 shows the variation of normalized growth rate and real frequency with $\bar{k}$ for variation of the relativistic factor $b_1 = (v/c)$. With the increase of the relativistic factor the growth rate increases and the bandwidth widens. This shows that the velocity of the energetic electrons have triggering effect on the growth of the wave.

Fig. 5 Shows the variation of normalized growth rate and real frequency with $\bar{k}$ for various values of spectral index κ. The growth rate increases and bandwidth shrinks towards higher wave number for increasing the value of κ. For $\kappa \to \infty$ the value of normalized growth rate approaches the value of growth rate for Maxwellian distribution function. This effect remains basically applicable to the Lorentzian (Kappa) plasma also, except that the limit of temperature anisotropy in this case is little higher because of series solution involving κ. Fig. 6 Shows variation of normalized growth rate and real frequency versus $\bar{k}$ for various values of AC electric field frequency for other fixed plasma parameters. The growth rate increases with increase of the value of a.c. frequency, maxima shifts to lower values of $\bar{k}$. it means that the a.c. frequency modifies resonance frequency. The increase of AC frequency increases the growth rate due to the negative exponential of Landau damping. The perpendicular electric field that modifies the perpendicular velocity contributing to the energy exchange contributes significantly to the emission of VLF signals and can explain the low frequency side of the spectrum. The energy exchange between electrons, the components of the wave electric field and the impressed AC field perpendicular to the magnetic field mainly contributes to the cyclotron growth or the damping of the waves.

Thus the frequency of the perpendicular AC electric field brings the maxima to different $\bar{k}$ as if the resonant charged particles were oscillating at different cyclotron frequencies and absorbing energy and thus growing.

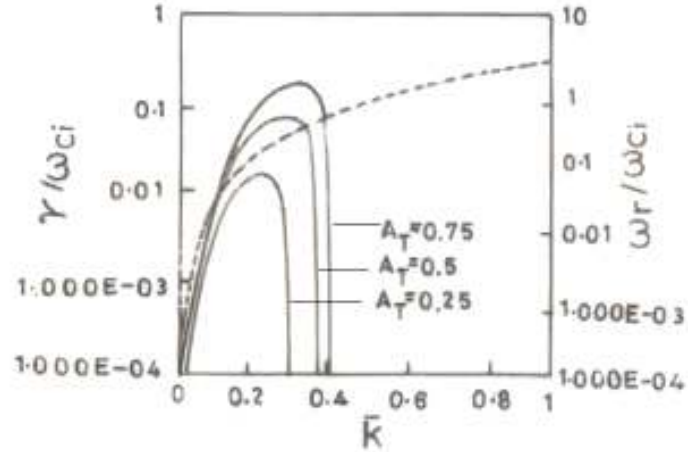

Fig. 1 Variation of growth rate (solid line) and real frequency (dotted line) with respect to $\bar{k}$ for various values of temperature anisotropy at other fixed plasma parameters.

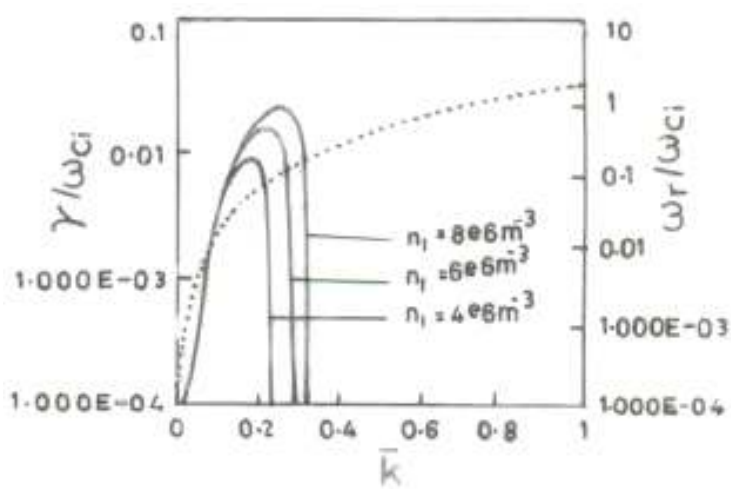

Fig. 2 Variation of growth rate (solid line) and real frequency (dotted line) with respect to $\bar{k}$ for various values of number density anisotropy at other fixed plasma parameters.

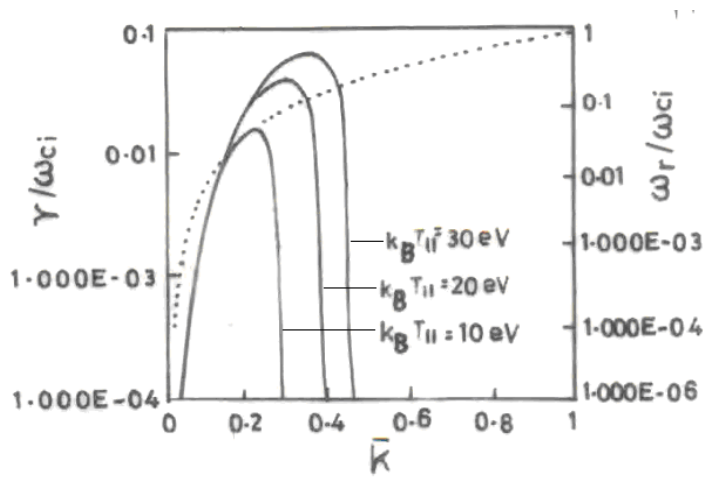

Fig. 3 Variation of growth rate (solid line) and real frequency (dotted line) with respect to $\bar{k}$ for various values of thermal energy at other fixed plasma parameters.

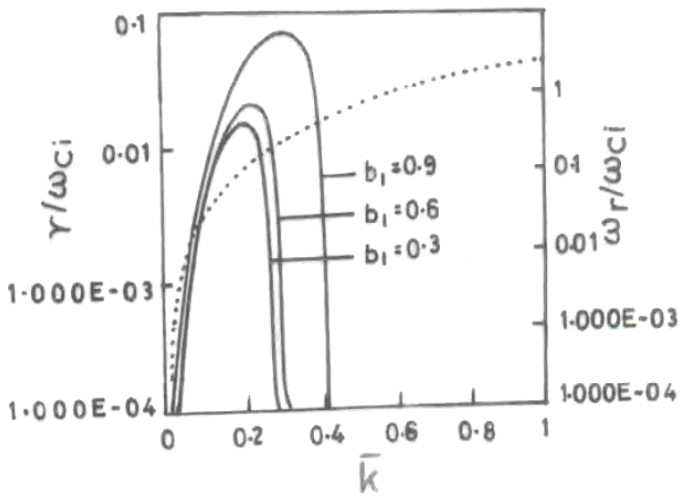

Fig. 4 Variation of growth rate (solid line) and real frequency (dotted line) with respect to $\bar{k}$ for various values of relativistic factor at other fixed plasma parameters.

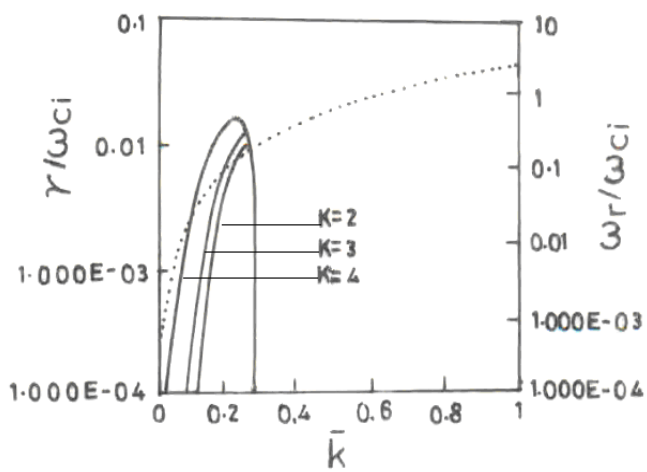

Fig. 5 Variation of growth rate (solid line) and real frequency (dotted line) with respect to $\bar{k}$ for various values of spectral index at other fixed plasma parameters.

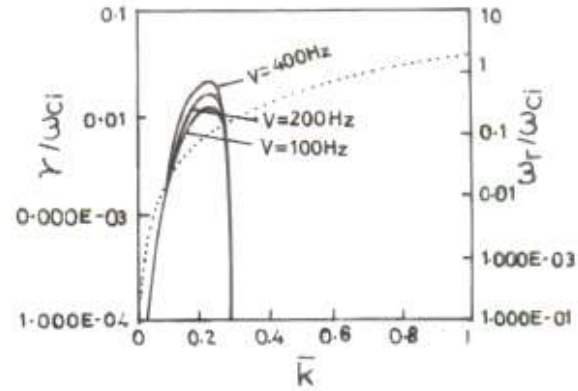

Fig. 6 Variation of growth rate (solid line) and real frequency (dotted line) with respect to $\bar{k}$ for various valuesof frequency of a.c. field at other fixed plasma parameters.

IV. CONCLUSION

The normalized growth rates have been evaluated for plasma parameters suited in interplanetary space at 1AU. The method of characteristics solution and kinetic approach has been used for the derivation of dispersion relation and growth rate. The effects of AC. frequency and relativistic factor will discuss in the light of Kappa distribution function. The velocity of background plasma has been considered in the order of velocity of light, so the relativistic approach of mass changing with velocity has been taken in account. Thus changing the mathematical treatment from velocity to momentum form in detail, an expression for the growth rate of the system has been calculated and the results for representative values of the parameters suited to bow shock region at 1AU has been obtained. It is inferred that A.C. field frequency modifies the resonance criteria, which influences the growth rate. Also the growth rate increases by increasing the number density of cold plasma and temperature anisotropy. Plasma particles having higher Kappa spectral index provide additional source of energy. In addition to the other factors the relativistic plasma modifies the growth rate and also shifts the wave band significantly. The relativistic electrons by increasing the growth rate and widening the bandwidth may explain a wide frequency range of whistler emissions in the Earth's magnetosphere.

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Development of an Assistive Aid for Speech Impaired

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Abstract- Speech impairment refers to the inability to produce normal speech. Dysarthria is a kind of speech disorder where there is a difficulty in producing the normal speech. The proposed system makes use of an acoustic plate that senses the vocal cord vibrations.When a set of unpatterned words are spoken by the user, the words are compared with the preprogrammed words in the speech IC where it is analysed and corresponding audio output is heard through the speaker. This system can be implemented in realtime to express the basic needs of speech impaired.

Index Terms- Vocals, Acoustic plate, Speech impaired.

I. Introduction

Speech impairment is a communication problem in which the normal speech is disrupted due to articulation problems. Difficulties in pronouncing the sounds and sluttering are some examples of speech impairment. Speech difficulties can also be associated with cerebral palsy, hearing impairment and brain injury. People with speech disabilities have difficulty in understanding and expressing their ideas.

Speech disorders affect the content of speech and the function of language in communication. The disorders associated with speech are articulation deficiency, speech disturbances, dysfluency, aphasia, dysphonia and dysarthria. People with the nerve or brain disorder have the inability to control the larynx and the vocal cords, which causes a condition known as dysarthria. Dysarthia is a common speech disorder which is found among the verbally challenged people. People with dysarthria have weak and impaired speech muscles, resulting in the improper pronunciation.

People with complex communication needs often struggle with verbal language and require an Alternative and Augmentative communication (AAC) strategy. These aids can be used for the people with communication defects. These aids are categorized in two types namely, low tech and high tech communication aids. Low tech communication aids are non-electronic form of communication by means of books, words and letters. High tech communication aids are in the form of electronic communication which permits the storage and retrieval of electronic messages.

Recognition systems can be broken down into two main types. Pattern Recognition systems that compare patterns to known/trained patterns to determine a match and Acoustic Phonetic systems use knowledge of the human body (speech production, and hearing) to compare speech features (phonetics such as vowel sounds).

II. Related Work

To facilitate an easy communication for a verbally challenged people an electronic speaking glove is designed in which the gestures from the gloves are converted into a synthesized speech to convey an audible message to others. The glove is internally equipped with multiple flex sensors that are made up of bend-sensitive resistance elements [1].

A system consisting of AG-500 articulograph sensor which is placed on the lips of the user was developed [2].The sensor calculates the distance between the various reference points assigned to the mouth. The distance is mapped with equivalent SAMPA code which is fed as an input to the voice generating software and output is obtained in audio form.

A vocal cord vibration switch [3] was developed which uses accelerometer sensors to detect the vibrations from the vocal cord. The vocal cord vibration due to speech are considered as high periodic signals and the vibrations produced due to coughs and swallows are considered as low periodic signals. These low periodic signals are filtered and the high periodic signals are allowed to activate the switch which can be connected to computers, or communication devices for further processing.

The digital speech aid [4], which is an electronic device developed for elimination or reduction of stuttering, which uses digital signal processing circuitry, to elicit the desired response characteristics of the feedback signal.

The speech impaired people have difficulty in using the communication systems and devices described in the literature which are not portable and more susceptible to noise. Thus we have proposed a portable and convenient embedded controlled assistive device for speech impaired people.

III. PROPOSED SYSTEM

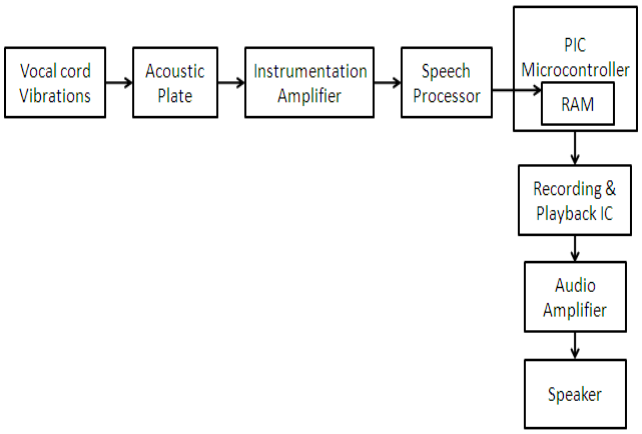

Fig.1.Block diagram of the proposed system

The proposed system is a user dependent system in which the speech IC is trained by the individual who will be using the system. It employs an acoustic plate to sense the vocal vibration.These vibrations are amplified and processed by the speech IC. The speech IC is trained with certain words. When the trained words are spoken by the user, the vibrations produced are recognized and compared by the speech IC. The output of the HM2007 is given as input to the PIC controller. The PIC controller is interfaced with recording and playback IC. The recording and playback IC is capable of recording up to 8 messages. The PIC controller is programmed in such a way it directs the output of the speech IC to the corresponding pins of the playback IC and audio output is produced by means of speaker.

Operation of HM2007

To use the HM2007, the user must train their voice prints on the chip.For each word that is to be recognized, the microcontroller asks the user to speak that word. Because the user may say the word differently.For each time the user says the word, the HM2007 integrates this word into a neural network (this network is stored in the off-chip SRAM). Later, in recognition mode, the HM2007 tries to match the spoken word against other words in its neural network.If a match is made, the index of that word in the vocabulary is returned.

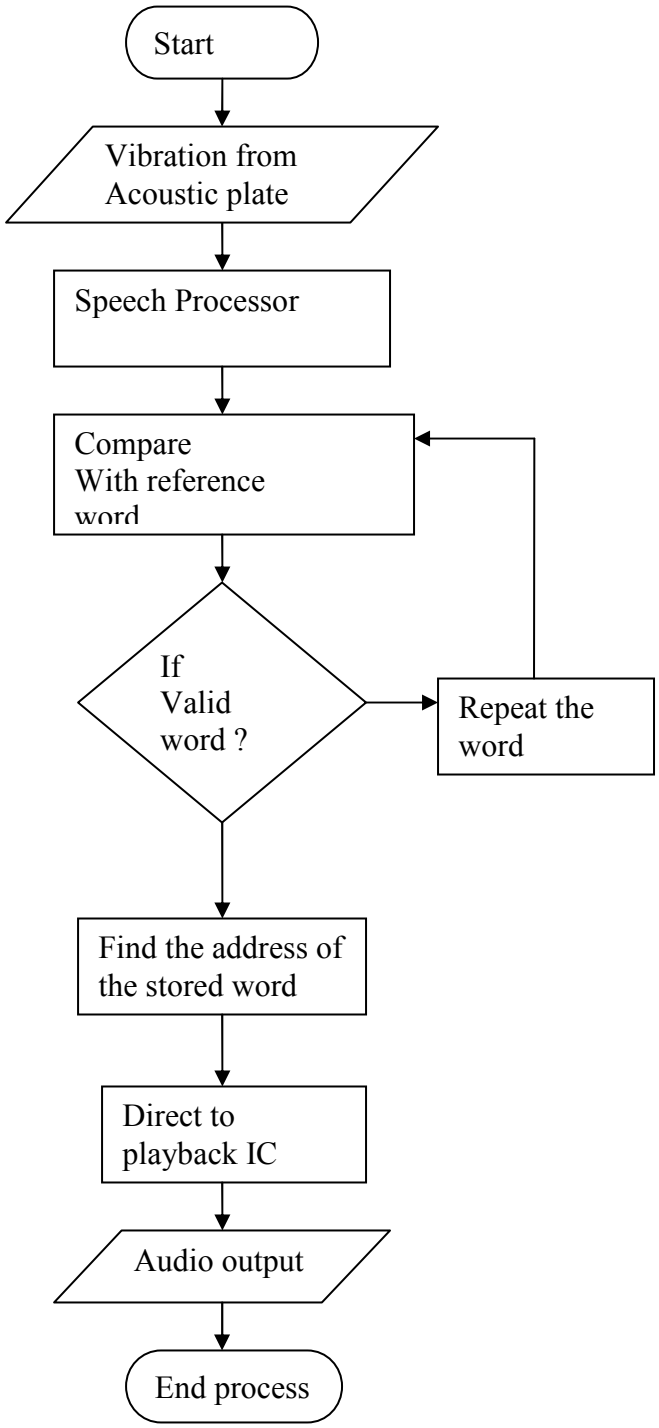

Fig.2. Flowchart for the proposed system

A. Hardware identification:

1. Acoustic plate:

An acoustic plate is a basic electronic sound component with its simple structure. It produces the stable performances and high

reliability. This consists of the ceramic plate with electrodes on both the sides of 20mm diameter and the metal plate of 30mm diameter. The diaphragm is designed to expand and bend in fixed direction. When the diaphragm shrinks, voltage is applied across the electrodes; sound waves are produced in air.

2. Instrumentation amplifier:

The differential input single-ended output instrumentation amplifier is one of the most versatile signal processing amplifiers available. It is used for precision amplification of differential dc or ac signals while rejecting large values of common mode noise. By using integrated circuits, a high level of performance is obtained at minimum cost. The instrumentation amplifier AD0620 is used in this project for amplifying the signals.

3. Speech IC:

HM2007 provides the options of recognizing either forty words of 0.92 seconds or twenty words of 1.92 seconds. It operates in two modes manual mode and CPU mode. Manual mode is chosen because it doesn't require a host computer and can be integrated into other devices to utilize speech control. HM2007 involves two main process, training and recognition. The training process involves the storage of the targeted words in HM2007 and the recognition process for the comparison and matching of the trained words.

4. Microcontroller:

A microcontroller is used to execute a single task within one application. The peripheral interface controller (PIC) 16F877A is used in this project. The PIC16F877A features 256 bytes of EEPROM data memory, self programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, the synchronous serial port can be configured as either 3-wire Serial Peripheral Interface or the 2-wire Inter-Integrated Circuit (I^2C) bus and a Universal Asynchronous Receiver Transmitter (USART).

5. Playback and recording IC:

The obtained output from the microcontroller is recorded by using the APR 9600 integrated circuit. The device supports both random and sequential access of multiple messages. Sample rates are user-selectable, allowing designers to customize their design for unique quality and storage time needs. The APR9600 device offers true single-chip voice recording, non-volatile storage, and playback capability for 40 to 60 seconds. It can provide recording and playback of maximum 8 messages.

5. Speaker:

For the audio output in this proposed system is 50mm audio speaker with 8 ohms is used.

IV. Result

The assistive aid that was developed resulted in providing an user friendly approach to the speech impaired people. The user dependent system provided 90 percent accuracy

V. CONCLUSION

This system helps the speech impaired people and for the bed-ridden deaf and dumb people to express their need and announce their requirements.

VI. FUTURE ADVANCEMENTS

This project can be extended using high efficient voice circuit which comes with the option of recording more messages. Further advancement include making the device wireless and using high efficient sensors for sensing the vocal vibrations.

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Privacy Preserving Back Propagation Algorithm for Distributed Neural Network Learning

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Abstract- We address to the problem of Privacy Preserving Back Propagation Algorithm for a Vertically Partitioned Dataset. To enhance cooperation's in learning, it is important to address the privacy concern of each data holder by extending the privacy preservation notion to original learning algorithms. In this paper, we focus on preserving the privacy in an important learning model, multilayer neural networks. We present a privacy-preserving multiparty distributed algorithm of back propagation which allows a neural network to be trained without requiring either party to reveal her data to the others. We provide complete correctness and security analysis of our algorithms. The effectiveness of our algorithms is verified by experiments on various real world data sets.

Index Terms- back propagation, privacy preserving, multi-party computation, neural network, ElGamal Scheme.

I. Introduction

With the development of distributed computing environment, many learning problems now have distributed input data. In such distributed scenarios, privacy concerns often become a big issue. In recent years, Secure Multiparty Computation (SMC) [1] and privacy preservation have attracted much attention in incorporating security into data mining and machine learning algorithms [2], [3], [4], [5], [6], [7]. A natural question is why the researchers would want to build a learning model (e.g., neural networks) without first collecting all the training data on one computer. If there is a learner trusted by all the data holders, then the trusted learner can collect data first and build a learning model. However, in many real-world cases, it is rather difficult to find such a trusted learner, since some data holders will always have concerns like "What will you do to my data?" and "Will you discover private information beyond the scope of research?" On the other hand, given the distributed and networked computing environments nowadays, collaborations will greatly benefit the scientific advances.

In this paper, we focus on one of the most popular techniques in machine learning, multilayer neural networks [8], [9], in which the privacy preservation problem is far from being practically solved. In [10], a Privacy preserving light weight two party protocol is proposed and implemented. However, it is not generalised for multiparty computation.

We propose a multiparty distributed algorithm for privacy-preserving back propagation training with vertically partitioned data1 (i.e., when each party has a subset of features). Our contributions can be summarized as follows.

1) Our paper is the first to investigate the problem of training multi-layered neural networks over vertically partitioned databases with privacy constraints.
2) Our algorithms are provably private in the semi honest model [10] and lightweight in terms of computational efficiency.
3) Our algorithms include a solution to a challenging technical problem, namely, privacy-preserving computation of activation function. This problem is highly challenging because most of the frequently used activation functions are infinite and continuous while cryptographic tools are defined in finite fields. To overcome this difficulty, we propose the first cryptographic method to securely compute sigmoid function for multiparty computation, in which an existing piecewise linear approximation of the sigmoid function [11] is used.

II. Technical Preliminaries

For ease of presentation, in this paper, we consider a neural network of three layers, where the hidden-layer activation function is sigmoid and the output layer is linear. Note that it is trivial to extend our work to more layers.

1) Semi honest Model: As many existing privacy-preserving data mining algorithms, we adopt semi honest model in this paper. Semi honest model is a standard adversary model in cryptography. In this paper, the security of our algorithm is guaranteed in this model. When computing function in a distributed fashion, semi honest model requires that each party that participates in the computation follow the algorithm, but a party may try to learn additional information by analysing the messages that she receives during the execution. In order to guarantee the security of distributed algorithm of computing, it must be ensured that each party can learn nothing beyond what can be implied by her own input and output. Semi honest model is a right fit for our setting, because normally participants want to learn the neural network learning results and thus they are willing to follow the algorithm to guarantee the results correctness. The security guaranteed in semi honest model can relieve the concerns about their data privacy. Of course, in reality, there may be scenarios in which there are malicious adversaries. It has been shown that a distributed algorithm that is secure in the semi honest model can be converted to one that is secure in the malicious model, with some additional costs in computation and communications for zero knowledge proofs.

2) El Gamal Scheme

El Gamal is a public-key encryption scheme .

Setup

- Choose Large Prime p
- Choose primitive element $\alpha \varepsilon Z_p^*$
- Choose secret key a ε {2,3,…..,p-2}.
- Compute $\beta = \alpha^a$ mod p.
- Public Key = K_{pub} = (p, α, β).
- Private Key = K_{pr} = (a).

Encryption

- Choose k ε {2,3,…..,p-2}.
- Y1= αk mod p.
- Y2= x.βk mod p
- Encryption: Ekpub (x, k) = (Y1, Y2).

Decryption

- x= Dkpr(Y1, Y2) = Y2 (Y1a)-1 mod p

Homomorphic Property: For two messages m1 and m2, an encryption m1m2 of can be obtained by an operation on E(m1,r) and E(m2,r) without decrypting any of the two encrypted messages.

Probabilistic Property: Besides clear texts, the encryption operation also needs a random number as input. There exist many encryptions for each message.

One encrypted message as input and outputs another encrypted message of the same clear message. This is called re-randomization operation.

3) Piecewise Linear Approximation of Sigmoid Function:

Equation 1 is piecewise linear approximation of sigmoid function $1/1+e^{-x}$ .Our algorithm for BPN Learning makes use of following approximation

$$y(x) = \begin{cases} 1 & x > 8 \\ 0.015628x + 0.875 & 4 < x \leq 8 \\ 0.03125x + 0.8125 & 2 < x \leq 4 \\ 0.125x + 0.625 & 1 < x \leq 2 \\ 0.25x + 0.5 & -1 < x \leq 1 \\ 0.125x + 0.375 & -2 < x \leq -1 \\ 0.315x + 0.1875 & -4 < x \leq -2 \\ 0.015628x + 0.125 & -8 < x \leq -4 \\ 0 & x \leq -8 \end{cases} \quad \ldots (1)$$

III. PRIVACY PRESERVING NEURAL NETWORK LEARNING

In this section, we present a privacy-preserving distributed algorithm for training the neural networks with back propagation algorithm. A privacy-preserving testing algorithm can be easily derived from the feed forward part of the privacy-preserving training algorithm. Our algorithm is composed of many smaller private computations. We will look into them in detail after first giving an overview

Algorithm No 1:

Statement: Securely Computing the Product of Two Integers.

M= Integer hold by Party A.

N= Integer hold by Party B.

Party A:

1) Generates a Random Number R
2) Computes M.i – R for each I, s.t –n<i<n Mi = M.i – R.
3) Encrypts each M_i using ElGamal Scheme using new random number for each M_i
4) Sends each $E(M_i,r_i)$ to Party B in increasing order of i

Party B:

1) B picks $E(M_N,R_N)$, randomizes it and sends back to A $E(M_N,r')$, $r' = r_N+S$ where S is known to Party B

Party A:

1) Party A partially decrypts E(Mn,r') and sends to B

Party B:

1) Finally decrypts to get Mn = M.N-R

Algorithm No 2:

Statement: Securely Computing Piecewise Linear Sigmoid Two Integers.

M= Integer hold by Party A.

N= Integer hold by Party B.

Party A:

1) Generates a Random Number R
2) Computes y (X1+i)-R for each I, s.t –n<i<n Mi = y (X1+i)-R
3) Encrypts each M_i using ElGamal Scheme using new random number for each M_i
4) Sends each $E(M_i,r_i)$ to Party B in increasing order of i

Party B:

1) B picks $E(M_N,R_N)$, randomizes it and sends back to A $E(M_N,r')$, $r' = r_N+S$ where S is known to Party B

Party A:

1) Party A partially decrypts E(Mn,r') and sends to B

Party B:

1) Finally decrypts to get Mn = y(x1+x2)-R

Algorithm 3: Privacy-Preserving Distributed Algorithm for Back propagation Training

Step1: Feed Forward Stage

For each hidden layer node hj, Party A computes weight * input for Ma attributes

Party B computes weight * input for Mb attributes

Using Algorithm 2, Party A and B jointly compute Sigmoid Function for each hidden layer node hj obtaining their random shares hj1 and hj2 respectively.

Each Party calculates Output Oi respectively.

Step 2: BACK PROAGATION STAGE

Party A Computes Δ1 wij as (oi1-ti)hj1+r11+r21

Party B Computes Δ2 wij as (oi2-ti)hj2+r12+r22

Similarly step is repeated to Hidden Layers to calculate the delta values back propagating from output layer to hidden layer

A sends Δ1 of output and hidden layers to B and B sends Δ2 of output and hidden layers to A.

A and B compute new weight vector values accordingly also considering the learning rate.(At hidden and Output Layers)

This rate is kept same at both parties.

Repeat above three steps until terminating condition for error threshold occurs or after predefined number of iterations.

IV. RESULT ANALYSIS

In this section, we perform experiments to measure the accuracy and overheads of our algorithms. We compare the testing error rates in privacy-preserving and non-privacy-preserving cases. The experimentation was carried on Intel Core I5 Machine with 4GB of memory. The results shown below are the average of 100 runs. The testing data sets are from the University of California at Irvine (UCI) data set repository [12]. We choose a variety of data sets, kr-versus-kp, Iris, Pima-Indian-diabetes (diabetes), Sonar and Landsat with different characteristics, in the number of features, the number of labeled classes, the size of data sets, and data distributions. Different neural network models are chosen for varying data sets. Table I shows the architecture and training parameters used in our neural network model. We choose the number of hidden nodes based on the number of input and output nodes. This choice is based on the criteria of having at least one hidden unit per output, at least one hidden unit for every ten inputs, and five hidden units being a minimum.

Figure 1, 2, 4 and 5 shows different training and testing error rates achieved for back propagation applied for Non Privacy Preserving Algorithm and Sigmoid Approximation Algorithm. The results are taken considering entire datasets for training and also some results are taken with variable datasets for training and testing.

Figure 3 indicates the decrease in the error rates in further increase of number of epochs. This graph only indicates the decrease of error rate for Non Privacy Preserving Algorithm.

Table 1: Architecture and training parameters

	IRIS	KRKP	DIABETES	SONAR
TOTAL SAMPLES	150	3196	768	208
CLASS	3	2	2	2
ARCHITECTURE	4-5-3	36-15-1	8-12-1	60-6-1
EPOCHS	80	20	40	150
LEARNING RATE	0.1	0.1	0.2	0.1

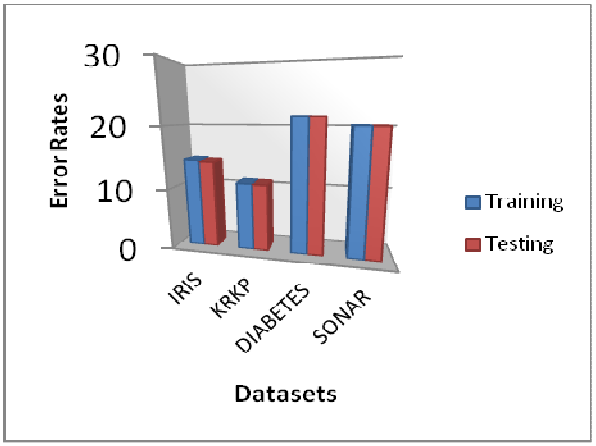

Fig. 1 Non Privacy Preserving Training v/s Testing results (100% Dataset used for Test and Train)

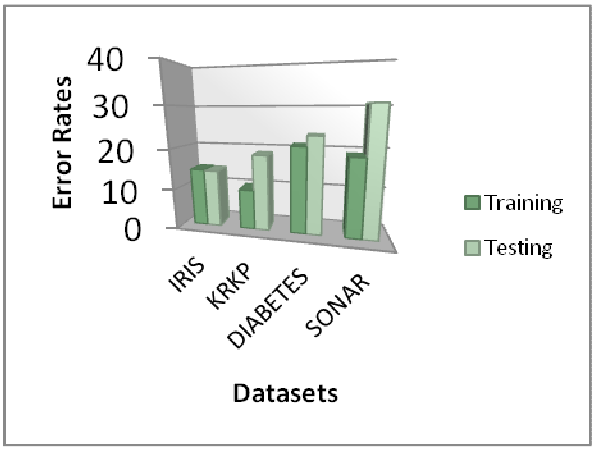

Fig. 2 Non Privacy Preserving Training v/s testing results (Divided Dataset used for Test and Train)

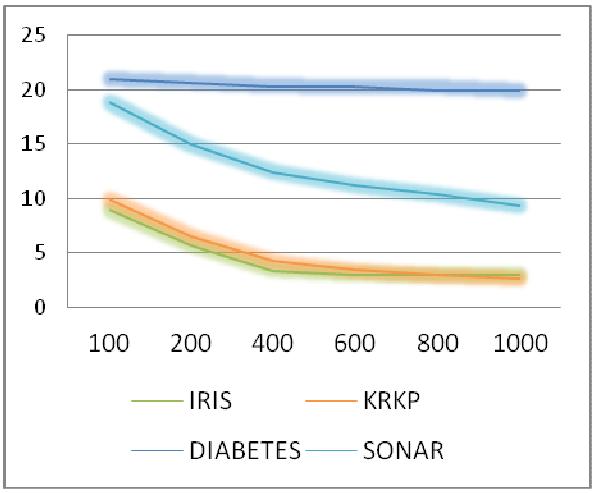

Figure 3: Error Rates on Training Epochs for Non Privacy Preserving Algorithm.

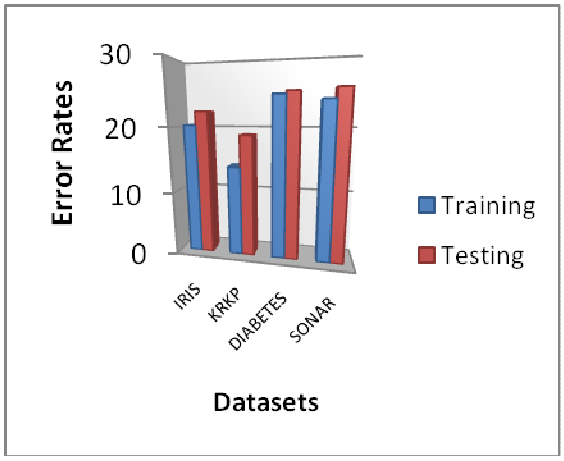

Figure 4: Piecewise Linear Approximation of Sigmoid for 100% dataset.

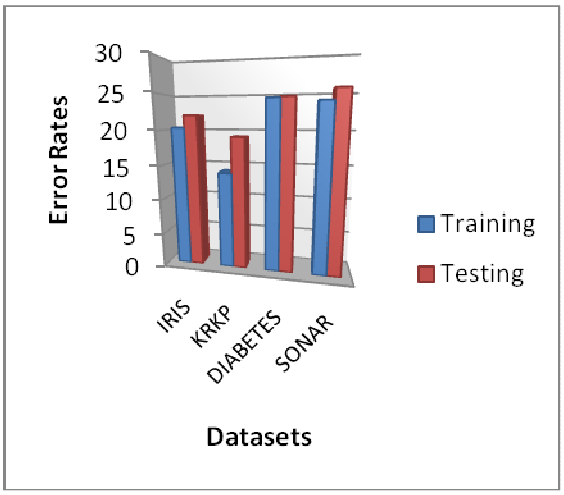

Figure 5: Piecewise Linear Approximation of Sigmoid for variable dataset.

Now we compare the results for Communication versus Computation Overhead for Computation of Product Algorithm Securely.

Product	Computation Time and Percentage		Communication Time and Percentage	
Party A	0.0872	65.07%	0.0468	34.93%
Party B	0.1028	86.82%	0.0156	13.18%
Average	75.93%		24.07%	

Table 2: Computation versus Communication Overhead on Securely Computing Product of Two Numbers.

Analysis based on Time Complexity

In Step 1 of Algorithm 1, there are 2 * n encryptions by party, where n is the parameter in piecewise linear sigmoid function definition. In Step 2, one re-randomization is conducted. In Steps 3 and 4, party A and party B perform one partial decryption, respectively. Total Time: (2n+1) C+2D, where C is cost of encryption and D is cost of partial decryption.

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Clinical Evaluation of Transdermal Nitroglycerine in Preterm Labor in Tertiary Care Teaching Hospital in North India

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***Abstract*- Research:** Effect of various tocolytics in preterm labour is varied and also the side effects. Thus in this study comparison between Transdermal Nitroglycerine (NTG) and Isoxsuprine was done to assess the same.

Material & Methods: This study was conducted in the Department of Obstetrics & Gynecology, CSM Medical University, Lucknow. A Prospective comparative study, 100 women of preterm labour were enrolled after the informed consent, amongst them 50 women received Inj. Isoxsuprine 5 mg intramuscular (Group-I) and 50 women received Transdermal Nitroglycerine patch (NTG 10) on the abdominal wall (Group-II).

Result: Successful tocolysis (Inj. Betamethasone 12mgm intramuscular 2 doses 24 hours apart) was achieved in 98% of Group-II as and 84% of patients in Group-I which was statistically significant (p=0.014). In group-I 28% women delivered after 37 weeks where as in group-II 50% delivered after 37 weeks which was statistically significant. (p=0.024) In group-I 16% neonates developed RDS whereas in Group-II 2% developed RDS which was not significant (p=0.307) Headache was found to be the persistent side effect in all subjects of Group-II as compared to none in Group-I. (p=<0.001)

CONCLUSION:

This randomized prospective comparative study lends support to the proportion that Transdermal Nitroglycerine may be promising safe, effective, well tolerated, cost effective and non invasive method of tocolysis.

***Index Terms*-** Transdermal Nitroglycerine, Isoxsuprine, and Preterm labour

I. Introduction

Premature birth is the single largest cause of perinatal morbidity and mortality in non anomalous infants. About 70-80% of perinatal deaths occur in preterm infants.[1] Almost two third of deaths in preterm infants occurs in those born at less than 28 weeks of gestation.[2] In practical terms, preterm birth after 32 weeks of gestation are known to have improved survival and less morbidity due to rapid advances in perinatal and neonatal medicine in recent decades.[3]

The major neonatal morbidity includes respiratory distress syndrome, intraventricular hemorrhage. Patent ductus arteriosus, sepsis, necrotizing, enterocolitis, periventricular leukomalacia and retinopathy of prematurity.[4] On the long term basis the preterm infants are found to be more at risk for neurodevelopmental handicaps like cerebral palsy, hearing loss, and blindness. Also a wide spectrum of intellectual impairments may be present.[5] The non neurologic long term sequelae can be chronic pulmonary disease or the compromise in over all growth of the preterm baby.[6]

According to World Health organization (WHO) preterm is defined as a gestational age of <37 completed weeks (259 days) from the first day of the last menstrual period.[7] The tocolysis used to prevent preterm labour basically aims at prolonging the pregnancy at least for 48-72 hours, so as to provide adequate time to administer two doses of corticosteroid which would help in preventing respiratory distress syndrome in the newborn if delivery occurs within 7 days of steroid administration. It will also provide opportunity to transfer the woman to a higher medical centre were adequate NICU facilities can be provided to the neonate as and when required.[8]

Over the few years a variety of tocolytic drugs (Isoxsuprine, Ritodrine, Nifedipine) with different pharmacological action have been used to suppress preterm labor. With the use of these drugs considerable adverse maternal effects. (like pulmonary oedema, arrhythmia, myocardial ischemia) and fetal effects (like hyperglycemia, hypokalemia, neonatal hypoglycemia & paralytic ileus) were reported. [2]

Nitroglycerine is a drug with a high first pass inactivation in liver. The active substance is rapidly metabolized in the liver by a glutathione dependent organic nitrate reductase. To avoid it, transdermal use of the drug is beneficial.[9] In transdermal drug administration the drug is delivered at a constant and predictable rate so a smooth plasma concentration of the drug is reached without fluctuations.

In this study Transdermal Nitroglycerine delivery system, Nitroglycerine patch-10 (NTG patch-10) was used which contains 50 mg nitroglycerine with contact surface of 20 sqcm & rate of release of nitroglycerine 0.4 mg/hour. This study was done to compare the efficacy in terms of achievement of successful tocolysis and prolongation of pregnancy with the use of Isoxsuprine vs Transdermal Nitroglycerine patch and their side effects and patients' acceptability.

II. Methods

This study was carried out in the department of Obstetrics & Gynaecology, C.S.M. Medical University Lucknow (A tertiary care teaching hospital). In the study period of one year total 134

women with preterm labour pain were assessed. In this prospective comparative study after taking informed consent, detailed history and clinical examination one hundred patients of preterm labour were enrolled. Women with singleton pregnancy between the gestational age of 24-37 completed weeks with threatened preterm labour pains or established preterm labour according to definition of A.C.O.G. (1997) (uterine contractions of 4 in 20 minutes or 8 in 60 minutes, cervical dilatation of >1cm, cervical effacement of 80% or greater) were included in this study.(fig.1)

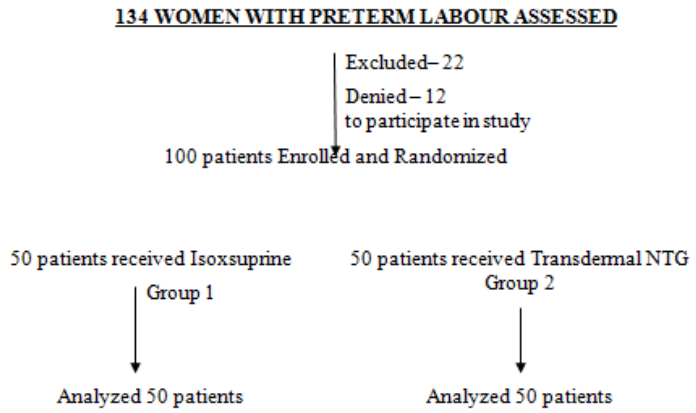
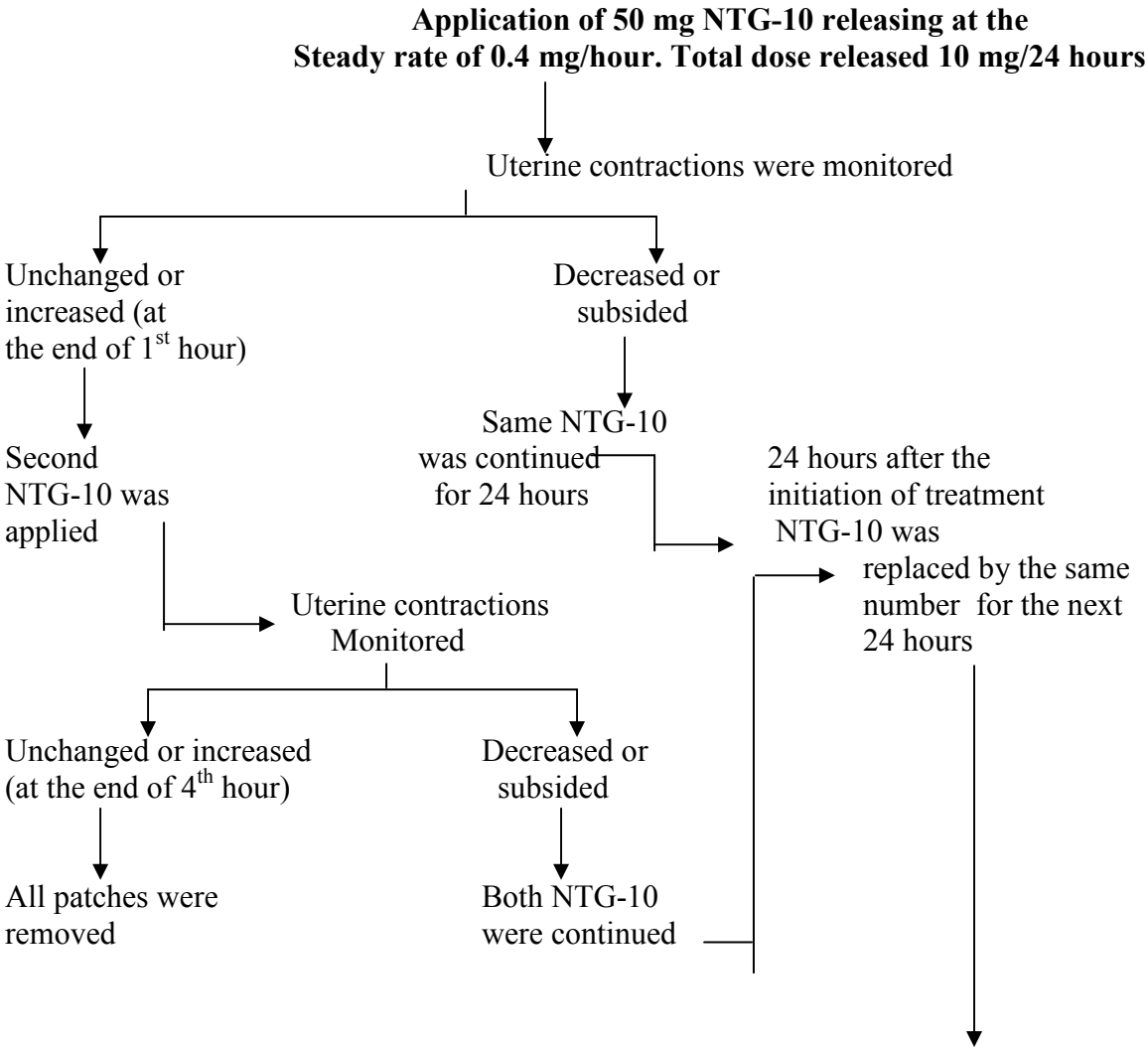


Fig. 1: Participant flow through the study.

Women with active labour, preterm premature rupture of membrane, chorioammnionitis, severe hypertension. Eclampsia, antepartum haemorrhage, fetal distress, severe IUGR, lethal congenital anomaly, intrauterine death, sensitivity or contraindication to tocolysis were excluded from this study. In group-I, 50 patients received Isoxsuprine injection intramuscularly every 8 hourly till 24 hours of uterine relaxation followed by tab Isoxsuprine 10 mg orally every 8 hourly for one week. In Group-II, 50 Patients received Transdermal Nitroglycerine patch (NTG -10) releasing nitroglycerine at the rate of 10 mg per 24 hours which was applied on the anterior abdominal wall. If no change in contractions occurred or there was an increase in intensity, frequency or duration of contractions after one hour of placement of first NTG Patch, one additional NTG Patch of same dose was applied, and then both patches were continued for 24 hours. If still contractions unchanged or increased at the end of four hours, all the patches were removed. Such patients were grouped under failed tocolysis. Twenty four hours after initiation of treatment, the patches were removed and replaced by the same number of patches for the next 24 hours. (Figure 2)



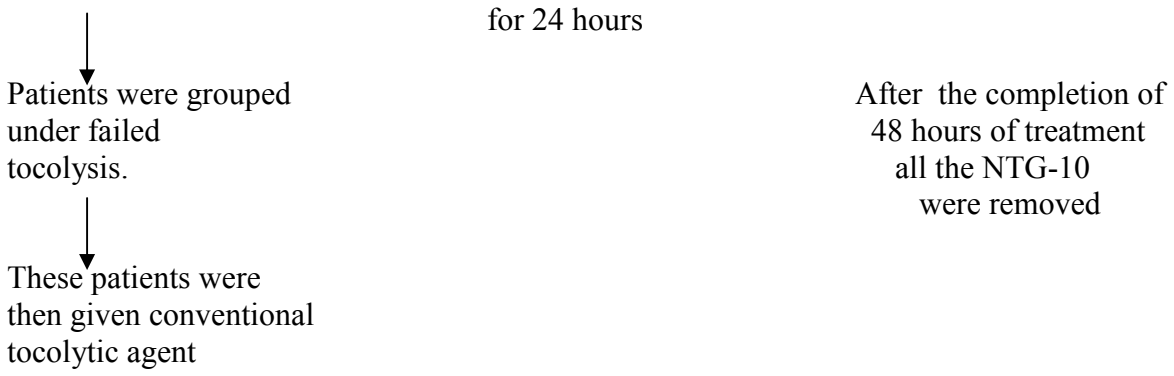


Fig. 2: Intervention strategy in Group-II patients

Maternal outcome were measured in terms of successful tocolysis, duration of prolongation of pregnancy, completion of course of maternal steroids, gestational age at delivery, mode of delivery and adverse drug reactions. *Fetal outcomes* were measured in terms of NICU admission and neonatal death.

The Ethical clearance for this study was given by Intuitional ethics committee, Office of the Research Cell, CSMMU (erstwhile King George's Medical University,), Lucknow, U.P. (*Ref. Code: XXX I ECM-II B/P3* dated 09/09/2008) for conducting and publishing the present work.

The demographic profile of women in the both the groups is shown in Table1

The data so obtained was subjected to statistical analysis and tabulated Parametric comparison of proportions has been made using chi-square test for proportions. The confidence level of the study was kept at 95% hence a "P" value less than 0.05 indicated a statistically significant difference.

III. Results

Both groups were age & parity matched. Participant flow through the study has been shown in Fig.-1. In the current study it was observed that in Group-II, 50% women delivered at the gestational age of more than 37 weeks as compared to 28% women in Group-I (p=0.024) (Table-2). In Group-II, 98% women had attained successful tocolysis as compared to 84% women in Group-I (p=0.014) (Table-2).

In the present study we also compared the duration of prolongation of pregnancy in both the groups. It was observed that in Group-I, 16% women delivered within 48 hours of start of tocolytic therapy as compared to only 2% women in group-II (p=0.008). The duration of prolongation of pregnancy exceeded 7 days in 60% women of Group-II. The duration of prolongation of pregnancy exceeded more than 7 days in higher percentage of cases in Group-II as compared to Group-I although the difference were not statistically significant because of small sample size (P=0.161) (Table-2). In Group-I, 81.25% of women of gestational age <34 weeks with preterm labour pain completed the course of steroid (Inj. Betamethasone 12 mg intramuscular given 24 hours apart),while in Group-II ,88.89% of women were able to complete the course of steroids. However the difference between the two groups was not statistically significant. (P =0.010) (Table-2)

The comparison of mode of delivery (vaginal/cesarean) between the two groups was not statistically significant (P=0.79) (Table-2).

We also assessed the clinical side effects of Transdermal Nitroglycerine and Isoxsuprine. In the present study headache occurred in 100% women of Group-II while none in Group-I (p<0.001) complained of headache. On visual analogue scale the severity of pain in Group-II was found to be mild in 70% of women and moderate in 30% of women. However, none of the women suffered from severe headache. Palpitation and tachycardia were observed in all 100% women of Group-I while none of the women of Group-II had such complaints (p<0.001). Other side effects were not observed in either of the two groups (Table-3).

We there after examined the neonatal outcome measures in the present study. In Group-I 16% neonates had Apgar Score <7 at 5 minutes and thus required resuscitation while in Group-II only 2% neonates had Apgar Score <7 at 5 minutes and required resuscitation. 10% neonates in Group-I and 2% neonates in Group-II developed respiratory distress syndrome, 6% neonates in Group-I required NICU admission and mechanical ventilator as compared to 2% neonates in Group-II. 4% neonates were recovered in Group-I and 6% of neonates expired while in Group-II only 2% of neonates expired. Although the neonatal death in group-I was not statistically significant as compared to group-II but neonatal complications were much higher in group-I as compared to group-II. (Fig.-3)

IV. Discussion

In 1961 first beta sympathomimetic drug that was used to inhibit preterm labour was Isoxsuprine. However in light of unpleasant side effects and efficacy, many studies have shown it to have limited therapeutic value. Thus still researches are ongoing in search of a safe and effective agent. Recently various studies done worldwide on NO donors such as NTG suggest that these are equally or more efficacious in comparison to betamimetics and have fewer side effects.

Graeme N. Smith et al.[10] did not find any significant reduction in delivery within 48 hrs with the use of Nitroglycerine. However in the current study, we found a significant reduction (p>0.008) in delivery within 48 hrs with the use of NTG as compared to Isoxsuprine. Similarly John Patrick et al.[11] found successful

tcocolysis with NTG in all 100% cases. Similarly C Lees M.B. et al. [12] also found successful tocolysis in all 20 episodes (13 women of preterm labour) with the NTG group.

Duckitt Thornton S et al.[13] found that significant number of pregnancies were prolonged beyond 37 wks of gestational age with the use of Transdermal NTG as compared to other tocolytics. In the present study 50% of women delivered after 37 wks of gestational age when NTG was used as tocolytic agent. Thus our results were quite comparable.

In the present study headache was the universal side effect with the NTG as also stated by Duckitt Thornton S et al.[13] that women were more likely to experience headache with the use of NO donors. Tachycardia and palpitation were universally seen in all women of Isoxsuprine group. Rayamajhi R et al.[14] also found the higher rate of such complications with Isoxsuprine. Similarly Rebecca et al.[15] reported significantly more cardiovascular side effects with betamimetics and minimal adverse effects with NTG group. However in our study no adverse cardiovascular side effects occurred in NTG group.

The primary goal for the use of tocolytic agents is to improve neonatal outcome. In the present study there was a trend towards a reduction in the incidence of Respiratory Distress Syndrome with the use of Nitroglycerine.

Only one neonate in group II died due to RDS in whose mother NTG tocolysis was not successful. In group-I 16% who had not completed successful tocolysis (Isoxsuprine group) only 10% neonates developed RDS and out of these 6% neonates died. Our results are in corroboration with Graeme Smith, et al.[10] where none of the neonates suffered from RDS in NTG tocolysis group.

However in study conducted by Gill A et al.[16] no significant difference in terms of neonatal morbidity and mortality was found between NTG and β2 agonist tocolytic therapy.

This randomized prospective comparative study lends support to the proportion that Transdermal Nitroglycerine may be promising safe, effective, well tolerated, cost effective and non invasive method of tocolysis. However before its widespread use can be recommended, large multicenteric trials are needed to assess optimal dosage, dosage regimes, overall efficacy and fetal safety.

V. CONCLUSION

This randomized prospective comparative study lends support to the proportion that Transdermal Nitroglycerine may be promising safe, effective, well tolerated, cost effective and non invasive method of tocolysis.

Table-1: Demographic characteristics of participants

		Group -1 Isoxsuprine		**Group -2 Transdermal NTG**	
		N	%	N	%
1.	Age (years)	25.68 +3.84 (Mean± SD)		25.92 + 3.68 (Mean± SD)	
2.	Parity				
	O	22	44	22	44
	1	16	32	15	30
	2	11	22	11	22
	>3	1	2	2	4
3.	History of Preterm Labour				
	Present	5	10	3	6
	Absent	45	90	47	94
4.	History of Recurrent Pregnancy loss				
	Present	4	8	2	4
	Absent	46	92	48	96
5.	Vaginal Culture				
	Positive	2	4	1	2
	Negative	48	96	49	98
6.	Urine Culture				
	Positive	2	4	1	2
	Negative	48	96	49	98

Table-2: Maternal Outcome

	Group -1 Isoxsuprine		Group -2 Transdermal NTG		P value
	N	%	N	%	
Gestational Age At Delivery (weeks)					
> 37	14	28	25	50	0.024
35-37	20	40	16	32	0.405
33-34	11	22	7	14	0.298
29-32	5	10	2	4	0.24
< 28	0	0	0	0	_
Successful Tocolysis					
Yes	42	84	49	98	0.014
No	8	16	1	2	
Duration of Prolongation of Pregnancy (Hours)					
<48	8	16	1	2	0.008
48-<72	7	14	4	8	0.505
72-<96	10	20	13	26	0.476
96-<7days	2	4	2	4	1
>7days	23	46	30	60	0.161
Completion of course of Maternal steroids(<34weeks)					
Yes	13 of 16	81.25	8 of 9	88.89	0.010
Negative	3 of 16	18.75	1 of 9	11.11	
Mode of Delivery					
Vaginal	42	84	41	82	0.79
Caesarean	8	16	9	18	

Table 3: Clinical Side Effects

Side Effects	Group I (Isoxsuprine) (n=50)		Group II (Transdermal Nitroglycerine) (n=50)		Statistical Significance	
	No.	%	No.	%	χ^2	P value
Headache	0	0	50	100	100	<0.001
Flushing	0	0	0	0	-	-
Palpitation	50	100	0	0	100	<0.001
Tachycardia	50	100	0	0	100	<0.001
Hypotension	0	0	0	0	–	–
Pulmonary oedema	0	0	0	0	–	–
Arrhythmia	0	0	0	0	–	–
Myocardial infarction	0	0	0	0	–	–

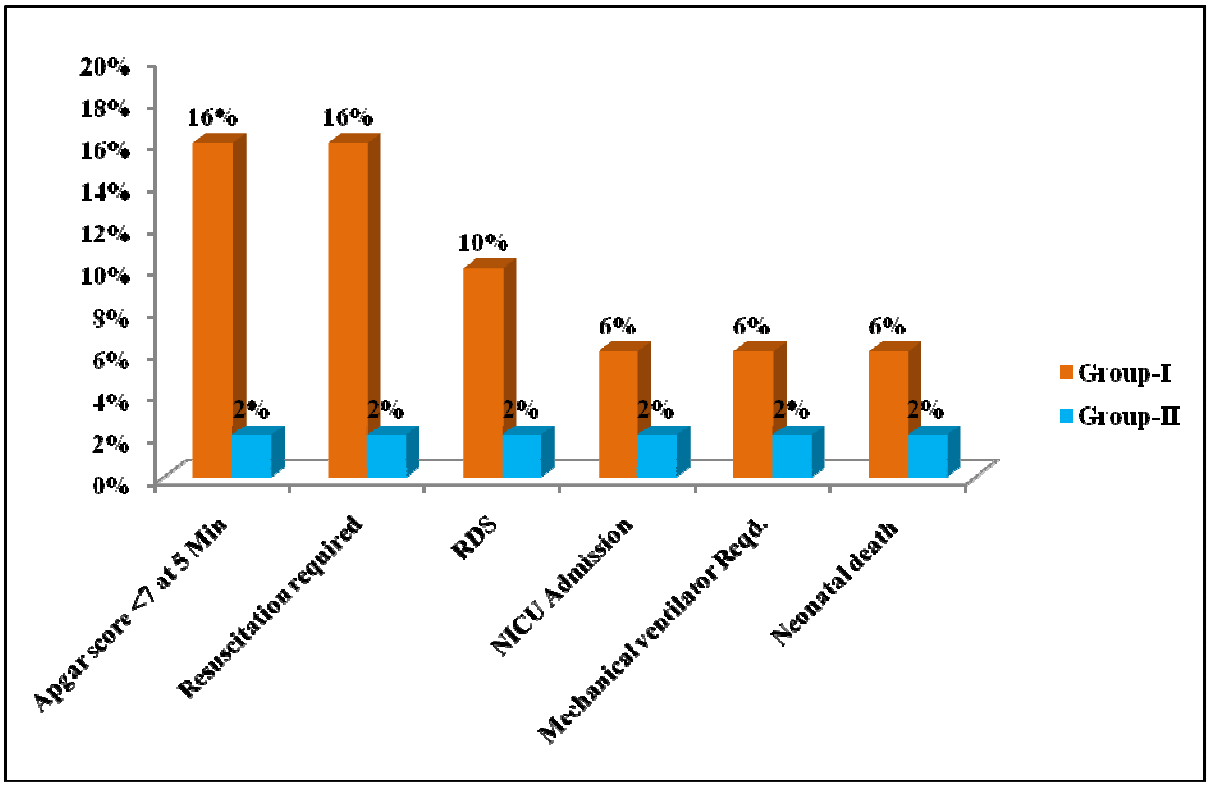


Figure 3: Neonatal Outcome

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Mobile Wireless Network and Intrusion Detection

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Abstract- An intrusion detection system framework for mobile wireless network is designed to support heterogeneous network environments to identify intruders at its best. The landscape of network security has drastically changed due to the rapid increase of wireless networks and mobile computing applications. Firewalls and encryption software methods have now become outdated for securing networks and are no longer sufficient and effective. There is a requirement for new architecture and mechanism to protect the wireless networks and mobile computing application.

In this paper, we will be examining the openness of wireless networks and put up an argument for inclusion of intrusion detection in the security architecture for mobile computing environment. We have developed such architecture and evaluated a key mechanism in this architecture, through simulation experiments.

Index Terms- intrusion detection, intrusion reply, mobile networks.

I. Introduction

The landscape of network security has drastically changed due to the rapid increase of wireless networks and mobile computing applications. New vulnerabilities are created due to mobility which is not present in a fixed wired network, and so many of the proven security measures turn out to be ineffective. That is why, firewalls and encryption software are no longer sufficient for protecting networks. New architecture and mechanism is required to protect the wireless networks and mobile computing applications. The inference of mobile computing on network security research can be further confirmed by the follow case. Recently (Summer 2001) Windows-based server machines were attacked by an Internet worm called Code Red. To protect the internal networks from such type of worms many companies relied on firewalls. But then also, multiple incidents were reported of Code Red due to the use of mobile computers. Since there has been an increment in the usage of laptops and public venues (like conferences) providing wireless Internet access, there are higher and higher chances that an inadequately protected laptop will be infected with worms. For example, in a recent IETF meeting, amongst the hundreds of attendees who carried laptops, a dozens were detected to be infected with Code Red worm. And when these laptops are later incorporated back into their company networks, they spread the worms from within and let the firewalls become useless in defending this worm.

II. Susceptibility of Mobile Wireless Networks

It depends on the mobile computing environment which can make it very vulnerable for challenger's malicious attacks. Firstly, the use of wireless links leaves the network liable for attacks ranging from passive snoop to active prying. In wired networks an enemy must gain physical access to the network wires or pass through several lines of security at firewalls and gateways, the wireless network can be attacked from all directions and they can target at any node. Leaking secret information, message contamination, and node impersonation are usual damages done. All these mean that a wireless network will not have a clear line of security, and every node must be prepared for encounters with an enemy directly or indirectly.

Secondly, mobile nodes are independent units that are capable of wandering independently. Inadequate physical protection means that with are approachable to being captured, compromised, and hijacked. The tracking of a particular mobile node in a global scale network is not so easy, that is why attacks by a compromised node from within the network are far more damaging and difficult to detect. Therefore, no peer mode has to be prepared for mobile nodes and the infrastructure.

Thirdly, some wireless network algorithms rely on the cooperative participation of all nodes and the infrastructure for decision-making in mobile computing environment. No centralized authority means that the enemies can exploit for new types of attacks designed to break the cooperative algorithms.
For example, mostly the current MAC protocols for wireless channel access are weak. Although, most of MAC protocols have similar working principles, in a contention-based method, each node has to compete for control of the transmission channel every time it tries sending a message. Nodes should strictly follow the pre-defined method to avoid collisions and to recover from them. In a contention-free method, an exclusive use of the channel resource is seeks on a one-time or recurring basis for each node. MAC protocol type does not matter incase of a break down in a scenario resembling a denial-of-service attack, if a node behaves nastily. The wired networks have rarely Although these attacks because the physical networks and the MAC layer are isolated from the outside world by layer-3 gateways/firewalls, every mobile node is completely exposed in the wireless open medium.

To add on, new type of computational and communication activities are introduced in mobile computing that rarely appear in fixed or wired environment. For example, mobile users tend to be grudging about communication due to slow links, limited bandwidth, higher cost, and battery power constraints; means like disconnected operations and location-dependent functions only emerge to mobile wireless environment. Naturally, security

measures developed for wired network are likely incompetent to attacks that exploit these new applications.

Applications and services in a mobile wireless network can be a weak link as well. Possible attacks may target these proxies or agents running in base-stations and intermediate nodes to achieve performance gains through caching, content transcoding, or traffic shaping, etc to gain sensitive information or to mount DoS attacks, such as flushing the cache with bogus references, or having the content transcoder do useless and expensive computation.

To recapitulate, a mobile wireless network is vulnerable due to its features of open medium, dynamic changing network topology, cooperative algorithms, lack of centralized monitoring and management point, and lack of a clear line of defense. Future research is needed to address these vulnerabilities.

III. THE NEED FOR INTRUSION DETECTION

Intrusions can be reduced by preventive measures, such as encryption and authentication, but cannot be eliminated. For example, encryption and authentication cannot defend against compromised mobile nodes, which often carry the private keys. Integrity validation using redundant information (from different nodes), relies on the trustworthiness of other nodes, which could likewise be a weak link for sophisticated attacks such as those being used in secure routing.

Security research has a history that teaches us a valuable lesson that there are always some weak links that one could exploit to break in, no matter how many intrusion prevention measures are inserted in a network. Intrusion detection presents a second wall of protection and it is a necessity in any high secured network.

In short, mobile computing environment has intrinsic vulnerabilities that are not easily avoidable. To secure mobile computing applications, it is necessary to deploy intrusion detection and response system, and further research to be done to adapt these techniques to the new environment, likewise in fixed wired network. In this paper, we focus on a particular type of mobile computing environment called mobile networks and propose a new model for intrusion detection and response for this environment. We will first give a background on intrusion detection, then present our new architecture, followed by an experimental study to evaluate its feasibility.

IV. PROBLEMS OF CURRENT IDS TECHNIQUES

It is rather difficult to apply current intrusion detection research used in fixed network into the mobile network. The difference comes into picture since the prior does not have a fixed infrastructure, and today's network-based IDSs, rely on real time traffic analysis, can no longer function well in the new environment. In wired networks where traffic monitoring is usually done at switches, routers and gateways, the mobile environment does not have such traffic focus points where the IDS can collect audit data for the whole network. Therefore, at any moment, audit trace available will be limited to communication activities taking place within the radio range, and the intrusion detection algorithms should be able to work on this partial and localized information.

The other noteworthy difference is in the communication pattern in a mobile computing environment. Mobile users tend to be grudging about communication and are prone to adopt new operation modes such as disconnected operations. This tells that the anomaly models for wired network cannot be used as is.

Furthermore, there cannot be a clear distinction between normalcy and irregularity in mobile environment.

A node sending out false routing information could be the one that has been compromised, or the one that is temporarily out of sync due to physical movement. Intrusion detection finds it difficult to distinguish between false alarms from real intrusions.

In short, our research must answer these questions in developing a feasible intrusion detection system for mobile networks:

- What is a good system architecture that fits features of mobile networks for building intrusion detection and response systems?
- What are the suitable audit data sources? How do we detect anomaly based on partial, local audit traces if they are the only dependable audit source?
- What is a good model of activities in a mobile computing environment that can separate anomaly when under attacks from the normalcy?

V. INTRUSION DETECTION ARCHITECTURE

The needs of mobile network can be boosted by a suitable Intrusion detection and response systems which is both distributed and cooperative. In the architecture proposed, every node in the mobile network takes part in intrusion detection and response. Signs of intrusion can be detected locally and independently in each node, but neighboring nodes can collaboratively investigate in a broader range. Individual IDS agents are placed on each and every node from the systems aspect and run independently and monitors local activities. Intrusions are detected from local traces and response initiated. On the detection of an anomaly in the local data, or if the evidence is open to doubt and a broader search is warranted, neighboring IDS agents will cooperatively participate in global intrusion detection actions. These individual IDS agent collectively form the IDS system to defend the mobile network.

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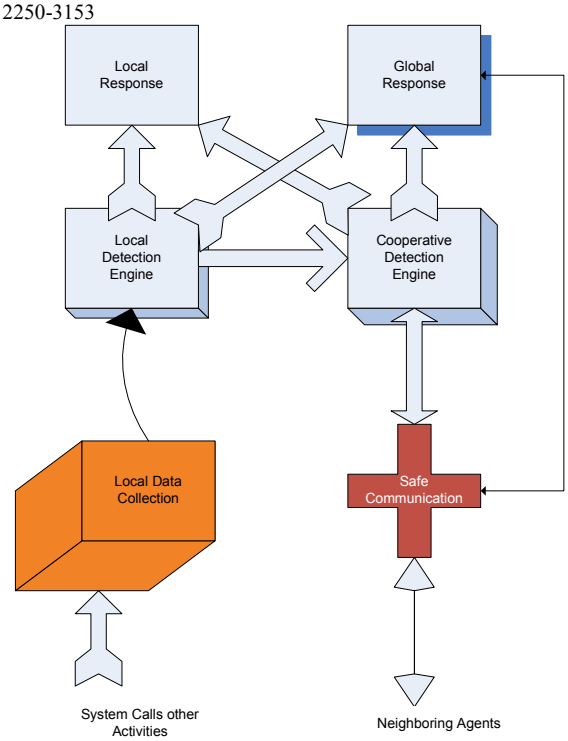

Fig. 1: An Intangible model for an Intrusion Detection System Agent

The internal of an IDS agent can be fairly complex, but theoretically it can be structured into six pieces (Figure 1). The data collection module is meant for gathering local audit traces and activity logs.

Next, to detect local anomaly the local detection engine uses this data. The cooperative detection engine is used in case of detection methods that need broader data sets or that require collaborations among IDS agents. The local response and global response modules are responsible for intrusion response actions. Actions local to this mobile node are triggered by the local response module, for example an IDS agent alerting the local user, while the global one synchronizes actions among neighboring nodes, such as the IDS agents in the network electing a remedy action. Finally, a secure communication module provides a high-confidence communication channel among IDS agents.

A. Data Collection

The first module, local data collection, is meant for gathering streams of real-time audit data from various sources. Intrusion detection algorithms is used to decide, these useful data streams can include system and user activities within the mobile node, communication activities by this node, as well as communication activities within the radio range and observable by this node. Therefore, for a multi-layer integrated intrusion detection method multiple data collection modules can coexist in one IDS agent to provide multiple audit streams.

B. Local Detection

The local detection engine is there to analyze the local data traces gathered by the local data collection module for evidence of anomalies. It can include both misuse detections and anomaly detection. Anomaly detection techniques will play a bigger role, since it is possible that the number of newly created attack types mounted on mobile computing environment will increase quickly as more network appliances become mobile and wireless.

C. Cooperative Detection

Any node that detects locally a known intrusion or anomaly with strong facts, can determine independently that the network is under attack and can begin a response. However, if anomaly or intrusion with weak evidence is detected by a node, or the evidence is inconclusive but warrants broader investigation, it can begin a supportive global intrusion detection procedure. The working of the procedure is by propagating the intrusion detection state information among neighboring nodes. The intrusion detection state information can range from a mere level-of-confidence value such as

- With p% confidence, an intrusion is concluded by node A from its local data.
- With p% confidence, node A concludes from its local data and neighbor states that there is an intrusion
- With p% confidence, node A, B, C,... collectively conclude that there is an intrusion to a more specific state that lists the suspects, like
- With p% confidence, the compromise of node X is concluded by node A from its local data or to a complicated record including the complete evidence.

As the next step, it is possible to derive a distributed consensus algorithm to compute a new intrusion detection state for this node, using other nodes' state information received recently. The algorithm can take in a weighted computation under the assumption that nearby nodes has greater effects than far away nodes, i.e., giving the immediate neighbor the highest values in evaluating the intrusion detection states.

For example, a mostly distributed intrusion detection procedure can include the following steps:

- the node sends to neighboring node an intrusion (or anomaly) state request;
- each node (including the start node) then propagates the state information, indicating the likelihood of an intrusion or anomaly, to its immediate neighbors;
- each node then determines whether the majority of the received reports indicate an intrusion or anomaly; if yes, then it concludes that the network is under attack;
- any node that detects an intrusion to the network can then initiate the response procedure.

The rationales behind this scheme are as follows. Since, falsified data can be sent, so audit data from other nodes cannot be trusted and should not be used data. However, the compromised nodes have no incentives to send reports of intrusion/anomaly because the intrusion response may result in their removal from the network. Therefore, unless the majority of the nodes are compromised, in which case one of the legitimate nodes will probably be able to detect the intrusion with strong evidence and will respond, the above scheme can detect intrusion even when the evidence at individual nodes is weak.

A mobile network is considered highly dynamic because nodes can move in and out of the network. Therefore, while each node uses intrusion reports from other nodes, it does not rely on fixed network topology or membership information in the distributed detection process. It is a simple majority voting scheme where any node that detects an intrusion can initiate a response.

D. *Intrusion Response*

The type of intrusion helps in deciding the response for mobile networks, the type of network protocols and applications, and the confidence (or certainty) in the evidence. For example, here is a few likely responses:

- Re-initializing communication channels between nodes (e.g, force re-key).
- Identifying the compromised nodes and reorganizing the network to preclude the promised nodes.

For example, the IDS agent can notify the end-user, who may in turn do his/her own investigation and take appropriate action, like can also send a re-authentication request to all nodes in the network prompting the end-users to authenticate themselves, using out-of-bound mechanisms. Only the re-authenticated nodes will be recognized as legal if, they collectively negotiate a new communication channel. That is, the compromised/nasty nodes can be excluded.

VI. MULTI-LAYER INTEGRATED INTRUSION DETECTION AND RESPONSE

Unlikely, IDSs uses data only from the lower layers: network-based IDSs analyze TCP/IP packet data and host-based IDSs analyze system call data. This is due to application layer firewalls preventing many attacks, and application specific modules, e.g., credit card fraud detection systems, developed to guard the mission-critical services in wired networks.

In the wireless networks, to protect the services from attack there are no firewalls. However, intrusion detection in the application layer is not only feasible, but also necessary. Certain attacks, for example, an attack that is trying to create an unauthorized access back-door to a service, may seem perfectly legal to the lower layers, e.g., the MAC protocols. Our belief is that some attacks may be detected much earlier in the application layer, due to the richer semantic information available, than in the lower layers. For example, in case of a DoS attack, the application layer may detect quickly that operations don't make sense or a large number of incoming service connections have no actual operations; whereas the lower layers, relying only on information about the amount of network traffic, may take a longer time to recognize the extraordinarily high volume.

We need to synchronize the intrusion detection and response efforts, given that there are vulnerabilities in several layers of mobile wireless networks and that an intrusion detection module needs to be placed at each layer on each node of a network. We use the following integration scheme:

- if a node detects an intrusion that aspects the entire network, e.g., when it detects an attack on the routing protocols, it initiates the re-authentication process to exclude the compromised/nasty nodes from the network;
- if a node detects a local intrusion at a higher layer, e.g., when it detects attacks to one of its services, lower layers are noticed. The detection modules can then further investigate.

In this approach, though the detection on one layer can be commenced by evidence from other layers, but the intrusion detection module at each layer still needs to function properly. As a first cut of our experimental research, we will be allowing the evidence to flow from one layer to its (next) lower layer by default based on the application environment.

The amplified versions of the detection model at a lower level are constructed in such a manner that in the testing process, the anomaly decision, i.e., either 1 for yes or 0 for no from the upper layer is inserted into the deviation score of the lower level, for example, (0.1, 0.1) now becomes (0.1, 0.1, 0). In other words, the extra information passed from the upper level is by deviation data. The bodies of evidence from the upper layers and the current layer are mingled in case of an anomaly detection model built from the augmented data and can make a more informed decision. The intrusion report also comprises a vector of the information from the layers sent to other node for cooperative detection.

With the changes done, the lower layers now need more than one anomaly detection model: one that is relying on the data of the current layer and is using evidence from the lower layers, and the augmented one that also considers evidence from the upper layer.

We are able to achieve better performance in terms of both higher true positive and lower false positive rates, because, multi-layer combination enables us to analyze the attack scenario in its entirety and as a result. For example, a likely attack scenario is that a foe takes control of the mobile unit of a user, and then uses some system commands to send fallacious routing information. The global detection and response can immediately be initiated by detecting the event when a detection module that monitors user behavior, e.g., via command usage is used, which can result in the exclusion of this compromised unit. As another example, suppose the users are responding to a fire alarm, which is a rare event and may thus cause a lot of unusual movements and hence updates to the routing tables. Though, if there are no indications that a user or a system software has been compromised, each intrusion report sent to other nodes will have a clean vector of upper layer indicators, and thus the detection module for the routing protocols can conclude that the unusual updates may be genuine.

VII. EXPERIMENTAL RESULTS

To study the feasibility of our security architecture, we have conducted a series of experiments to evaluate the effectiveness by implementing anomaly detection in a network simulator. Three specific wireless protocols were chosen as the subjects of study. They are Dynamic Source Routing (DSR) protocol, On-Demand Distance Vector Routing (ODV) protocol, and Destination-Sequenced Distance-Vector-Routing (DSDV) protocol; which were selected since they represent different types of wireless routing protocols, proactive and on-demand. Further we shall discuss how our anomaly detection methods can be applied to these protocols and then shall demonstrate the effectiveness of the models used on other different scenarios.

We used the wireless networks simulation software, from Network Simulator ns-21. It includes simulation for wireless network infrastructure, popular wireless routing protocols (DSR, DSDV, ODV and others), and mobility scenario and traffic pattern generation.

A. Features Selection

The decision to pick features relies on several factors, like the reaction of information from several sources, i.e, from traffic pattern, from routing change, and from topological movement. A similar feature has been set for all so that we can compare among different protocols. Generally to allow slight deviation to make utmost utilization of routing information, we regard same sets for traffic and topological information. Even under the same gauge, different protocols infer it in a slight different way. For instance, PCH is the percentage of change in number of total intermediate hops from all source routes cached in DSR, but the percentage of change of sum of metrics to all reachable destinations in DSDV and ODV.

B. Models

Two classification algorithms were used to build models, the traditional induction based classifier RIPPER and a new SVM classifier SVM Light. First, the models are trained online using training data from one of our simulations with pure normal data with running time of 100,000 seconds.

C. Data

To test the models, five different test scripts were used to generate traces. normal is a normal trace, 100k-rt and 10k-rt are traces with intrusions on routing logic and with running time as 100,000 and 10,000 seconds respectively. 100k-tf and 10k-tf are traces with distortion on traffic patterns. 10k-rt and 10k-tf contain at most 10 intrusion sessions, while 100k-rt and 100k-tf contain at most 100 intrusion sessions. Then all results were altered through post-processing procedure. For each result, we run ten times and report its average and error under 95% confidence levels.

D. Discussion

The experiment results demonstrate that on different wireless networks, an anomaly detection approach can work well, and so, the normal behavior of a routing protocol can be recognized and used to detect anomalies. First, it is important to point out that some spurious errors during normal use period were removed using a post-processing scheme. Though errors are inevitable in normal traces but we assume that they should not happen frequently. In contrast, numerous disorders are usually recorded during purposeful intrusion. On selection of a good window size, high false positive rate can be avoided and still high detection rate can be achieved. The intrusion detection research community can debate on how to detect an intrusion that relies on single plan. For example, on use of network connection data, the anomaly detection can be successful against multi-connection-based port scan and DDoS attacks, but then for a single-connection-based buyer-overflow attack, it is not so. Though, anomaly detection models can be very useful against buyer-overflow attacks if we use system call trace generated by a running program. Depending on, at which layer the data is collected there are some natural limits on detection capabilities. Similarly, for the routing protocols layer, our belief is that with the help of IDS on other layers, on the whole anomaly detection performance can be improved.

In this experiment, we also conclude that the normal behavior can be changed heavily by a few system parameters. One of them is the mobility level, which can lead to much higher alarm rate if the model is classified using values from another mobility level, which can further be resolved by randomizing the mobility level in the experiment. Though, the current ns-2 code is not in support for this feature. It however teaches us an important lesson that a good anomaly detection model should collect all possible value groupings and normal scenarios. Our plan is to develop schemes that shall cluster and categorize the normal scenarios by which we can build specific anomaly detection models for every normal scenario.

VIII. CONCLUSION

We have argued that any secure network will have susceptibility that a rival could exploit. This is especially true for mobile wireless networks. To secure the mobile computing environment, intrusion detection can support intrusion prevention techniques (like encryption, authentication, secure MAC, secure routing, etc.). Still, to make intrusion detection work better for wireless networks a need is there for development of new techniques.

Through our ongoing investigation, which shows architecture for better intrusion detection in mobile computing environment should be distributed and cooperative. Intrusion detection and response mechanism have a critical component of anomaly detection. Trace analysis and anomaly detection should be done hand in hand in each node and if possible through cooperation with all nodes in the network. Moreover, intrusion detection should happen in all networking layers in an integrated cross-layer manner, though our focus of research was on routing protocols since they are the foundation of a mobile network. We projected the usage of anomaly detection model constructed using information available from the routing protocols for intrusion detection purposes. We have tried proving the performance by simulations. Finally, we showed that these detectors in general have good detection performance.

There were some interesting findings, like; we noted some difference in security performance amongst different types of routing protocols. We assert that protocols with strong correlation among changes of different types of information tend to have better detection performance. Especially, since the behavior of on-demand protocols reflects the correlation between traffic pattern and routing message flows, the on-demand protocols usually work better than table-driven protocols.

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A Data Path Quality Estimation Based on Delay Time Using Probes

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Abstract- In most of the network data transformation sender nodes choose the link depends on link quality that implies sender could not much concentrate on the traffic and data loss. So this paper mainly focus on both data loss and queuing delay to identify most congested link in a network. Identifying the existence of a dominant congested link is useful for traffic engineering. It also helps us understand and model the dynamics of the network since the behavior of a network with a dominant congested link differs dramatically from one with multiple congested links. The network data congested mainly made by the router overhead and the intruder path selection; by consider these things here introduce a congested identification method by combining hypothesis test with model based approach. Here developing parameter inference algorithms for hidden Markov model and Markov model with a hidden dimension to infer this virtual delay. The process is more efficient than the existing methods and can implement in future for secure high throughput achieving group communication.

Index Terms- bottleneck link, dominant congested link, end–end inference, hidden Markov model (HMM), markov model with a hidden dimension (MMHD).

I. Introduction

Measurement and inference of end–end path characteristics have attracted a tremendous amount of attention in recent years. Properties such as the delay and loss characteristics of an end–end path [7], the minimum capacity and available bandwidth of a path [3], [5], and the stationarity of the network have been investigated. These efforts have improved our understanding of the Internet. They have also proved valuable in helping to manage and diagnose heterogeneous and complex networks.

In this paper, we study a specific end–end path characteristic, namely whether a *dominant congested link* exists along an end–end path. Informally, a dominant congested link is one that produces most of the losses and significant queuing delays on an end–end path. We avoid using the term "bottleneck link" since it has been defined in many different ways in the literature and there is no consensus on its meaning. Later in the paper, we relate our definition of dominant congested link to the notion of bottleneck link.

Identifying the existence of a dominant congested link is useful for traffic engineering. For example, when there are multiple paths from one host to another and all are congested, improving the quality along a path with one dominant congested link may require fewer resources than those along a path with multiple congested links.

Identifying whether a path has a dominant congested link also helps us understand and model the dynamics of the network since the behavior of a network with a dominant congested link differs dramatically from one with multiple congested links. When a dominant congested link exists, identifying the existence of such a link requires distinguishing its delay and loss characteristics from those of the other links. Achieving this goal via direct measurements is only possible for the organization in charge of that network. However, commercial factors often prevent an organization from disclosing the performance of internal links. Furthermore, as the Internet grows in both size and diversity, one organization may only be responsible for a subset of links on an end–end path. Some measurement techniques obtain internal properties of a path by using ICMP messages to query internal routers.

Traceroute and *ping* are two widely used tools in this category. Some more advanced techniques use ICMP messages to measure per-hop capacity or delay and pinpoint faulty links [4]. These approaches, however, require cooperation of the routers (to respond to ICMP messages and treat them similarly as data packets). Contrary to direct measurements using responses from routers, a collection of network tomography techniques infers internal loss rate and delay characteristics using end-end measurements [1]. Most tomography techniques, however, require observations from multiple vintage points.

II. Related Work

A dominant congested link is a link that produces most losses and significant queuing delays on an end–end path. Since most applications (TCP-based or real-time applications) are adversely affected by losses and delays, a dominant congested link is a form of "bottleneck link." One notion of bottleneck link is *tight link*, i.e., the link with the minimum available bandwidth; another notion is *narrow link*, i.e., the link with the minimum capacity [2]. Several studies focus on locating tight or narrow links.

We precisely define dominant congested link and differentiate it from other notions of bottleneck link in Section IV. After identifying a dominant congested link, we further derive an upper bound of the maximum queuing delay of that link, which is an important path characteristic and is complementary to other tools that estimate the available bandwidth or the minimum link capacity of a path [8], [9]. Network tomography infers internal link properties through end–end measurements. A rich collection of network tomography techniques have been developed in the past (see [1] for a review). Many techniques rely on correlated measurements (through multicast or striped unicast probes). More recently, several studies use uncorrelated measurements to

detect lossy links [6], estimate loss rates, or locate congested segments that have transient high delays. Most tomography techniques, however, require *many* vintage points, while we only need measurements between two end-hosts along a *single* path.

The work closest in spirit to ours is the loss pair approach that is used to discover network properties. A loss pair is formed when two packets are sent close in time and only one of the packets is lost. Assuming that the two packets experience similar behaviors along the path, the packet not lost in a loss pair is used to provide insights on network conditions close to the time when loss occurs. Our work focuses on determining whether a dominant congested link exists along a path. Furthermore, our model-based approach differs significantly from the loss pair approach: Our approach *infers* the properties of the lost packets by utilizing delay and loss observations jointly and the correlation in the entire observation sequence, instead of using direct measurements from the loss pairs.

III. PROPOSED METHOD

In this paper, we propose a novel *model-based* approach to identify whether a dominant congested link exists along an end–end path using end–end measurements. We periodically send probes from one host to another so as to obtain a sequence of delay and loss values. The key insight in our approach is to utilize the queuing delay properties of the *lost* probes. For example, if one link along the path is solely responsible for all losses, then all lost probes have the property that they "see" a full queue at this link. We interpret a loss as an *unobserved delay* and discretize the delay values. Afterwards, we model the discretized delay sequence of all probes including those with missing values to infer whether a dominant congested link exists.

Our model-based approach has the following advantages. First, it utilizes delay and loss observations *jointly* for inference instead of the common approach of treating them separately. Second, it utilizes the correlation in the *entire* observation sequence instead of the very limited temporal correlation present in back-to-back packets. As we will see, the identification procedure only requires a short probing duration (in minutes).
The following are the main contributions of this paper.

- We present a formal yet intuitive definition of dominant congested link and provide two simple hypothesis tests to identify whether a dominant congested link exists along a path.
- Our model-based approach fully utilizes the information from the probing packets and enables very fast identification. Validation using *ns* simulation and Internet experiments demonstrates that this approach can correctly identify the existence of a dominant congested link in minutes.
- We provide a statistical upper bound on the maximum queuing delay of a dominant congested link once we identify such a link exists.

IV. DOMINANT CONGESTED LINK

In this section, we formally define dominant congested link and relate it to the widely used term "bottleneck link." For ease of reference, the key notation is summarized in Table I.

Consider K links/routers along an end–end path, as shown in Fig. 1. Each link/router is modeled as a droptail queue with a processing rate equal to the link bandwidth, and the maximum queue size equal to the buffer size of the router. Let Q_K denote the maximum queuing delay at queue k, i.e., the time required to drain a full queue. Then Q_K is determined by the buffer size and the link bandwidth of queue k. Probes are sent periodically from the source to the destination in a time interval $[t_1, t_2)$.

TABLE I
KEY NOTATION

Notation	Definition
K	Number of links/queues along the path
Q_k	The maximum queuing delay at queue k
D_t^k	Queuing delay for virtual probe t at link k
D_t	Aggregate queuing delay for virtual probe t over all the links along the path
L_k	Set of virtual probes marked as lost at link k
L	Set of virtual probes with loss marks
F_k	Set of virtual probes that experience the maximum queuing delay Q_k at link k
F	Set of virtual probes that experience the maximum queuing delay at some link along the path

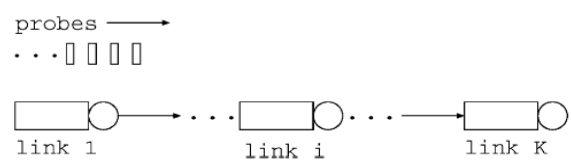

Fig. 1: Periodic probes are sent along a path with K links to identify the existence of dominant congested link.

Definition 1: Link k is a **strongly dominant congested link** in time interval $[t_1, t_2)$ if and only if for a virtual probe sent at any time $t \in [t_1, t_2)$, the following two conditions are satisfied:

$$P(t \in L_k \;\; t \in L) = 1 \qquad (1)$$

$$P(D_t^k \geq \sum_{i \neq k} D_t^i \;\; t \in F_k) = 1 \qquad (2)$$

In other words, link k is a strongly dominant congested link if and only if it is responsible for all the losses, and if a virtual probe experiences the maximum queuing delay at link k, this delay is no less than the aggregate queuing delays over all the other links. It is easy to see from this definition that a strongly dominant congested link is unique.

The above definition considers both loss and delay, reflecting our sense that a dominant congested link is one that causes most losses and leads to significant queuing delays. Note that the condition on queuing delay is defined over the virtual probes that experience the maximum queuing delay at link k instead of overall virtual probes. This definition accounts for the dynamic nature of the network since even a congested link may sometimes have very low queue occupancy.

Definition 2: Link k is a **weakly dominant congested link** with parameters θ and ϕ, where $0 \leq \theta < 0.5$ and $0 \leq \phi < 1$,

in time interval $[t_1, t_2)$ if and only if for a virtual probe sent at any time $t \in [t_1, t_2)$, the following two conditions are satisfied:

$$P(t \in L_k \mid t \in L) \geq 1 - \theta \quad (3)$$

$$P(D_t^k \geq \sum_{i \neq k} D_t^i \mid t \in F_k) \geq 1 - \phi. \quad (4)$$

In other words, link *k* is a weakly dominant congested link if and only if a virtual probe is lost at link *k* with a probability no less than $1-\theta$, and if a virtual probe experiences the maximum queuing delay at link *k*, this queuing delay is no less than the aggregate queuing delays over all the other links with a probability no less than $1-\phi$. Since $0 \leq \theta < 0.5$, that is, more than half of the losses occur at a weakly dominant congested link, a weakly dominant congested link is unique. Note that the lower the values of θ and ϕ, the more stringent are the requirements on being a weakly dominant congested link. In particular, the definition of a weakly dominant congested link is the same as that of a strongly dominant congested link when $\theta = \phi = 0$. A link identified as a weakly dominant congested link with θ and ϕ is also a weakly dominant congested link with θ' and ϕ', where $\theta' \geq \theta$ and $\phi' \geq \phi$. In particular, a strongly dominant congested link is a weakly dominant congested link with any $\theta \geq 0$ and $\phi \geq 0$.

Dominant Congested Link Versus Bottleneck Link

A bottleneck link is typically defined to be a link with high loss rate, long queuing delay, high utilization, low available bandwidth, or low link capacity.

Several other differences between bottleneck link and dominant congested link are the following.

- Whether or not a link is a dominant congested link is relative. A link with a low loss rate is a dominant congested link as long as it satisfies the corresponding delay and loss requirements, despite the low loss rate.
- By definition, dominant congested link is unique if it exists, while there may exist multiple bottleneck links along a path.
- Neither strongly nor weakly dominant congested link can describe links that do not have losses. Therefore, a link with the lowest capacity, available bandwidth, or highest utilization is not a dominant congested link if no loss occurs at that link.

V. IDENTIFICATION OF DOMINANT CONGESTED LINK

In this section, we first describe two hypothesis tests to identify whether a dominant congested link exists along a path. We then describe how to obtain an upper bound on the maximum queuing delay of a dominant congested link after detecting its presence.

A. Hypothesis Tests

Our hypothesis tests utilize the queuing delays of the virtual probes with loss marks, i.e., virtual probes in L. We next use an example to illustrate why these queuing delays are helpful for dominant congested link identification. Suppose the null hypothesis is that there exists a strongly dominant congested link *k*. Then, if this hypothesis holds, the queuing delay of any virtual probe in *L* must satisfy the following two properties. First, by Condition (1), it must be no less than Q_K, the maximum queuing delay at link *k*. Second, it must satisfy Condition (2) since all probes in F must satisfy this condition and L is a subset of *F*. If one of the two conditions does not hold, we can reject the null hypothesis.

We next describe the identification methodology in detail. Let *W* be a random variable representing the discretized end–end queuing delay of virtual probes in L. The discretization is as follows. Let D_0 denote the end-end propagation delay along the path. Let $D_{\max}$ denote the largest end-end delay of all virtual probes sent in the time interval $[t_1, t_2)$ (including those with and without loss marks). The maximum queuing delay is therefore $D_{\max} - D_0$. We divide the range of queuing delay, $[0, D_{\max} - D_0]$ into *M* equal length bins with bin width $b = (D_{\max} - D_0)/M$. Then, *W* takes value in {1,2,…,*M*}, where *i* corresponds to an actual delay value between (*i*-1)*b* and *ib*. Let $F_W(w)$ represent the cumulative distribution function (CDF) of *W*. That is, $F_W(w) = P(D_t \leq w \mid t \in L)$ for any virtual probe sent at time $t \in [t_1, t_2)$.

B. Upper Bound of the Maximum Queuing Delay at a Dominant Congested Link

Suppose link *k* is a strongly dominant congested link. We estimate an upper bound of its maximum queuing delay Q_K as follows. From $F_W(w)$, we find the smallest value *D* such that $F_W(D) > 0$. Since all losses occur at link *k*, by the definition of $F_W(w)$, $D \geq Q_k$. Therefore, *D* is an upper bound of Q_K (note that *D* is a discretized delay value; the corresponding actual delay value is (*D*-1)*b*, where *b* is the bin width). For a weakly dominant congested link *k* with parameters θ and ϕ, we can obtain an upper bound on its maximum queuing delay Q_K in a similar manner. More specifically, from $F_W(w)$, we find the smallest value *D* such that $F_W(D) > \theta$, then *D* can be used as an upper bound of Q_K since $D \geq Q_k$ by Theorem 2 (again the actual delay bound is (*D*-1)*b*, where *b* is the bin width). For link *k* with a very small value of θ, we can apply the following heuristic to obtain a tighter bound on Q_K.

VI. IDENTIFICATION OF DOMINANT CONGESTED LINK

In this section, we validate the model-based identification method using both *ns* simulations and Internet measurements.

Validation Using ns Simulations

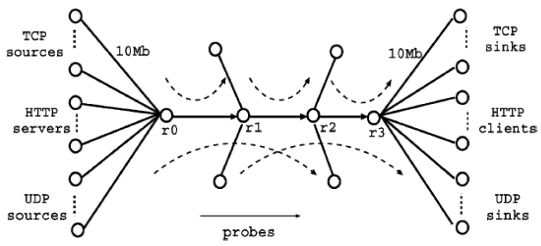

Fig. 2: Topology used in *ns*

We use a topology containing four routers, r_0, r_1, r_2 and r_3, in *ns* simulation, as shown in Fig. 2. Link (r_i, r_i+1) denotes the link from router r_i to r_{i+1}, where $0 \le i \le 2$. The bandwidth and the buffer size of link (r_i, r_i+1) are varied to create different scenarios. All the other links (from a source or a sink to its corresponding router) have bandwidth of 10 Mb/s and buffer size sufficiently large so that no loss occurs. The propagation delay of link (r_i, r_i+1) is 5 ms.

The propagation delay from a source or a sink to its corresponding router is uniformly distributed in [10,20] ms. We create three types of traffic conditions. The first type only has TCP-based traffic (in particular, FTP and HTTP traffic) from router r_i to r_j. The number of FTP flows ranges from 1 to 10, and the HTTP traffic is generated using the empirical data provided by *ns*. The second type only has UDP on-off traffic on link (r_i, r_i+1). The third type has both TCP-based and UDP ON–OFF traffic. The utilization of link (r_i, r_i+1) varies from 28% to 95% in different scenarios.

We only present results under the third type of conditions; results under the other two types are similar (indeed, our scheme relies on virtual queuing distribution and is not sensitive to whether the congestion is caused by TCP or UDP traffic). In each experiment, we send UDP probes periodically along the path from r_0 to r_3 at an interval of 20 ms. Each probe is 10 bytes. Therefore, the traffic generated by the probing process is 4 kb/s, much smaller than the link bandwidths used in the simulation.

VII. CONCLUSION

In this paper, we provided a formal yet intuitive definition of dominant congested link and proposed two simple hypothesis tests for identifying whether a dominant congested link exists along a path. We then developed a novel model-based approach for dominant congested link identification from one-way end–end measurements. Our validation in *ns* simulation and Internet experiments shows that the model-based approach requires only minutes of probing for accurate identification. As future work, we will investigate how to pinpoint a dominant congested link after identifying such a link exists.

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An Investigation about Abrasion Resistance and Seam Stretchability Properties of Weft Knitted Fabrics made from Conventional Ring and Compact Spun Yarn

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Abstract- Compact Spinning is a new version of ring spinning and distinct features of these yarns are their high strength and elongation values and low hairiness. In this research work cotton yarns, produced from same cotton blend were spun according to compact and conventional ring spinning principles in three different counts. Three different knitting structures single jersey, rib and interlock were produced from these yarns. The physical properties of those fabrics were investigated and compared with each other before and after reactive dyeing processes. When the results were studied, it was observed that higher abrasion resistance and lower mass loss after 10,000 cycles was found in all knitted fabrics made from compact yarn. Compact yarn based knitted fabrics showed higher seam stretchability and higher extension percentages compared to knitted fabrics made from conventional ring yarn.

Index Terms- compact yarn, abrasion resistance, seam stretchability and weft knitted fabric

I. Introduction

A revolutionary version of ring spinning process is called compact spinning achieves remarkable improvement in yarn quality through better utilization of fibre properties which gives benefit in the downstream. So the fabric made from compact spun yarn gives better look and feel [1].Compact spinning produces a novel yarn structures and the development of compact spinning has set new standards in yarn structures [2, 3].

Compact yarns are uniformly oriented and having better tenacity, elongation and hairiness properties. The better tenacity properties of compact yarn provide opportunities to work with lower twist coefficients result in an increase in production rate and also better handling properties of end product [4].

Many textile scientists have studied factors that have an effect on pilling and abrasion resistance [5, 6, 7]

Ortlek and Ulku found that the material type, twist level and pile length have a significant effect on the abrasion resistance of cotton chenille yarns is higher than that of acrylic or viscose chenille yarns [8].

Nergis and Candan proved that the over feed ratio, the binding yarn in the twist direction and the twist amount affected the stitch density, thickness and abrasion behavior of knitted fabrics from boucle fancy yarns [9].

Kaynak and Topalbekirroglu observed that the weave pattern and number of rubbing cycles have a significant effect on the abrasion resistance property of woven fabrics [10].

The performance assessment of ring and compact yarns in knitted fabrics with single jersey knit fabrics have been studied and reported that plain knitted fabric made out of compact spun yarn having better pilling resistance and abrasion resistance when compact or ring spun knitted [11].

In this research work was carried out to investigate the abrasion resistance and seam stretchabilty of knitted fabrics using ring and compact spun yarn on various knit structures such as single jersey, rib and interlock.

II. Material and Methods

In this study, 100% cotton yarns of 40/1 and 30/1 and 20/1 Ne were spun according to combed and compact spinning methods from the roving produced by using the same cotton blend (CIS Uzbekistan cotton).The compact yarns were produced on suessen EliTe compact system and Toyota Rx-240 ring frame was used to produce the conventional yarn. The quality parameters of these yarns are given in Table-2. Experimental samples from these conventional ring (combed)and compact yarns were knitted into Single Jersey, Rib (1×1) and Plain Interlock fabric. Knitting Machine specification are given in Table-1.

Table 1: Knitting Machines specifications

Machine Specification	Single Jersey	Rib	Interlock
Manufacturer	Mayer & Cie	Mayer & Cie	Mayer & Cie
Country of origin	Germany	Germany	Germany
Machine Diameter	30”	40”	40”
Gauge	24	18	24

Table 2: Quality parameter of Conventional ring and Compact yarn made from 100% cotton fibres produced on Conventional ring (Toyota –Rx240) and Suessen Elite compact system.

Test parameter	40/1Ne		30/1 Ne		20/1Ne	
	Conventional Ring Yarn	Compact Yarn	Conventional Ring Yarn	Compact Yarn	Conventional Ring Yarn	Compact Yarn
Yarn count	39.89	39.7	29.95	29.92	19.83	19.8
Count CV%	0.35	0.6	0.61	0.55	0.93	0.65
Uster U%	9.76	9.02	8.97	8.73	7.5	7.13
Uster CVm%	12.33	11.4	11.32	11.01	9.76	9
Thin place/km(-50%)	1	0	0	0	0	0
Thick places/km(+50%)	24	14	12	5	4	2
Neps/km(+200%	35	37	20	21	8	3
IPI	60	51	32	26	12	5
CSP	2549	2789	2411	2473	2722	2862
RKM(CN/Tex)	17.01	19.93	18.29	19.29	19.82	20.07
RKM CV%	11.56	9.08	7.13	9.75	5.91	9.24
Elongation%	4.6	4.81	4.21	4.62	5.03	4.86
Elongation CV%	8.66	8.63	8.06	11.2	5.92	10.62
TPI	23.74	23.19	20.28	19.46	16.59	16.38
Hairiness(H-index)	4.47	3.12	4.79	3.33	5.59	3.98
Hairiness(CV Hb%)	3	3	2.2	3.3	3.4	2.3

III. SAMPLE PREPARATION

All the grey fabrics of compact and ring spun yarn were processed in same bath to eliminate any variation during the process. Scouring and bleaching was applied to all the knitted fabrics in same bath as the first step to finishing process. The scouring and bleaching was done in the same bath with liquor ration 1:20 using Theis winch dyeing machine. The scoured and bleached fabrics were rinsed at 80° C for 20 minutes. After drop the bath fabric were neutralization with peroxide killer and Acetic acid. After this all the fabrics were dyed with medium brand reactive dyes (red color) in Theis Winch dyeing machine. The scouring & bleaching and dyeing process condition are given in following Table-3 and 4.Digital picture of Theis Winch dyeing machine(Germany) is given in figure-1.

Table 3: Scouring and Bleaching Recipe

Scouring and bleaching recipe	
Felosan RGN (Detergent)	0.7 g/l
Denquist HYN (Sequestering agent)	0.25 g/l
Windcrease WL (Anticreasing)	0.7 g/l
Soda ash Light (Alkali)	5 g/l
Hydrogen Peroxide (oxidizing agent)	2.5 g/l
Setabiocal A_4 (Stabilizer)	0.5 g/l
Geizyme APB (Peroxide Killer)	0.5 g/l
Acetic Acid (Neutralizing agent)	1 g/l
Time	60 min
Temperature	98° C
Liquor ratio	1/20

Table 4: Dyeing Recipe

Dyeing Recipe	
Sarabid LDR (leveling agent)	0.5 g/l
Setazol Red 3BS (dyestuff)	%3.0 owf
Sodium Sulphate (glauber salt)	80 g/l
Soda ash light (alkali)	20 g/l
Liquor ratio	1/50
Temperature Time	60° C 60 min
After Treatment	
Cotoblance NSR (soaping)	0.3 g/l
Acetic acid (Neutralizer) Time	0.8 g/l 45min

Fig. 1: Thies Winch Dyeing Machine (Germany)

IV. FABRIC TESTING

Following tests were carried out for all knitted fabric samples. All the tests were performed after the fabrics had been conditioned for 24 hours. (Atmosphere conditions of 65% R.H .and 27° C).

A. Abrasion resistance

Martindale tester is designed to give a controlled amount of abrasion between fabric surfaces at comparatively low pressures

in continuously changing direction. The abrasion resistances of the fabrics were tested on the Martindale pilling and abrasion tester at 9 kPa pressure according to BS EN ISO 12947-2(Determination of specimen break down and mass loss.)[12]A circular specimen(38mm), mounted in a specimen holder and subjected to a defined load, is rubbed against an abrasive medium in a translational movement tracing a lissajous figure, the specimen holder being additionally freely rotatable around its own axis perpendicular to the plane of the specimen. The evaluation of the abrasion resistance is determined from the inspection of specimen break down and mass loss of specimen after specific amount(10,000 cycles) of rubs. Experimental data of breaking cycle for Grey and bleached Sample are given in table-5, 6,7and 8. Figure-2shows the abrasion resistance tester.

Fig. 2: Martindale pilling and abrasion tester

Fig. 3: Seam strength tester, Tinius Olsen, SDL

B. Experimental Data

Table 5: Data of breaking cycle for Grey Sample

40/1 Knitted Fabrics		
Sample	Sample Type	Number of Cycle
Single Jersey	Combed	17000
	Compact	17500
Rib	Combed	21000
	Compact	25000
Interlock	Combed	30000
	Compact	35000
30/1 Knitted Fabrics		
Single Jersey	Combed	20500
	Compact	22000
Rib	Combed	38000
	Compact	42000
Interlock	Combed	35000
	Compact	35500
20/1 Knitted Fabrics		
Single Jersey	Combed	29500
	Compact	30500
Rib	Combed	33000
	Compact	35000
Interlock	Combed	62000
	Compact	72000

Table 6: Data of breaking cycle for Bleached Sample

40/1 Knitted Fabrics		
Sample	Sample Type	Number of Cycle
Single Jersey	Combed	32,000
	Compact	40,000
Rib	Combed	32,000
	Compact	33,000
Interlock	Combed	34,000
	Compact	62,000
30/1 Knitted Fabrics		
Single Jersey	Combed	36,000
	Compact	40,000
Rib	Combed	28,000
	Compact	30,000
Interlock	Combed	46,000
	Compact	66,000
20/1 Knitted Fabrics		
Single Jersey	Combed	38,000
	Compact	40,000
Rib	Combed	47,000
	Compact	48,000
Interlock	Combed	65,000
	Compact	72,000

Table 7: Data for Abrasion resistance (Mass Loss) in grey stage

40/1 Knitted Fabrics		
Sample	Sample Type	Mass loss after 10,000 cycles
Single Jersey	Combed	10.9 %
	Compact	10.2 %
Rib	Combed	6.2 %
	Compact	5.8 %
Interlock	Combed	4.4 %
	Compact	4 %
30/1 Knitted Fabrics		
Single Jersey	Combed	9.2 %
	Compact	7.8 %
Rib	Combed	4.1 %
	Compact	3.7 %
Interlock	Combed	3.7 %
	Compact	3.6 %
20/1 Knitted Fabrics		
Single Jersey	Combed	5.2 %
	Compact	4.8 %
Rib	Combed	3.8 %
	Compact	3.6 %
Interlock	Combed	2.8 %
	Compact	1.6 %

Table 8: Data for Abrasion resistance (Mass Loss) in For Bleached Sample

40/1 Knitted Fabrics		
Sample	Sample Type	Mass loss after 10,000 cycles
Single Jersey	Combed	5.3 %
	Compact	3.2 %
Rib	Combed	2.8 %
	Compact	2.8 %
Interlock	Combed	2.6 %
	Compact	1.5 %
30/1 Knitted Fabrics		
Single Jersey	Combed	1.182 %
	Compact	1.10. %
Rib	Combed	4.4 %
	Compact	3.2 %
Interlock	Combed	0.80 %
	Compact	0.60 %
20/1 Knitted Fabrics		
Single Jersey	Combed	3.5 %
	Compact	3.2 %
Rib	Combed	3.6 %
	Compact	2.3 %
Interlock	Combed	3.1 %
	Compact	2.3 %

C. *Seam Stretchability of knitted Garments*

This method covers the measurement of breaking force and elongation at break of seams from different areas of garment when stretching. TS -015 was followed to test Seam Stretchability of knitted Garments [13]. Tinius Olsen,SDL was used to test the samples. Side seam (super imposed) was produced for every knitted fabric. Four thread over lock machine and 50/2 Nm sewing thread was used to produce those seam.

All the testing of knitted fabric was carried out in standard atmospheric condition of 65% RH and 27±2 ° C. Finally load value recorded in pounds and as well as elongation at break in percentage.

Experimental data for Seam Stretchability for Grey and dyed Sample are given in table-9 and 10. Digital picture of Seam strength tester (Tinus Olsen,SDL) is given in figure-3.

Table 9: Data for Seam Stretchabilityfor Grey Sample

40/1 Knitted Fabric			
Sample Name	Sample Type	Stretching Force (lbf)	Extension (%)
40/1 Single Jersey	Combed	32.84	99.8
	Compact	36.82	114.3
40/1 Rib	Combed	40.78	80.0
	Compact	65.80	87.0
40/1 Interlock	Combed	67.00	83.9
	Compact	81.00	101.9
30/1 Knitted Fabric			
Sample Name	Sample Type	Stretching Force (lbf)	Extension (%)
30/1 Single Jersey	Combed	41.55	119.4
	Compact	51.3	131.0
30/1 Rib	Combed	72.3	74.0
	Compact	78.8	92.6
30/1 Interlock	Combed	81.9	87.1
	Compact	110.2	79.2
20/1 Knitted Fabric			
Sample Name	Sample Type	Stretching Force (lbf)	Extension (%)
20/1 Single Jersey	Combed	67.8	87.1
	Compact	80.4	106
20/1 Rib	Combed	116.8	70.8
	Compact	140.4	82.9
20/1 Interlock	Combed	167.3	86.4
	Compact	171.9	89.7

Table 10: Data for Seam Stretchability for Dyed Sample:

40/1 Knitted Fabric			
Sample Name	Sample Type	Stretching Force (lbf)	Extension (%)
40/1 Single Jersey	Combed	28.56	52.6
	Compact	31.80	77.9
40/1 Rib	Combed	37.14	61.8
	Compact	42.40	53.3
40/1 Interlock	Combed	53.3	62.9
	Compact	80.9	77.0
30/1 Knitted Fabric			
Sample Name	Sample Type	Stretching Force (lbf)	Extension (%)
30/1 Single Jersey	Combed	33.98	68.8
	Compact	37.12	75.4
30/1 Rib	Combed	53.5	53.7
	Compact	56.8	55.9
30/1 Interlock	Combed	66.8	46.21
	Compact	86.6	70.0
20/1 Knitted Fabric			
Sample Name	Sample Type	Stretching Force (lbf)	Extension (%)
20/1 Single Jersey	Combed	46.31	65.2
	Compact	54.9	75.3
20/1 Rib	Combed	64.8	65.2
	Compact	72.5	70.5
20/1 Interlock	Combed	84.1	91.2
	Compact	84.8	89.5

V. RESULTS AND DISCUSSION

A. *Abrasion resistance*

i. *Specimens break down*

In order to evaluate the resistance of the samples to abrasion, the fabrics were subjected to 100000 rubs or until a hole occurs. Abrasion tests were performed for all knitted fabrics in grey and bleached stages. The weight loss percent of the fabrics were also measured after 10,000 cycles. In figure 4 and 5 showed that the production process (Compact or conventional ring) have a significant effect on the abrasion resistant values on Knitted fabrics. Fabric made from compact yarn shows higher abrasion than fabric made from conventional ring yarn. Compact yarns based fabrics are expected to have lower friction values because

of their uniform and less hairy structures and as a result higher abrasion resistance in expected.

It was also seen that knitting structure had an important effect on the abrasion values on knitted fabric. The abrasion resistance values (breaking cycles) of interlock and rib are higher than single jersey fabric. Highest breaking cycles was found in 20/1 interlock fabric due to its compact structures. It was 62,000(grey stage) for fabric made from conventional ring yarn. In compact it was increased to 72,000 cycles.

In bleached stage abrasion resistance was increased due the removal of impurities of fabrics after bleaching.

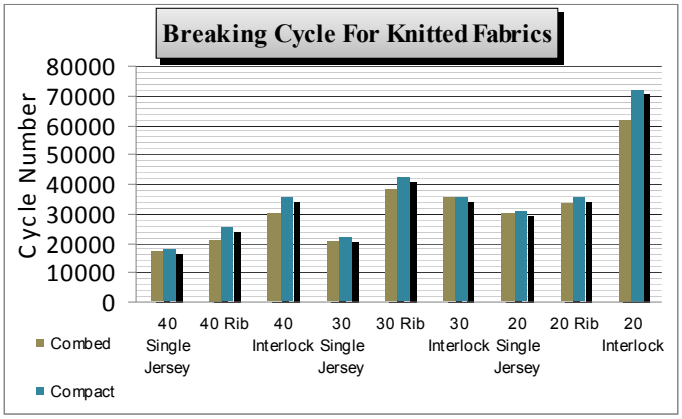

Fig. 4: Abrasion resistance (specimen breakdown) for all knitted fabric in grey stage.

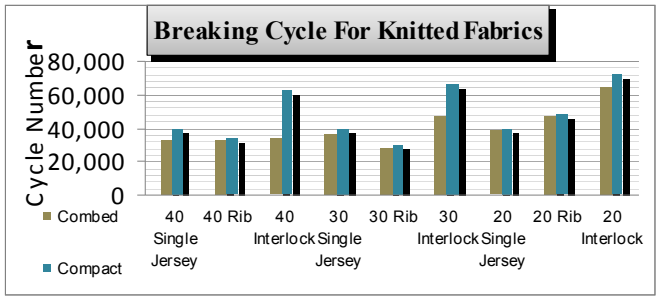

Fig. 5: Abrasion resistance (specimen breakdown) for all knitted fabric in bleached stage.

ii. Mass loss

In figure 6 and 7 it was clearly showed that Knitted fabric made from Compact yarn showed less mass loss after 10,000 cycles than the conventional ring based fabric in both grey and bleached stages. Fabric structures had in important effect on mass loss percentages. Higher mass are found Single jersey knitted fabric compare to rib and interlock structures. Less hairiness and higher strength of compact yarn have caused this difference.

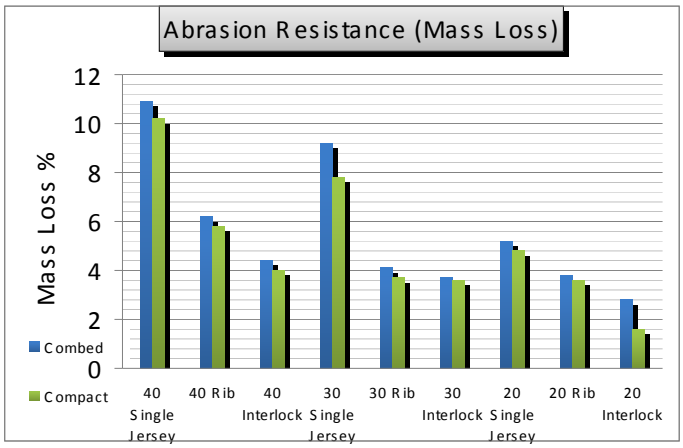

Fig. 6: Abrasion resistance (Mass loss) for all knitted fabric in grey stage.

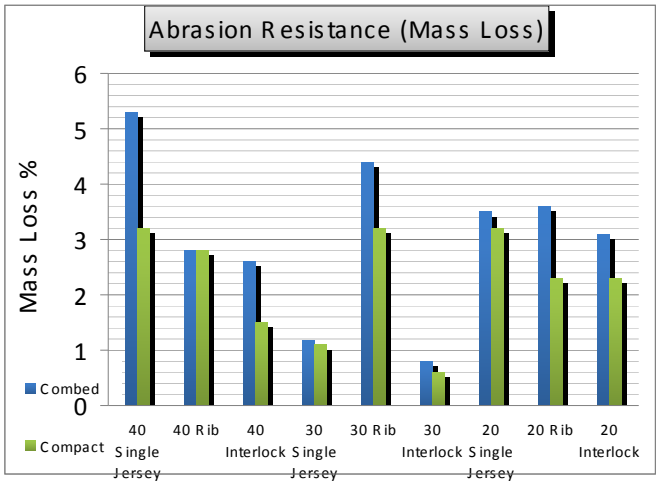

Fig. 7: Abrasion resistance (Mass loss) for all knitted fabric in bleached stage.

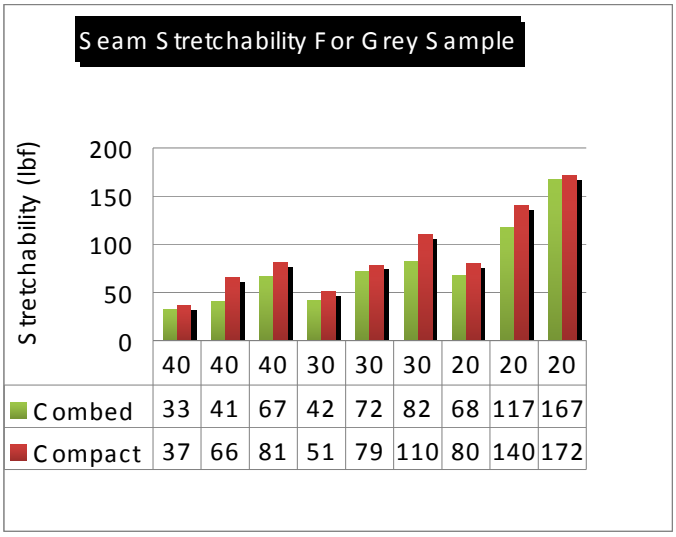

Fig. 8: Seam stretchability for all knitted fabric in grey stage.

iii. Seam stretchability of knitted garments

In graphical representation(Figure8 and 9) showed that Compact yarn based garment show the better seam stretchabilty than the conventional ring yarn based knitted fabric. 40/1 fabric has less stretch ability than 20/1 knitted fabric and Interlock fabrics showed higher seam stretchability. These results are due to higher bursting strength, lesser hariness and the more parallel state of fibre in yarn of compact yarn based. In grey stage seam stretchability was higher than the dyed stages. But in all stages fabric made from compact yarn showed higher seam strength and extension percentages compared to fabrics made from conventional ring yarns.

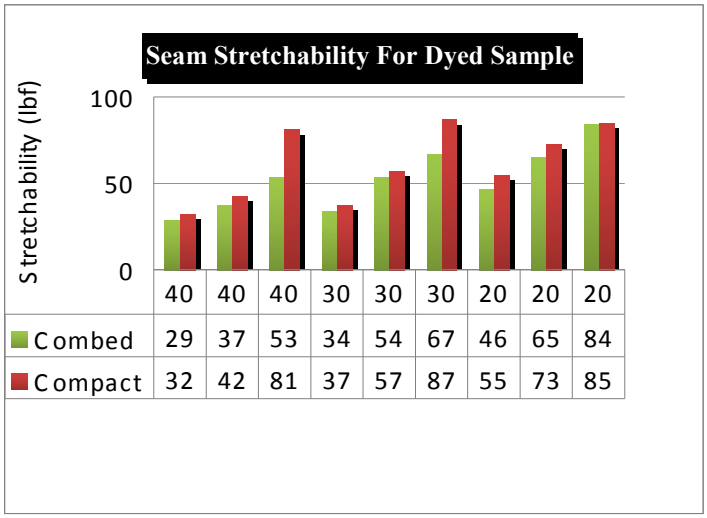

Fig. 9: Seam stretchability for all knitted fabric in grey stage.

VI. CONCLUSION

It was established that knitted fabric made from compact yarn have better physical properties than the fabric made from conventional ring(combed) yarn from the viewpoint of hairiness, neps, Unevenness, strength and elongation etc. Abrasion Resistance and seam stretchability are the two important properties of knitted garments. Compact yarn based fabric have abrasion resistance and seam stretchability which means they are more durable than conventional ring(combed) yarn based fabric. So knitted fabrics made of compact yarn can be used to make high quality garments with higher productivity.

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Length-weight relationship and condition factor of *Schizothorax niger* (Heckel, 1838) Misra from Dal lake, Kashmir

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Abstract- The length-weight relationship of *Schizothorax niger* from Dal lake was calculated ,which can be expressed by the equation,Log W = -5.13+3.07 Log L, for combined ones.The coeffiecient of correlation indicated a high degree of positive relationship between the two parameters.The exponential value (b) of the relationship in this fish species followed the cube law (3.07) which indicated the isometric growth pattern.Kn values of different length- groups exhibited variations which ranged from 0.94 to 1.14 during different months, with an average value of 0.7 which indicated that fish is under physiological stress in this water body.

Index Terms- s*chizothorax niger,* dal lake, length-weight relationship, co-efficient of correlation, condition factor

I. Introduction

Schizothoracines, the indigenous cyprinids (also called snow trouts), locally known as 'Alegad**.**They inhabit both lentic as well as lotic water bodies of Kashmir.The fish belongs to the family Cyprinidae and order Cypriniformes.Schizothoracines are highly valued fish, preferred to most other fish species. They feed on detritus, attached plant (including algal) coating of stones and rocks, and the associated invertebrate fauna.The fish population in the Dal lake has been declined to large extent due to encroachment, urbanization, agricultural activities,eutrophication and overfishing. Most fish species inhabiting the Himalayan region are small in size. Their distribution depends on environmental conditions such as velocity of water current , nature of substratum, and the availability of food. *S.niger* being a truely lacustrine fish does not show any spawning migration.

A number of research papers have been published on the length-weight relationship and condition factor of fishes (Torres 1991, Yousuf *et al.* 1992, King 1996, Firdous 1995, Raizada *et al.* 2005, Rao and Sreeramullu 2006, Singh and Gupta 2008, Devi *et al.* 2008.)

II. Materials and Methods

The length frequency data of male,female and combined sex of fresh samples of Schizothorax niger were collected from the four different basins of Dal lake,viz;Hazratbal, Nishat,Gagribal and Nageen.These specimens were caught with the help of cast net weighing 9 to 10 kg with total number of iron sinkers 244 and with a mesh size of 13mm to15mm from knot to knot. The total length of the fish was measured to its nearest 0.1 mm. and total body weight was measured to its neares 0.01g. The determination of length-weight relationship was made by applying the log transformation equation $w = aL^b$ to the data (Hile, 1936) Where,

W = Total weight of the fish in grams.
L = Total length of the fish in millimeters.
a = Initial growth constant and.
b = Regression co-efficient.

To assess the stoutness of the fish, ponderal index or condition factor was evaluated by Fultons formula i.e. by the following formula,

$$\text{Ponderal index K} = \frac{W \times 10^5}{(L)^3}$$

Where,
W = Total weight of fish in grams.
L = Total length in millimeters.
10^5 = It has been introduced to bring the value of ponderal index near the unity.

III. Results

As far as the length weight relationship of this fish was concerned, it was based on data of 151 specimens with a size range of 121mm to 359mm and weight range of 35g to 628g respectively. The regression equation is expressed as:

Male: Log w = -5.14+3.07 Log L (r = 0.988)
Female: Log w = -4.277+2.77 Log L (r = 0.988)
Combined: Log w = -5.13+3.07 Log L (r = 0.900)

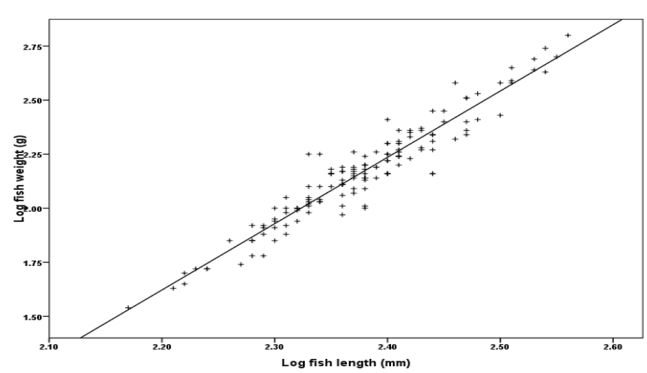

Fig. 1: Length Weight relationship of *S. niger*

IV. Ponderal Index

The value of condition factor (K) ranged from a minimum of 0.996 in November to the maximum of 1.24 in March (Table 1)

whileas, it observed its minimum value during November (0.99). The condition factor recorded an irregular trend throughout the year. .The k-factor varied in different length groups, among various length groups the smallest length group I (121-151) exhibited a K-value of 0.95 whereas, the highest length group VIII (330-359) was found to be in better condition and recorded a K-value of 1.14 respectively (Table 2).

Table 1: Monthly fluctuations in various indices in *S. niger*

	Months											
	Jan.	**Feb.**	**March**	**April**	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**
Comb.	1.06	1.068	1.24	1.118	1.082	1.062	1.16	1.04	1.153	1.162	0.996	1.10

Table 2: Fluctuation in condition factor of various length groups of *S. niger*

	I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**
Length Group	121-151	152-180	181-210	211-240	241-269	270-299	300-329	330-359
Condition factor	0.95	1.0	1.06	1.12	1.0	1.03	1.10	1.14

In case of males 'b' was 3.07, while in females it was 2.77 and in case of pooled data its value was 3.07. Thus on the basis of above equations it can be inferred that cube law is not followed in any case. As males exhibited slightly more growth than females,these acquired the value of exponent 'b' less than 3, therefore it can be concluded that females acquired lesser weight than cube of its length.

V. DISCUSSION

The length-weight relationship of fish have significant importance in studying the growth, gonadal development and general well-being of fish population (LeCren,1951: Pauly,1993 and Nagesh *et. al* 2004) and for comparing life history of fish from different lacalities (Petrakis and Stergion, 1995)

Ideally, the value of 'b' usually fluctuates between 2 and 4 (Tesch 1971) and in majority of cases it is not found equal to 3 (Hile,1936).Allen (1938) worked out that the cube law is applicable only for those species, which maintain their from and specific gravity throughout their life.But the shape and the form of fish may change with time, so the length-weight relationship of most of the fish species may deviate the cube law Further, the cube law does not hold good throughout the life period and the weight gain in a fish may not be always cube of its length gain (Rounsefell and Everhart 1953, Lagler, 1956.Hile (1936) and Martin (1949) opined that the value of 'b' may range between 2.5 and 4.0. Antony Raja (1967) recorded the value of 'b' within a range of 2.0 to 5.4. LeCren (1951) pointed out that the variation in 'b' value is due to environmental factors, season, food availability, sex, life stage and other physiological factors.

The males and females revealed significant differences in the value of 'b' in this fish species. In *S. niger* males recorded higher exponential value than females. Similar to our observations, Dashmona (1990) and Thapliyal (2002) have also reported significant differences in length-weight between different seasons and sexes of fishes studied by them. High 'b' values in case of males were also reported by Sunder *et al.* (1984), Yousuf *et al*. (2001). Hatikakota and Biswas (2004) and Rao and Sreeramullu (2006) reported higher values of 'b' in females, while higher values of 'b' in females were also observed by Sunder (1985), Kulshrestha *et al.* (1993) and Firdous (1997) .

The present work revealed that the studied species did not followed the cube law completely. Similar departure from cube law has been observed by Subla and Sunder (1981), Sunder *et al.* (1984), Torres (1991), Yousuf *et al.* (1992), King (1996), Firdous (1995), Raizada *et al.* (2005) Rao and Sreeramullu (2006), Singh and Gupta (2008), Devi *et al.* (2008) and Mandal *et al*. (2008). The present data make it quite clear that the relationship was influenced by environmental conditions like food and physiological parameters (Sunder *et al.,* 1984; and Sandhya and Shameem, 2003).

According to LeCren (1951) and George *et al.* (1985) the relative condition factor K_n is an indicator of general well-being of the fish. K_n greater than one (1) is indicative of the general well being of fish, whereas its value less than one (1) indicates that fish is not in a good condition. Carlander *et al.* (1952) is of opinion that condition factor may vary with increasing length when average weight of fish does not increase in direct proportion to cube of its length. However, Salam *et al.* (2005) pointed out that 'K' remained constant with increase in length and weight of fish.

Yousuf and Pandit (1989) suggested that condition factor of *S. niger* varied seasonally in close association with gonadal development and feeding intensity. During the present study, the fish was found in better condition in March (1.24) when gastrosomatic index was 7.40 and another peak in 'Kn' was noticed in October.Mahapatra and Datta (2004) attributed low mean K_n values in *Aristichthys nobilis* to spawning strain, spent condition and low feeding rate. Likewise, Hatikakoty and Biswas (2004) suggested increase in the weight of body due to weight of mature gonads.

The gonad weight and feeding intensity as influncing factors were emphasised by previous workers (LeCren, 1951 ; Babu and Nair, 1983,Yousuf and Pandit ; 1989, Narejo *et al.* ; 2002). Several other workers stressed that Pollution is responsible for variations in Kn values of fish (Bakhoum, 1999 and Devi *et al.,* 2008). During the present study also the monthly fluctuations in condition factor in studied species seemed to be influenced by gonadal development, availability of food and gastral activity and environmental factors.Chatterji (1979), have also related the changes in condition factor with age, feeding intensity and gonadal development.

VI. CONCLUSION

In conclusion, it can be said that feeding intensity, physiological factors like gonadal maturation and spawning along with environmental factors play an important role in the variations in condition factor of *S.niger.*

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Length-weight relationship and condition factor in *puntius conchonius* (Hamilton, 1822) from Dal Lake, Kashmir

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Abstract- The length-weight relationship and condition factor K in *Puntius conchonius* were investigated on samples collected from Dal Lake, Kashmir. The analysis of this fish species was based on 150 specimens ranging in size from 38mm to 84mm and in weight from 1.42g to 10.712g. The regression values obtained for male, female and for pooled sexes (2.97, 2.93 and 2.94). The regression coefficient was found to depart significantly from the cubic value. The computed value of correlation coefficient (r) for males, females and pooled ones were as r = 9.22, r = 9.36 and r =9.35 respectively, which were closer to 1 indicating that there is high positive correlation between the two variables i.e. length and weight.

The paper also throws light on the changes in the ponderal index (month-wise and length-wise). The index exhibits seasonal variations in close association with the feeding intensity and gonadal development in the fish. It recorded least values during winter month especially in January and from summer season in the month of July in both the sexes as well as in combined ones, which can be attributed to low feeding intensity and spawning stress in the fish.

Index Terms- Puntius conchonius, Dal Lake, length- weight relationship, condition factor

I. Introduction

The Puntius conchonius which is locally known as ''bloz.'' It is a deep bodied cyprinid fish species. It is characterized by the presence of dark black rounded spot at the base of the caudal peduncle. It is widely distributed in lakes and small streams in the Kashmir valley. Cyprinus carpio was introduced in Kashmir around 1955-1956, and it is likely that puntius conchonius were introduced at the same time.

The Dal Lake is situated between 34º 5' and 34º6'N latitude and 74º 8' and 74º12' E longitude at an altitude of 1584m above sea level. It has been an important fishery resource to the people of the valley, especially to Srinagar since ancient times. It is a shallow open drainage type water body spread over an area of 11.4km2, divided into five basins viz. Hazratbal, Nishat, Gagribal, Nigeen and Brarinumbal.

No scientific study of the Kashmir fish fauna seems to have been undertaken till early nineteenth century. It was Mr. Von Hugel, a visitor to Kashmir during 1830-1832 who found the fish of the valley somewhat different from those of the plains of India as well as Europe, and collected samples of different fish and handed them over to Mr. J.J. Heckel in Germany for identification. Heckel studied the samples thoroughly and on the basis of taxonomic features described sixteen species of fishes for the first time from the valley, all new to science (Heckel, 1838). Based on origin, the ichthyofauna of Kashmir has been categorized into three groups, viz., species of central Asiatic origin, those of Indian origin and exotic species introduced in recent past (Das & Subla, 1963).

II. Materials and Methods

(a) Study sites

During the present study, eight sites were selected for collection of fish in four different basins of the Lake, one peripheral and one central site from each basin.

Site-I and II: The site-II was located near Dhobi-ghat area and the –site II near the Sona-lank island in the Hazratbal basin.

Site-III and IV: Site-III was located near the (Nishat garden), while the Site-IV was located opposite the Ropa-lank island in the Lokut Dal basin

Site-V and VI: The site-V was located near the Boulevard area of the Gagribal basin, while site VI was located in the central region of this basin.

Site-VII and VIII: The site VII was situated in the Nageen basin along the peripheral areas near Ashaibagh Bridge and site VIII was located in the central part of this basin.

(b) Collection of Fish

The fisherman used traditional cast net with different mesh sizes. The cast net, locally known as "Shahat-jall" has been used which is locally known as "Guran-jall". It has a mesh size of 5mm to 9mm and a length of 7 metres. It is used to catch small sized fishes like *Crossocheillus diplochilus* and *puntius conchonius.*

(c) Identification

Identification of fishes was done with the help of standard taxonomic works (Day, 1878; Hora, 1936; Mukerji, 1936; Kullander *et al.,* 1999).

(d) Length Weight Relationship

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The determination of length weight relationship was made by applying the log transformation equation $w = aL^b$ to the data (Hile, 1936). Where,

W = Total weight of the fish in grams.
L = Total length of the fish in millimeters.
a = Initial growth constant and.
b = Regression co-efficient.

The ponderal index or condition factor for each fish was evaluated by Fultons formula i.e.
Where,

$$\text{Ponderal index K} = \frac{W \times 10^5}{(L)^3}$$

W = Total weight of fish in grams.
L = Total length in millimeters.
10^5 = It has been introduced to bring the value of ponderal index near the unity.

OBSERVATIONS:

The regression equation computed from data for males, females and pooled or combined ones is presented as:

Male: Log w = -4.72+2.97 Log L (r =0.922)
Female: Log w = -4.60+2.93 Log L (r =0.936)
Combined: Log w = -4.63+2.94 Log L (r =0.935)

The above equations clearly indicated that the two sexes (male and female) exhibited difference in the value of exponent 'b'. The weight gain is slightly more in case of males, whereas the weight gain was less than cube of the length in all the three cases.

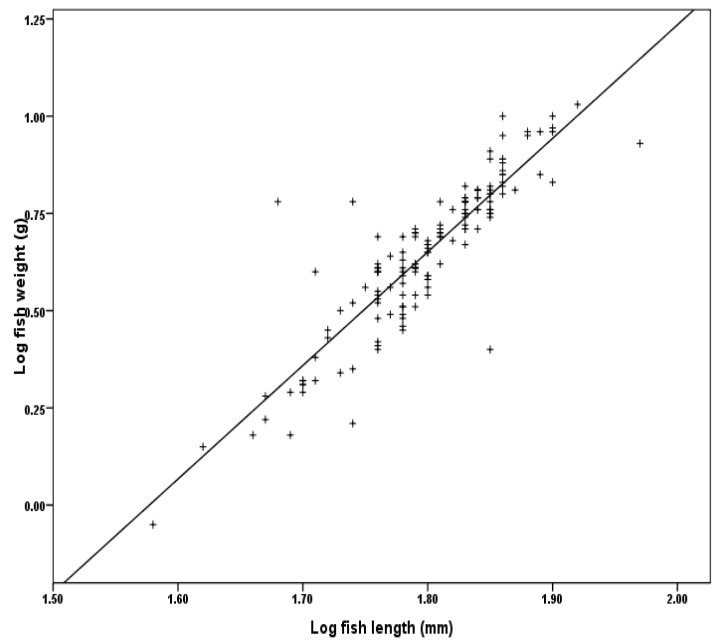

Figure 1: Length Weight relationship of P. *conchonius*

PONDERAL INDEX:

The Ponderal index recorded variations throughout the year (Table: 1). It recorded a minimum of 1.49 during January, whereas the maximum K was noticed during December (1.96). The males recorded high K. value in September (1.89) whileas, females were found in better condition in month of July (2.04). With regard to various length groups, the length group I recorded the minimum of 1.74, however the length group III recorded a highest K-value of 2.10 (Table: 2).

Table: 1 Monthly fluctuation in various indices in *P. conchonius.*

Type of sex	Months											
	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug	Sep.	Oct.	Nov.	Dec.
K												
Male	1.42	1.76	1.46	1.71	1.71	1.82	1.68	1.77	1.89	1.85	1.59	1.86
Female	1.57	1.91	1.76	1.61	1.84	1.99	2.0	1.79	1.94	1.70	1.63	2.06
Comb.	1.49	1.83	1.61	1.66	1.77	1.91	1.86	1.78	1.91	1.77	1.61	1.96

K=Condition factor

Table 2: Fluctuations in various indices in length groups of *P. conchonius*

Type of index	I	II	III	IV
Length groups	38-49	50-61	62-73	74-84
Condition factor	1.74	1.75	2.10	1.81

III. Discussion

The study of length-weight relationship is of paramount importance in fishery science, as it assists in understanding the general well being and growth patterns in a fish population. Basheer *et al*. (1993) opined that length- weight relationship of fish varies depending upon the condition of life in aquatic environment.

Ideally, the regression coefficient 'b' of a fish should be very close to 3.0 (Allen, 1938), however the cube law does not hold good throughout the life period and the weight gain in a fish may not be always cube of its length gain (Rounsefell and Everhart 1953. Hile (1936) and Martin (1949) opined that the value of 'b' may range between 2.5 and 4.0. Antony Raja (1967) recorded the value of 'b' within a range of 2.0 to 5.4. LeCren (1951) pointed out that the variation in 'b' value is due to environmental factors, season, food availability, sex, life stage and other physiological factors.

The males and females revealed significant differences in the value of 'b'. In *P. conchonius* males recorded higher exponential value. High 'b' values in case of males were also reported by Sunder *et al.* (1984), Yousuf *et al*. (2001). Hatikaktoa and Biswas (2004) and Rao and Sreeramullu (2006) reported higher values of 'b' in females, while higher values of 'b' in females were also observed by Sunder (1985), Kulshrestha *et al.* (1993).
The present work revealed that studied fish species did not followed the cube law completely. Similar departure from cube law has been observed by Subla and Sunder (1981), Sunder *et al.* (1984), Torres (1991), Raizada *et al.* (2005) and Mandal *et al*. (2008).

According to LeCren (1951) and George *et al.* (1985) the relative condition factor K_n is an indicator of general well-being of the fish. K_n greater than one (1) is indicative of the general well being of fish, whereas its value less than one (1) indicates that fish is not in a good condition. Salam *et al.* (2005) pointed out that 'K' remained constant with increase in length and weight of fish.

The condition factor of fishes has been reported to be influenced by a number of factors such as the onset of maturity (Hoda, 1987), Spawning (De-Silva and Silva, 1979; Al-Dham and Wahab, 1991), sex and maturity (Gowda *et al.,* 1987; Doddamani and Shanbouge 2001) and Pollution (Bakhoum, 1999 and Devi *et al.,* 2008). During the present study also the monthly fluctuations in condition factor in all the six species seemed to be influenced by gonadal development, availability of food and gastral activity. A perusal of present data revealed that in case of *C. P. conchonius* condition factor recorded its peak values during December highest K-factor was attributable to gonadal development. Mahapatra and Datta (2004) attributed low mean K_n values in *Aristichthys nobilis* to spawning strain, spent condition and low feeding rate. Likewise, Hatikakoty and Biswas (2004) suggested increase in the weight of body due to weight of mature gonads.

As a consequence the studied fish species revealed low feeding intensity during winter. Kashmir waters experience significant variations in temperature with near freezing condition during winter, the feeding activity of the fish gets appreciably decreased. This is also supported by the work of Penttinen and Holopainen (1992).

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Wireless Local Danger Warning (WILLWARN)

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Abstract- The primary cause for most accidents is vehicle's excessive speed and delayed driver's reaction. Road safety can be improved by early warning based on vehicle hazard detection and warning system. An innovative system called wireless local danger warning (WILLWARN), which is based on recent and future trends of cooperative driving, enables an electronic safety horizon for foresighted driving by implementing onboard vehicle-hazard detection.

One of the key innovative features of the proposed system is the focus on low penetration levels in rural traffic by a new message management strategy that is based on storing warning information in the vehicle and distributing warnings through communication, particularly with oncoming traffic. The system timely warns the driver about a dangerous situation ahead by decentralized distribution of warnings and incident messages via Intervehicle communication.

The WILLWARN system is based on a modular object-oriented architecture consisting of the warning message-management module (WMM), the hazard-detection-management module (HDM), the hazard-warning-management module (HWM), a Global Positioning System (GPS) receiver, and various onboard sensors. In this paper, all system modules, as well as their interoperability, are presented in detail.

Index Terms- foresighted driving, incident messages, local danger, rural traffic, vehicle-hazard, warning, WILLWARN

I. Introduction

The development of vehicle-collision-warning systems that detect oncoming collision dangers and provide warning messages to the driver has become, particularly over the past decade, a very important research field and application area. A significant amount of the proposed systems is based on information that is individually collected by each vehicle using radars and other types of sensors. The data elicited from vehicle onboard sensors usually provide information regarding the relative position, speed, and motion between the detecting vehicle and the moving or stationary obstacles, which is then processed to determine both the probability of a collision and a time estimation of a collision. Such commercial systems already exist in the market and mainly hold to the concept of autonomous collision warning.

Over the last decade, an alternative approach known as cooperative driving has appeared, introducing a very active research area based on vehicle-to-vehicle (V2V) or vehicle-to-infrastructure (V2I) communication. More specifically, this new scenario of collaborative driving lies in the fact that the vehicle or the infrastructure can communicate its location and other information to surrounding vehicles or nearby infrastructure. In this case, the collision warning is intended by incorporating the information communicated from the surrounding vehicles into the warning decision-making process.

Recent advances in wireless communication systems and the fact that GPS has become common practice in vehicle applications significantly support the investigation toward new applications in cooperative driving for road safety through communication.

All of the aforementioned applications of cooperative driving mainly focus on two issues: 1) the exchange of information among vehicles or infrastructure and 2) the way the vehicles should be guided using the obtained information. The former issue is tackled through the horizon of drivers by sharing information about driving status and intentions. The latter issue is approached by using cooperative trajectory planning by the driver.

WILLWARN is a complete application that supports the driver in safe driving by applying vehicle to infrastructure communication and enables an electronic safety horizon for foresighted driving. The whole WILLWARN application is innovative with significant scientific and technological contributions summarized as follows:

1. A concept for automatic detection, localization, and relevance check of traffic and weather-based hazards through onboard sensors and a positioning system such as GPS;
2. A new warning message management for transmission, storage, and distribution of hazard warnings, ensuring driver information in time at the right spot;
3. A local self-organized car-to-car communication system for establishing a decentralized communication network.

The key feature of the WILLWARN application is the focus on low penetration levels in rural traffic by a new message-management strategy; it is based on storing warning information in the vehicle and distributing warnings through communication, particularly with oncoming traffic. This leads to a high benefit for the user, even if the equipment rate is low. All of the aforementioned modules and features of the proposed WILLWARN system are presented in this paper separately and in detail in the following sections.

II. System Overview

WILLWARN, in concept, is a decentralized information system that is based on an ad hoc (V2V) communication

network. Vehicles automatically and without any driver intervention or action detect road hazards like, e.g., low road friction, and share this information with neighbored vehicles or vehicles, which come into radio range later on. This sharing of information enables drivers to adapt their driving style, therefore avoiding any hazards before they come into the drivers' visual range. The WILLWARN system is based on modular object oriented architecture, as depicted in Fig. 1. It consists of the V2I communication module (VIC), the warning message-management module (WMM), the hazard-detection management module (HDM), the hazard-warning-management module (HWM), a GPS receiver, and various onboard sensors.

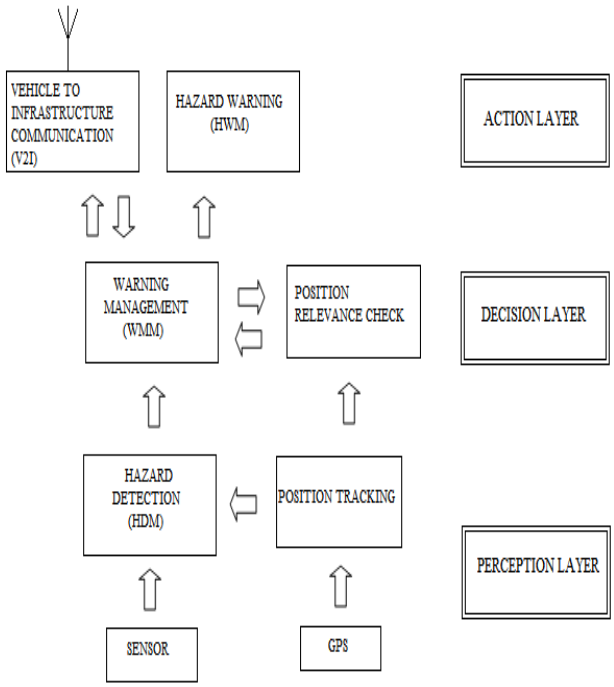


Figure 1: WILLWARN system architecture.

A. Hazard-Detection Module

The HDM is clearly a part of the perception layer and implements the automatic detection of road hazards.

Since the detection of road hazards is conveyed from characteristic sensor patterns, the hazard detection module is connected to the vehicle's bus system through which onboard sensor data are collected and compared against specific sensor data patterns, according to which, hazards are detected. Once a potential hazard is detected, an "information package" describing the hazard is passed to the WMM module. It contains the type of the hazard, various data needed to describe the hazard, as well as other parameters. Such information includes the temporal validity of the hazard, an initial reliability value, a priority index, and an indication of the traffic direction (following, oncoming, or both) that can potentially be affected by the detected hazard.

B. Warning Management Module

The WMM module performs the following:

1. processing of the "information package" sent by the HDM module;
2. processing of hazard messages received by the VIC module;
3. identification of hazard messages that need to be sent by the VIC module;
4. recognition of any invalid or obsolete hazard messages (also considering the vehicle's current position, speed, and direction); and
5. preparation of the information data to be displayed to the vehicle's driver through the HWM module.

C. Positioning and Relevance Check

Positioning and relevance check basically fulfills three major tasks: First, it provides all residual modules with positioning and timing information. Second, it generates the trace point chains, which have to be added to each newly generated message ("Trace Point Casting"). Third, it matches its own current position to trace point chains to evaluate the local relevance of received messages ("Trace Point Chain Matching"). Obviously, the prerequisite for these tasks is to have access to a positioning system like, e.g., GPS.

D. Hazard Warning Management

A well-designed human–machine interface (HMI) is important for the driver to gain trust in the system. However, warning HMI aspects. A driver, both reliably and on time, of a potential hazard that is not at the driver's line of sight is not an easy task. A too early warning may result in the driver forgetting it or even ignoring it. On the other hand, repeated warnings regarding the same hazard might annoy the driver. In addition, a warning system that produces a large amount of warnings may lose its importance for the driver, resulting in an inappropriate driver's reaction. Warnings within the WILLWARN system are classified as "actual danger" and "potential danger" based on the hazard detection reliability or the time difference between hazard detection and warning message reception or warning message display on the receiving vehicle. This classification helps overcoming hazard uncertainty and still keeps trust of drivers to the systems on high level. In addition, a hazard warning is suppressed or intensified in the receiving vehicle according to the vehicle's speed.

Different grades of required driver action based on danger classification are

1. Imminent Dangers – accident of leading car, end of traffic jam ahead
2. Particular Attention – detect climatic conditions like rain, temperature, humidity
3. Driver Information – high traffic, traffic jams, areas without warnings

A warning of the class "actual danger" addresses an imminent danger that requires from the immediate action of the driver, such as a braking maneuver. On the other hand, a "potential danger" requires the driver's particular attention and adaptation of speed and distance. Finally, it should be noted that prior to informing the driver about a reliable and relevant hazard, the situational relevance is performed by the HWM module. The latter is directly related to the hazard type itself. One example is a scenario where the vehicle actually approaches a hazard location but its speed is already significantly low. In this case, a warning might be needless.

In Fig 2, the classification of dangerous situations according to the previously described required driver actions is depicted.

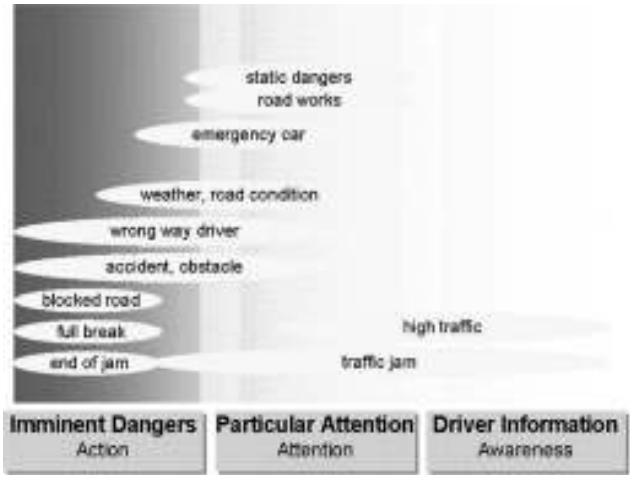
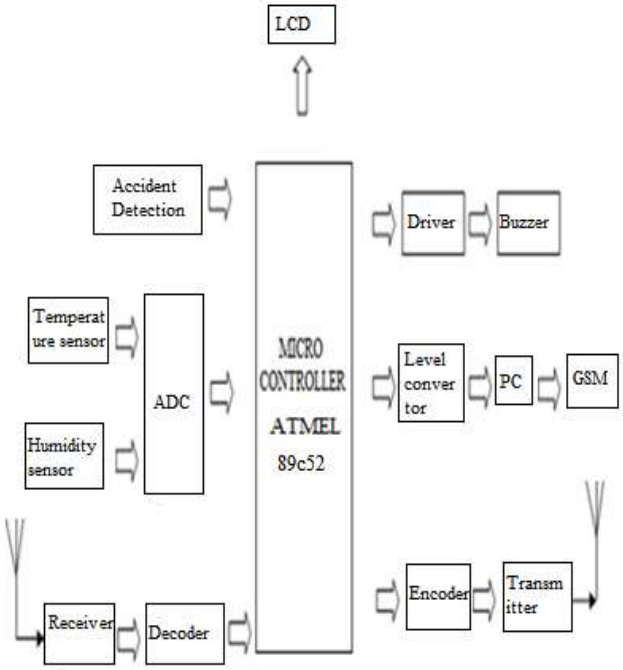


Figure 2: Classification of hazards.

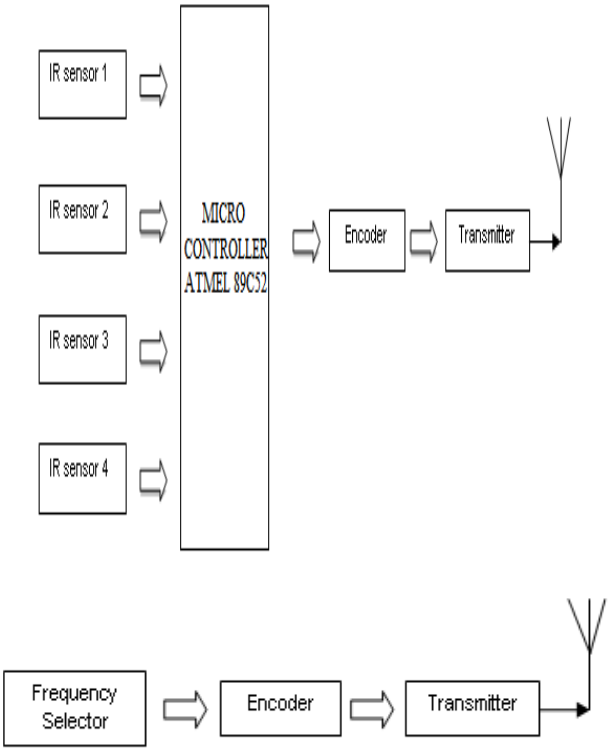
III. BLOCK DIAGRAM

Vehicle Section



The ATMEL 89C52 is a low-power, high-performance CMOS 8-bit microcomputer with 8K bytes of Flash programmable and erasable read only memory (PEROM). AT89C52 microcontroller is used for processing and controlling. The GPS and GSM are used for automatic localization and intimation when accident occurs and it has a reacting relay for controlling and switching purpose on emergency applications. Various sensors like temperature, humidity and rain for sensing purpose and for analog to digital conversion ADC 0809 is used. A local wireless communication is established by RF Transceiver 433.9 MHz. One of the main intentions of this project is to find the accident spot at any place and intimating it to ambulance through the GPS and GSM networks. Many attempts have been made regarding proving intimation when an accident occurs through GSM. But there was no possibility to locate the spot. Our project presents an automotive localization system using GPS and GSM SMS services.

Analyzer Section



One of the key innovative features of the proposed system is the focus on low penetration levels in rural traffic by a new message management strategy that is based on storing warning information in the vehicle and distributing warnings through communication, particularly with oncoming traffic. For this purpose IR sensor is used. When IR sensor senses the upcoming high traffic or traffic jam, it sends the warning message to the vehicle so that the driver could change the path. The wireless communication is established by RF Transmitter 433.9 MHz

IV. FEATURES

1. On board hazard detection based on data from the vehicle buses (e.g., obstacles, reduced visibility);
2. Decentralized distribution of warnings and incident messages from store and forward to RF vehicle to infrastructure communication;
3. Position-based relevance check by comparison of vehicle position by using GPS;
4. Timely driver warning by a LCD display and warning sound signals only if the driver is on the dangerous path.

V. CONCLUSION

The system characteristics enable an inexpensive approach, which can easily be integrated to vehicles of all price ranges. In this project, a new approach is introduced to find the accident

spot at any place and intimating it to ambulance, effective control of traffic and to give timely driver warning by a LCD display and warning sound signals when the driver is on the dangerous path. This distribution of warning and messages enables drivers to adapt their driving style, therefore avoiding any hazards before they come into driver's visual range. Thus WILLWARN system improves road safety. WILLWARN showed that communication is the next step and the right way to improve traffic safety in the future.

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Speckle Noise Reduction in Ultrasound Fetal Images Using Edge Preserving Adaptive Shock Filters

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Abstract- In image processing, image is corrupted by different type of noises. But generally medical image is corrupted by speckle noise. So image de-noising has become a very essential exercise all through the diagnosis. Noises are of two type additive and multiplicative noise. Speckle noise is multiplicative noise, so it's difficult to remove the multiplicative noise as compared to additive noise. The traditional techniques are not very good for especially speckle noise reduction. In this paper, an attempt has been made to compare and evaluate the performance of famous filters for speckle noise removal in ultrasound fetal image. Out of traditional filters, Adaptive Shock filter gives desirable results in terms of Mean Square Error and Peak Signal to Noise Ratio.

Index Terms- ultrasound images, speckle, biomedical imaging, MSE

I. Introduction

Each imaging system suffers with a common problem of "Noise". Mathematically there are two basic models of Noise; additive and multiplicative. Additive noise is systematic in nature and can be easily modeled and hence removed or reduced easily. Whereas multiplicative noise is image dependent, complex to model and hence difficult to reduce. When multiplicative noise caused by the de-phased echoes from the scatterers appears, it is called "Speckle Noise". Speckle may appear distinct in different imaging systems but it is always manifested in a granular pattern due to image formation under coherent waves.

Medical imaging like Ultrasound is very popular due to its low cost, least harmful to human body, real time view and small size. But this imaging has major disadvantage of having Speckle.

A. Speckle Noise In Ultrasound Images

It is an ultrasound-based diagnostic medical imaging technique used to visualize muscles and many internal organs, their size, structure and any pathological injuries with real time tomographic images. It is also used to visualize a fetus during routine and emergency prenatal care. Obstetric sonography is commonly used during pregnancy. It is one of the most widely used diagnostic tools in modern medicine. The technology is relatively inexpensive and portable, especially when compared with other imaging techniques such as magnetic resonance imaging (MRI) and computed tomography (CT). It has no known long-term side effects and rarely causes any discomfort to the patient. Small, easily carried scanners are available; examinations can be performed at the bedside. Since it does not use ionizing radiation, ultrasound yields no risks to the patient. It provides live images, where the operator can select the most useful section for diagnosing thus facilitating quick diagnoses.

This work aims to suppress speckle in Ultrasound fetal images. Speckle noise affects all coherent imaging systems including medical ultrasound. Within each resolution cell a number of elementary scatterers reflect the incident wave towards the sensor. The bac kscattered coherent waves with different phases undergo a constructive or a destructive interference in a random manner. The acquired image is thus corrupted by a random granular pattern, called speckle that delays the interpretation of the image content.

II. Model of Speckle Noise

A speckled fetal image is commonly modeled as 1 $v_1 = f_1 J$: Where f = $\{f_1, f_2, f_3, \ldots, f_n\}$ is a noise-free ideal fetal image, V $=\{V_1, V_2, \ldots, V_n\}$ is a speckle noise and J = $\{J_1, J_2, \ldots, Jn\}$is a unit mean random field.

In the medical literature, speckle noise is referred as "texture", and may possibly contain useful diagnostic information. The desired grade of speckle smoothing preferably depends on the specialist's knowledge and on the application. For visual interpretation, smoothing the texture may be less desirable.

Physicians generally have a preference of the original noisy fetal images more willingly than the smoothed versions because the filters even if they are more sophisticated can destroy some relevant fetal image details. Thus it is essential to develop noise filters which can secure the conservation of those features that are of interest to the physician. The shock filter has recently entered the field of image de-noising and it has firmly recognized its stand as a dominant de-noising tool.

III. Speckle Filtering

In speckle filtering a kernel is being moved over each pixel in the image and applying some mathematical calculation by using these pixel values under the kernel and replaced the central pixel with calculated value. The kernel is moved along the image only one pixel at a time until the whole image covered. By applying the proposed filter smoothing effect is achieved and speckle noise has been reduced to certain extent.

A. Adaptive Shock Filter

The term shock filtering has been introduced by Osher and Rudin in 1990. They proposed a continuous class of filters based on PDEs. The relation of these methods to the discrete Kramer, Bruckner fillter became evident several years later. To explain the idea behind adaptive shock filtering, let us consider a

continuous image f : R2 → R. Then a class of filtered images $\{u(x; y; t) \mid t \geq 0\}$ of f(x; y) may be created by evolving f under the process

$$ut = - \text{sign}(\Delta u) \mid \nabla u \mid;$$
$$u(x; y; 0) = f(x; y);$$

where subscripts denote partial derivatives, and $\nabla u = (ux; uy)^T$ is the (spatial) gradient of u. The initial condition ensures that the process starts at time t = 0 with the original image f(x; y). The image evolution proceeds in the following way. Assume that some pixel is in the influuence zone of a maximum where its Laplacian $\nabla u := uxx + uyy$ is negative. Then becomes

$$U_t = \mid \nabla u \mid;$$

Evolution under this PDE is known to produce at time t a dilation process with a disk-shaped structuring element of radius t. At the influence zone of a minimum with $\nabla u < 0$, the above equation can be reduced to an erosion equation with a disk-shaped structuring element:

$$U_t = - \mid \nabla u \mid;$$

These considerations show that for increasing time, increases the radius of the structuring element until it reaches a zero-crossing of Δu, where the influence zones of a maximum and a minimum meet. Thus, the zero-crossings of the Laplacian serve as an edge detector where a shock is produced that separates adjacent segments. The dilation or erosion process ensures that within one segment, the image becomes piecewise constant.

A number of modifications have been proposed in order to improve the performance of shock filters. For instance, it has been mentioned that the second directional derivative $U\eta\eta$ with $\eta \mid\mid \nabla u$ can be a better edge detector than Δu. In order to make the filters more robust against small scale details, Alvarez and Mazorra replaced the edge detector $U\eta\eta$ by $V\eta\eta$ with $V := K\sigma * u$. In this notation, $K\sigma$ is a Gaussian with standard deviation σ, and * denotes convolution. Taking into account these modifications the adaptive shock filter becomes

$$U_t = - \text{sign}(V\eta\eta) \mid \nabla u \mid$$

IV. RESULTS AND DISCUSSIONS

The performance of the filters was tested on an Ultrasound fetus image taken using B (brightness) mode. For analysis, speckle noise were added and the performance was analyzed based on Peak Signal to Ratio (PSNR), Mean Absolute error (MAE) and Mean Squared Error (MSE),. The response of the adaptive Shock filter was appreciable than other filters.

Figure 1: Original Image

Figure 2: Frost Filter

Figure 3: Kaun Filter

Figure 4: Lee Filter

Figure 5: Gabour Filter

Figure 6: Adaptive Shock Filter

Figure 1 shows the original image, Figure 2 to 6 shows the filtered output obtained using Frost, Kaun, Lee, Gabour and proposed Adaptive Shock filter.

Table I: Comparison of the performance of proposed filter with other conventional filters.

Filter	PSNR	MAE	MSE
Kaun	16.578	18.770	733.609
Lee	18.579	18.540	776.403
Frost	20.654	18.375	714.16
Gabour	20.738	18.495	720.204
Adaptive Shock	21.531	18.598	704.254

The above table shows the performance comparison of the proposed filter with other conventional filters. It shows that the proposed filter has marginally higher PSNR value and good MSE compared to other de-speckling filters.

V. CONCLUSION

The performance of noise removing algorithms is measured using quantitative performance measures such as PSNR, MAE and MSE as well as in term of visual quality of the images. Many of the methods fail to remove speckle noise present in the ultrasound medical image, since the information about the variance of the noise may not be identified by the methods. Performance of all algorithms is tested with ultrasound image