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Contact Information:

Editor: editor@ijsrp.org

Website: <http://www.ijsrp.org>

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Employee Assistance Program Counseling Improves Clinical and Work Outcomes: Longitudinal Results from CuraLinc Healthcare 2017-2022 in United States

Dr. Mark Attridge*, David Pawlowski**, and Sean Fogarty**

* Attridge Consulting, Inc., United States

** CuraLinc, LLC (d.b.a. CuraLinc Healthcare), United States

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Abstract: This paper presents empirical findings from a multi-year applied naturalistic study that focused on changes in clinical and work outcomes after using an employee assistance program in the United States. Self-report outcomes assessed with standardized measures were collected at the start of counseling from 33,683 employees during the normal course of business at CuraLinc Healthcare during 2017 to June 2022. A total of 5,159 employees had valid Pre and 30-day Post use data on one or more of the outcomes. Tests within each outcome sample found significant improvement after counseling (most had a 5 or 6 session model). Among the 487 cases using the EAP for a depression issue, the average severity level of depression symptoms (PHQ-9) was reduced by 59%. Among the subset of these cases at-risk for clinical depression disorder ($n = 292$), 89% had a reliable clinical improvement in severity. Among the 440 cases using the EAP for an alcohol issue, the average severity level of alcohol misuse (AUDIT-10) was reduced by 67%. Among subset of these cases at-risk for alcohol misuse disorder ($n = 288$), 73% had a reliable clinical improvement in severity. Across all cases with absence data ($n = 3,732$), the average hours of work absence in the past month per employee (Workplace Outcome Suite) was reduced by 80%, changing from 8.9 hours at Pre to 1.8 hours at Post. At the start of counseling, 35% of these cases were classified as having an absence problem (i.e., missing more work than a typical healthy employee), but at Post only 7% had a work absence problem. Across all cases with productivity data ($n = 3,845$), the level of work productivity (Stanford Presenteeism Scale) improved by 35%. At the start of counseling, 34% of cases were initially classified as having a problem with work productivity (i.e., low performance and lack of focus), but at Post this rate was reduced to just 5% of cases. All primary results for each outcome were large size statistical effects. Moderator tests indicated the improvement in each outcome was generally consistent across different sub-groups of employees based on client age, sex, clinical use characteristics and other study context factors. Some moderator findings were identified for clinical issue, referral type (self or manager) and client sex having slightly different profiles on certain outcomes. Comparisons with past research, study design limitations, and best practices in conducting applied research on workplace mental health are discussed.

Index Terms: absenteeism, alcoholism, counseling, depression, employee assistance program, productivity

I. INTRODUCTION

The need for mental health support for working adults all over the world is well documented in the literature [1]. For the United States, in normal times, epidemiological data on prevalence rates indicate that about 1 in every 5 (20%) working adults have diagnosable mental health disorders and/or substance abuse problems [2]. This rate is even higher when examining the full population and not just the employed (typically healthier) segment. The 2018 National Survey on Drug Use and Health found that 23% of adults had either a mental illness or a substance use disorder [3]. These kinds of behavioral health issues have been exacerbated since early 2020 during the ongoing COVID-19 global pandemic [4-6].

1.1. Depression and Alcohol Disorders

Depression is a common mental illness that has a negative impact on the way a person thinks, feels, and acts. Depression is also known as major depressive disorder [7]. Although it ranges from mild to more severe levels of impairment, depression can be a serious illness for some of those affected. It causes feelings of sadness and can result in a person losing interest in activities that were once enjoyable. Depression also impacts the ability to function effectively at home and work. It is often experienced together with anxiety disorders, other mental health disorders, and with substance abuse [7]. Depression is also associated with increased suicide risk [8]. Depression is among the most burdensome of behavioral health disorders, giving rise to considerable adverse effects on activities of daily living,

work functioning, and disability [9-11]. Chronic stress and other behavioral health issues are also deeply disruptive for the individuals experiencing them, as well as their friends and family.

Alcohol is the single most used and abused drug in America. According to national survey data [12], in 2015, over 175 million people in the United States reported using alcohol and 1 in every 3 of these people reported binge drinking in the past month (i.e., having 4 or 5 alcoholic drinks in one session). Alcohol misuse includes a spectrum of severity from drinking above recommended limits (called "risky drinking") to severe alcohol dependence. Most people with alcohol misuse are not alcohol dependent (i.e., addicted) and this relatively less severe portion of people account for most of the morbidity and mortality that is attributed to drinking. For example, alcohol misuse contributes to a total of over 88,000 deaths in the United States each year and 1 in 10 deaths among working adults are due to alcohol misuse [13].

1.2. Consequences of Mental Health Conditions

Mental health and alcohol use problems usually do not get better on their own. The consequences of leaving these issues untreated have a far-reaching impact on both physical and emotional fitness [14]. Numerous studies have demonstrated that depression and other mental health conditions are associated with increased overall health care costs [15,16]. There is also substantial evidence that alcohol, depression, and other common behavioral health risk factors are associated with deficits in employee absenteeism and work productivity [17-19]. The greater impact that behavioral health issues have on work presenteeism than on work absenteeism also is a consistent theme in the literature [20-22]. Employers are justifiably concerned about mental health and substance abuse issues both from a personal perspective for their workers and from a cost and productivity standpoint [23-26]. Therefore, it makes sense for employers to try to prevent or reduce the rates of depression, alcohol misuse and other common behavioral health conditions among employees and family members. Employers have a range of behavioral health benefits and tools to choose from to address the rising tide of behavioral health challenges. Sponsoring an employee assistance program (EAP) is a popular response from employers.

1.3. Employee Assistance Programs (EAPs)

According to the Employee Assistance Professionals Association (EAPA) [27], an EAP is:

“a worksite-based program designed to assist (1) work organizations in addressing productivity issues and (2) employee clients in identifying and resolving personal concerns, including, but not limited to, health, marital, family, financial, alcohol, drug, legal, emotional, stress, or other personal issues that may affect job performance.”

According to the most recent national random sample study of employers in the United States in March of 2021 [28], most employers have an EAP - but it varies by size of the company and market sector. In the public sector, all federal employees have an EAP and 78% of all state and local governments offer an EAP to their workers. In the private sector, 83% of large business (500 or more employees), 66% of medium size employers, and 35% of small employers (under 100 employees) sponsor an EAP benefit. In total, over 70.9 million American workers have access to an EAP.

Depression and other mental health problems are common reasons why employees use brief counseling from EAPs [1]. An analysis of over 90,000 EAP cases in the U.S. from year 1999-2010 [29], found only 3.1% of clients were seeking support for an alcohol issue whereas 55% of users had a psychological issue (however, the number specifically with depression was not identified). Another study of a national EAP vendor in Canada [30] examined 9,105 users of counseling from year 2005 to 2007. Their data indicated that 37% of the total sample of EAP counseling cases meet the criteria for having a clinical depression disorder (based on screening at the start of the case). Interestingly, the vast majority of these cases had sought help from the EAP for a reason *other than* depression or anxiety (i.e., 87% of the group with depression disorder and 93% of the other group with only minimal or mild depression severity).

In a more recent example, an industry report examined the mix of issues for over 29,000 total cases contributed by 35 different EAPs during the years 2010 to 2021 [31]. This study found that alcohol or other addiction issues represented just 3% of the total cases, whereas psychological health issues accounted for 30% of the total – with cases specific to depression being 8% of the total. The other two-thirds of cases in this study were spread across categories of personal life stress (29%), marital, dating or family relationships (19%) or work-related issues (19%). Although the number of employees seeking support for alcohol issues is a small part of overall case-mix at most EAPs today, the full-service EAP approach has a long history of understanding how to identify and address employee alcohol problems by using the power of the workplace [32,33]. Identifying and supporting employees with alcohol problems is even specified as one of the seven “core technologies” of the EAP profession [34].

1.4 Research on EAP Cases for Depression or Alcohol Outcomes

Few examples exist in the literature in the past 20 years that have focused specifically on the effectiveness of EAP counseling for employees with depression or alcohol risks [35-46]. Some of this research has involved a mismatch between the client’s clinical issues

in the study sample and the clinical outcomes assessed. More specifically, some studies evaluating the effectiveness of EAP counseling have inappropriately tested for changes in depression or alcohol outcomes among all cases using the EAP for any reason. A logical consequence of having test samples with the majority of cases being irrelevant to clinical depression or to alcohol disorders is finding only modest improvement in depression symptoms and weak or no improvement in levels of alcohol misuse [40-42].

In contrast, other studies evaluating the effectiveness of EAP counseling have used a different approach that focused only on the subsamples of cases selected to be relevant to depression (i.e., scored above the at-risk level on a standardized depression symptoms screener [38,43-46]). Each of these studies found significant and substantial improvement in the severity level of depression symptom after counseling. The statistical effect sizes for the improvement in these five studies that tested only the EAP cases starting treatment at a clinical level of depression ($d = 1.08$ to 1.62) were more than double what was found in the two studies noted earlier that used general samples of EAP users with a range of issues and relevance to depression ($d = 0.45$ [41] and 0.59 [42]). Matching the clinical condition of the user to the outcome is also standard practice for most research studies assessing the effectiveness of computer and phone App machine-based interventions designed for self-support of specific mental health conditions [47-49].

The lesson from the literature is that in order to conduct a fair test of the counseling impact on cases with depression and especially for cases with alcohol problems (as they are more rare), it is important to first identify the subset of EAP users relevant to these specific clinical outcomes. To do this, however, requires a very large sample to start with to provide an opportunity to find enough relevant cases. The normative data on the mix of client issues for most EAPs suggests it takes about 10 cases to find one case who presents with a depression issue and that it takes about 33 cases to find one case who presents with an alcohol issue.

Focusing on cases at the clinical level of behavioral health risks also allows for conducting a more sensitive statistical analysis of the change in clinical symptom severity within each case after EAP treatment. The Reliable Change (RC) index methodology can be used to mathematically test if the extent of clinical change is beyond chance level using the standardized variance of the outcome scale [50-54]. While introduced over 20 years ago, this analytical approach has only recently been applied to study the effectiveness of brief counseling for anxiety and depression cases at EAPs with just three published examples [44-46]. We know of no prior studies using the RC testing approach with alcohol cases at EAPs.

1.5. Research on EAP Cases for Work Outcomes

The typical non-distressed employee misses less than 4 hours per month due to health reasons [see literature review in 55]. In contrast, the typical user of EAP counseling misses about twice as much time from work [22,31,55-58]. Recent studies reveal that by emphasizing the *average* number of absence hours per case, it obscures the fact that the majority of the employees who use EAP counseling actually report zero hours of work absence both at before and after treatment [55-58]. For example, analysis of over 38,000 cases from 47 different EAPs [31] determined that 59% of cases at the start of counseling reported no absence and this group rose to 79% of cases at follow-up. When an absenteeism problem is defined as missing more scheduled work time than the typical employee (i.e., 4 or more hours total in the past month), this same study found that 32% of cases at the start of counseling had a work absence “problem” but that this was reduced to only 15% of cases at follow-up.

In contrast to work absence, the majority of employees who use EAP counseling do typically experience reduced on-the-job productivity (i.e., presenteeism) during the period of acute distress during the month just before seeking counseling [37-40,42,46,55-58]. The same studies all find that work productivity tend to rebound to a more normal level after counseling is completed. For example, the most recent EAP industry-wide study [31] found that over half of EAP cases (56%) had a work presenteeism problem when starting counseling but this was reduced to only 30% of the total cases at the follow-up a few months after treatment. Thus, most EAP cases when starting counseling report having difficulty concentrating at work and doing their job at a normal level of performance even though they may not be missing much (or any) time away from work.

Moderator tests conducted in large samples of cases [31,57,58] consistently have found that employees with different reasons for using the EAP (i.e., clinical issue) tend to have rather similar profiles on work absenteeism and presenteeism/productivity outcomes, although having depression is linked with greater absence and lost productivity. Thus, unlike specific clinical outcomes that are more appropriate to investigate when matched to the client’s goal for therapy or matched to at-risk clinical status (such as alcohol or depression), work-related outcomes are relevant to investigate in all cases regardless of the reason why they used the EAP. Other demographic and clinical use factors also tend to have only small effects as moderators of improvement in work outcomes after use of EAP counseling.

1.6. Methodological Issues in EAP Counseling Effectiveness Research

More than 100 applied research studies have been conducted around the world evaluating the effectiveness of workplace mental health services and EAPs [58]. Over the years, many scholars have critically reviewed this literature on EAP effectiveness [59-73]. Most of the studies have examined the impact of counseling on aspects of clinical functioning and also on work-related outcomes (such as absenteeism and presenteeism /productivity). The consistent conclusion from every one of these reviews is that counseling from EAPs

is generally effective for most users for reducing clinical distress and improving work-related outcomes. Yet, despite these generally supportive findings, these same reviews and also reports by other critics of EAP [74-77] have noted that most of the source studies tend to share practical limitations associated with analyzing data collected from applied business contexts.

Most of the works examining the effectiveness of EAP counseling are white papers, conference presentations, or articles in trade journals rather than articles published in scientific peer-review journals. Most of these studies featured non-experimental, single-group, longitudinal study designs and involved samples of users of EAP counseling who were not randomly selected. Few studies have empirically tested the representativeness of the sub-group of cases with longitudinal data included in the study compared to the much larger caseload at the EAP who did not complete follow-up measures. Less than half of EAPs today even bother to collect longitudinal outcome data from their users, with many opting for a post-only follow-up satisfaction and outcome survey study design [31]. The validity and reliability of the specific outcomes measures used in most studies is also questionable. Despite having multiple research-validated measures available in the public domain for the last 10 to 20 years, a recent study determined that these high-quality tools are not being used by most of the 101 EAP vendors or internal programs surveyed [31]. More specifically, only 35% of EAPs used a research-validated outcome measure for clinical outcomes and only 24% of EAPs used a research-validated measure to assess work-related outcomes. Thus, the level of scientific rigor in many aspects of EAP service evaluation could be enhanced for most providers.

1.7. Project Overview

CuraLinc Healthcare is a global external vendor of EAP services, based in the United States. In business since 2008, it has over 2,900 employer customers that offer the EAP as a benefit to over 4 million employees. This company specializes in delivering transformative mental health care by marrying technology and personalized advocacy to engage, empower and support employees throughout their care journey. The intake clinicians, also referred to as Care Advocates, were all independently licensed, masters or doctorate level educated mental health professionals. During the initial intake assessment, these clinicians were asked to conduct thorough clinical assessments, make expert referrals and collect study outcome data when relevant. The clinicians also provided consultative follow-ups on all EAP cases.

As part of its ongoing business practice, this EAP also routinely collects several kinds of data relevant to assessing the user satisfaction and outcomes of the services. For example, over the past six years of follow-up anonymous survey results have consistently shown a high level of user satisfaction with the EAP counseling service experience. At a 30-day post use follow-up, these cases were asked: "Overall, how would you rate your experience using the program?" and offered response options of: *Excellent, Very Good, Good, Fair* or *Poor*. When combining the top three options, the results have been remarkably consistent each year: Year 2017: 95.0%; Year 2018: 95.1%; Year 2019: 95.1%; Year 2020: 95.3%; Year 2021: 95.0%; Year 2022: 95.1%; Combined: 95.1%.

1.8. Hypotheses and Research Questions

Given the results in past literature on the general effectiveness of EAP counseling, we also expected to find positive changes in both the clinical and work kinds of outcomes after use of counseling in this study. Thus, we proposed the following four research hypotheses:

- *H1*: Among cases who used the EAP for a depression issue, the severity level of depression symptoms will be reduced from Pre to Post use of the service.
- *H2*: Among cases who used the EAP for an alcohol issue, the severity of symptoms of alcohol misuse will be reduced from Pre to Post use of the service.
- *H3*: Among all cases who used the EAP and reported on their work absenteeism, the number of hours of missed work will be reduced from Pre to Post use of the service.
- *H4*: Among all cases who used the EAP and reported on their work performance, the level of performance will be improved from Pre to Post use of the service.

We also wanted to leverage the client background and operational data available in our study to explore the potential for moderators of improvement in the clinical and work outcomes after use of counseling. Thus, we proposed the following research question:

- *RQ1*: Is improvement in clinical and work outcomes from Pre to Post use of the service consistent across different subgroups of cases defined by employee demographic, clinical use, or employer context factors?

II. METHODOLOGY

2.1. Archival Data

We focused only on employee users in this study. Thus, the experiences of spouses, dependents and retirees of covered employees who used the EAP service were excluded. Users were made aware of the service as a benefit open to all covered employees through a variety of digital, interpersonal and workplace promotional practices. There was no direct cost to the employees in this study, as access to the

EAP was sponsored by their employer. Employees participated voluntarily and were not paid for using the services. The study period spanned 63 months, from the start of January of 2017 through the end of March of 2022, based on the start date of program use. The last case included in the study had a Post use data collection date of June 2 of 2022. The year of use was defined by date of when the employee contacted the program and completed the initial intake assessment (2017 to 2022). The case-level raw data was aggregated into one master dataset and analyzed for the present paper. Across the four outcomes examined, we had valid longitudinal data from 5,159 unique employees who worked at over 500 different employers in the United States. Some of this data has been reported on previously in a series of annual reports of preliminary findings [78-81].

2.2. Counseling Intake, Intervention and Follow-up

Employees accessed the EAP in a variety of ways, most commonly by calling the EAP service and talking on the telephone with a licensed mental health professional. After the initial assessment, each employee was provided a referral to engage with a licensed mental health clinician for short-term counseling. Every employee who requested support was referred to a clinician with a specialty that matched their presenting issue or concern who also had confirmed appointment availability. The counseling was most often delivered in either face-to-face sessions at the counselor's office or remotely via live secure video over the Internet. During the initial assessment, the outcome measure(s) were collected, either over the telephone or from a brief online survey. After the counseling treatment phase was completed, a Care Advocate conducted individual follow-ups with cases about 30 days after the last clinical session to assess the employees' clinical progress, use of any recommended additional support services and determine if any other referrals were needed. At this point, the second wave of data was collected for each relevant outcome measure. In all cases, the counselor who treated the employee was not the same person who collected the outcome data. The typical case had a model that allowed for a maximum of 5 or 6 sessions of counseling. The typical cases engaged in treatment over a 50-day period (i.e., from date of case open to case close) with the follow-up survey done at approximately 30 days later after the final session (see Figure 1). Note, the total amount of time involved for each employee to complete their use of the service and participate in the follow-up varied from case to case.

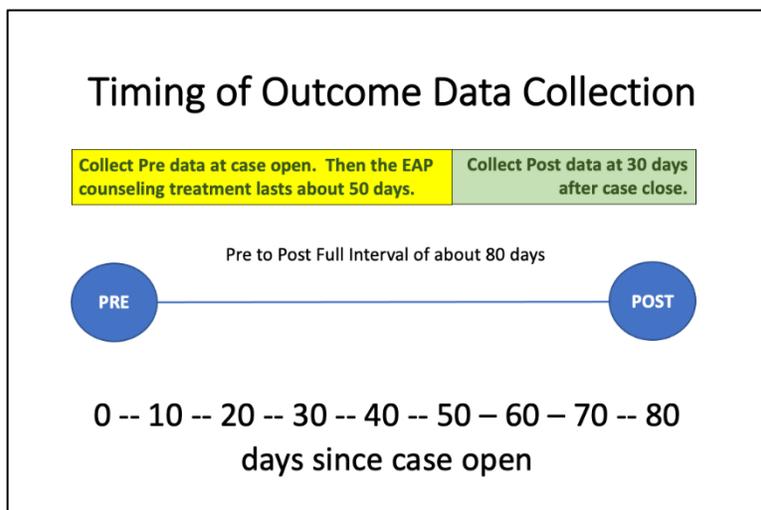


Figure 1: Timing of longitudinal outcome data collection for a typical case.

2.3. Operational System Data

The first kind of data came from the operational business processes used by the staff and counselors who provided the counseling services. Part of this process involves recording core aspects of the business customer context, employee demographics and the clinical experience. For this study we extracted the following information from the operational data system: name of employer/customer, maximum clinical sessions allowed per case in the employer/customer contract, date of first use of the service, date of follow-up survey (only available for cases with the work absenteeism outcome), employee age (date of birth), employee gender, source of referral to the EAP (self or formal referral from management), primary clinical issue (alcohol, depression, work and so on) and the clinical modality.

2.4. Self-Report Outcomes Data

Clinical symptom outcome data was collected at Pre for cases that had a relevant clinical issue (i.e., the case had either depression or alcohol as a primary or secondary issue as the reason for using the EAP). Work outcome data at Pre was collected for cases regardless of the specific clinical issue. Not all relevant EAP cases with depression or alcohol issues were invited to complete the depression or

alcohol clinical symptom measure and not all users completed the work outcome measures. This was because many employees had limited time available at the intake session or were not interested in engaging in the outcome measurement process. The business needs and the unique individual preferences of the employees and/or the intake Care Advocates ultimately determined which specific cases participated in the outcomes study data collection efforts. The Post use data was collected routinely for cases that had the same outcome(s) collected at the start of the program use.

2.5. Outcome Measures

Standardized measures of clinical symptoms and work outcomes were assessed using published and validated scales from the scientific literature and available in the public domain.

Depression. Depression was measured for employees who presented with depression during the initial assessment as either their primary or secondary issue. The Patient Health Questionnaire 9-item scale (PHQ-9) [82] was used for screening, diagnosing, monitoring, and measuring the severity of depression. This scale has been used in many research studies and has established validity and reliability [83-86]. The instructions state: “Over the last 2 weeks, how often have you been bothered by any of the following problems?” It has four response options of: (0) *Not at all*; (1) *Several days*; (2) *More than half the days*; and (3) *Nearly every day*. The PHQ-9 is scored by adding together the scores for all 9 items. Higher scores on this measure indicate greater depression. Scores are categorized into five levels of severity: Minimal = 0 to 4; Mild = 5 to 9; Moderate = 10 to 14; Moderately Severe = 15 to 19; and Severe 20-27. Based on recent reviews [87,88] clinical at-risk status for depression was categorized as Moderate or above (i.e., scores of 10+). This scale had excellent psychometrics with high internal consistency at both time points ($\alpha = .85$ Pre; .92 Post) and a significant test-retest correlation ($r_{\text{paired}} = .51$).

Alcohol Misuse. Developed by the World Health Organization, the Alcohol Use Disorders Identification Test, 10-item full scale second version (AUDIT-10) was used to assess level of alcohol misuse and risky drinking behavior. First developed in 1989 for use in a primary care setting, the AUDIT-10 is now used in a wide variety of clinical and research settings as a brief screening tool for identifying at-risk alcohol consumption [89-92]. It measures three content domains: hazardous alcohol use (items 1-3); symptoms of alcohol dependence (items 4-6); and harmful alcohol use (items 7-10). The responses are on a 5-point scale for items 1 through 8 (scored as 0, 1, 2, 3, or 4) and a 3-point scale for items 9 and 10 (scored as 0, 2 or 4). The AUDIT-10 is scored by adding together the scores for all 10 items. Higher scores on this measure indicate greater alcohol misuse. It has four levels of risk for alcohol misuse: Low risk 0-7; Risky use 8-15; Harmful use 16-19; and Severe use 20-40. “At-risk” clinical status is defined as a score of 8 or higher. Items 4 to 10 refer to experiences “in the last year”. At Pre the original items and responses were used, but at the Post, these items were changed where appropriate to be “in the last 30-days.” This scale had excellent psychometrics with high internal consistency at both time points ($\alpha = .83$ Pre; .74 Post) and a significant test-retest correlation ($r_{\text{paired}} = .64$).

A minor methodological issue concerned the 12-month vs. the 30-day reference periods for the alcohol outcome measure at the Pre and Post periods, respectively. The response options, though, for 8 of the 10 items had 4 of the 5 choices with time frames reflecting monthly or less frequent rates of experience. In addition, our data revealed that very few responses were in the less than monthly final option on this scale, which makes the differences in response time frame for Pre and Post far less relevant.

Work Absenteeism. Developed by Chestnut Global Partners in 2010 [93], the Workplace Outcome Suite (WOS) is a psychometrically tested and validated five-scale questionnaire that has been used in over 40 EAP studies [55]. The WOS was designed to provide assessment on relevant individual differences that focus on five outcomes which are related specifically to EAP interventions and are likely to change across time if treatment is successful – and remain static if it is not. Of the five outcomes assessed by the WOS, only the absenteeism scale was used in this study. The instructions are to: “Please report for the period of the past 30 days the total number of hours your personal problems (or presenting issue)”...[item here]. It uses a fill in the blank response for the number of specific hours of absence in the past 30-days for five ways that refer to how much the employee’s ability to be at work were affected by their personal problem(s). Based on past research using the WOS [31,55,56] the following five levels were used for the severity of absence: None 0 hours; Minimal < 4 hours; Low 4-8 hours; Moderate 1-3 days (9-24 hours); High > 3 days (25-159 hours).

As other research shows the typical employee in the U.S. misses only about 3 hours per month of work due to health-related issues (see review in [31]) problem status for work absenteeism was defined as 4 or more hours of absence (4-159 hours). Based on past research using the WOS [31,55,56] we excluded cases who reported 160+ hours missed and were not actively working. Unlike the other outcome scales, the work absenteeism measure did not use a set of statements to be rated, rather it asked for specific hours of missed work to be provided in five behavioral contexts and each context is added up for total number of hours of missed work. Similar to past research [31,55,56] the total for the absenteeism scale showed a skewed pattern, with three-fourth of the total hours coming from the first item on missing a full day(s) of work and the remaining one-fourth of the total hours coming from various kinds of partial day types of absence assessed by the other four items (i.e., being late arriving to work, leaving work early, change in work location and personal communication activity while at work). The internal reliability of the WOS was not relevant to assess.

Work Productivity. Originally a 32-item version, the brief 6-item version of the Stanford Presenteeism Scale (SPS-6) is a widely used scale for assessing the impact of health problems on work productivity of employees [94,95]. According to Google scholar, since its release it has been cited in over 800 scientific papers. The SPS-6 consists of two dimensions, with one factor on completing work (items 2, 5, and 6) and a second factor on avoiding distraction while working (items 1, 3, and 4). It has response options of: (1) *Strongly disagree*; (2) *Somewhat disagree*; (3) *Uncertain*; (4) *Somewhat agree*; and (5) *Strongly agree*. The items are answered for the time period of the past month. Three of the six items are reverse scored (items 1, 3, and 4). The SPS-6 score is the sum of the three raw scores and the three reversed scores (range 6–30). A higher total scale score indicates greater work productivity despite experiencing a health issue. Based on the Consortium for Mental Healthcare [96], scale scores were grouped into five levels of work productivity, ranging from low to high: Very Low productivity 6-10; Low 11-15; Medium 16-20; High 21-25; and Very High 26-30. This scale had excellent psychometrics with high internal consistency at both time points ($\alpha = .94$ Pre; $.97$ Post) and a significant test-retest correlation ($r_{\text{paired}} = .38$). To allow us to conduct similar analyses of a change in “at-risk status” (like depression and alcohol outcomes) for this scale, we needed a way to split the distribution of SPS-6 scores into two groups of at-risk (i.e., a problem of poor productivity) or not at-risk. We defined a score on the SPS-6 at 15 or below in the very low to low range, as having a work productivity “problem”.

Note that the creators of this scale defined presenteeism as a positive aspect of work productivity [94]: “A decrease in presenteeism can hurt productivity in a way similar to an increase in absenteeism” (p. 14). However, almost all other researchers in this area define the concept of presenteeism negatively as a problem of not being psychologically present enough while working to perform properly [18-20,31,36,38-41,55,56,97,98]. For example, Cooper and Dewe [99] defined presenteeism as “lost productivity that occurs when employees come to work ill and perform below par because of that illness” (p. 522). More simply put, Hemp [100] defined presenteeism as “at work – but out of it” (p. 49). Therefore, to align the interpretation of the SPS-6 scores better with the dominant deficit-themed definition of presenteeism, we retained the original 1-5 direction of the item ratings but labelled higher scores on the SPS-6 as indicating greater work productivity while at work (i.e., better performance and greater focus while at work).

2.6. Correlation of Outcome Measures Within Cases

The four outcome measures were all correlated with each other (all $p < .001$) when tested in various samples of all available cases with data at the start of counseling. More severe depression was associated with both missing more time from work ($r = .25, n = 2,481$) and with poorer work productivity ($r = -.30, n = 2,084$). More severe alcohol misuse was related to greater work absence ($r = .23, p < .001, n = 1,485$) and slightly with lower work productivity ($r = -.10, n = 1,294$). More severe depression tended to co-occur with more severe alcohol misuse ($r = .29, n = 433$). The two work outcomes were also intercorrelated ($r = -.32, n = 25,061$). This pattern of associations in expected directions for all tests offers evidence for the convergent form of measurement validity for each outcome scale.

2.7. Data Analysis Plan

All analyses were conducted using the Statistical Package for the Social Sciences (SPSS) Version 27. Analyses with categorical variables were conducted with chi-square (χ^2) non-parametric test procedures. The tests of improvement over time (Pre to Post) in the outcome measures were conducted using a repeated measures analysis of variance procedure (RM-ANOVA). For the sub-groups of cases at-risk for depression or at-risk for alcohol misuse, we also used a more sensitive analysis developed by Jacobson and Truax [50] that tested for the extent of clinical improvement achieved based on the Reliable Change (RC) index methodology. The development of certain statistics needed for the RC index analyses were derived from data specific to our study (see Appendix A). In addition, we calculated the number of at-risk cases who demonstrated “reliable recovery” [52] which is defined as when the case experienced *both* a clinically reliable improvement (based on the size of the difference between their Pre and Post scores) and recovery on the clinical symptom measure (i.e., changed from being above the clinical cut-off score at Pre to below the threshold at Post).

2.8. Statistical Power and Effect Size

With different sample sizes for each outcome, we assessed the power to detect a particular finding as being statistically significant in the longitudinal tests [101]. The level of power to detect a small size effect in repeated measures tests at $p < .05$ chance level was very high in this study at .99 for each outcome. To allow for reasonable comparison of the findings from outcomes involving different sample sizes, we calculated the statistical effect size for most results. The partial eta squared (η_p^2) effect size statistic can range from 0 to more than 1.00, but it is usually a number closer to the zero end of the scale. These effect sizes can be interpreted as follows [102]: large size effect is $\eta_p^2 = .14$ or greater; medium size effect is $\eta_p^2 = .06$ to $.13$; small size effect is $\eta_p^2 = .01$ to $.05$; and a trivial size effect is $\eta_p^2 < .01$ (even if the finding is significant at p value less than 5% chance level). Meaningful findings in this study were defined as having both a statistically significant result and at least a small size statistical effect.

2.9 Ethical Considerations

The privacy of users was protected by having all program use and survey data deidentified before being shared with the independent consultant (first author) who conducted all statistical analyses. As this was an applied study of archival anonymized data collected from

routine use of the service, additional informed consent from individual participants beyond their initial consent agreement in terms of use of the EAP service was not required. All data was collected as part of the normal business practices and not for a separate specific research project. Project approval from a university internal review board was not required. The use and analysis of archival operational data in this manner for applied research is consistent with the published ethical guidelines of the American Psychological Association [103]. All counselors involved in the delivery of the clinical treatment services were fully licensed and trained professionals. The real-world conditions for this study are like other applied studies published in peer-review journals that have examined the effectiveness of commercial mental health support programs [44-46,56,104-107].

III. RESULTS

PART 1: Longitudinal Samples

3.1 Determination Valid Longitudinal Samples

The minimum criteria for inclusion in the longitudinal group for each outcome was having the outcome measure collected for all items on the measurement scale both at the start of the counseling and at the follow-up (Pre and Post). Employees not working were judged as irrelevant to answer questions about absence from work and productivity while working. This criterion was operationalized by excluding any employee who reported having 160 or more hours of absence in the past 30 days (we assumed a standard full-time schedule with an 8-hour daily work shift performed five days per week for the month). Excluded from the final longitudinal sample for the absenteeism outcome were 110 cases (0.4%) who were not working at Pre and 13 cases who were not working at Post (0.3%). Excluded from the final longitudinal sample for the work productivity outcome were 77 cases (0.3%) who were not working at Pre and 13 cases (0.3%) who were not working at Post. Note that cases with work productivity data who did not have work absenteeism data for the same period (i.e., at Pre or at Post) were still retained as valid cases, as the likelihood of having 160+ hours of absence - and thus not working status - for these cases was very small.

The longitudinal samples for each outcome measure are shown in Table 1. The valid longitudinal sub-groups represented from 9% to 17% of the starting sample that had data collected on the same outcome measure at the start of the case.

Table 1. Number of counseling cases with valid longitudinal data for each outcome and cases within each sample with data for the other outcome measures.

Outcome measure:	Longitudinal Sample			
	Depression	Alcohol misuse	Work absenteeism	Work productivity
Depression (PHQ-9)	487	38 (9%)	88 (2%)	93 (2%)
Alcohol misuse (AUDIT-10)	38 (8%)	440	168 (5%)	166 (5%)
Work absenteeism (WOS-5)	88 (18%)	168 (38%)	3,732	3,015 (78%)
Work productivity (SPS-6)	93 (18%)	166 (38%)	3,015 (81%)	3,854
Total valid cases	487	440	3,732	3,854
Longitudinal cases as % of total cases with data at Pre (follow-up response rate)	9% of 5,330	17% of 2,614	13% of 28,442	14% of 26,819

Note: Number of cases with primary outcome measure for sample in **bold**.

Whether an employee had completed one or more of the outcomes measures *other than* the focus for that sample (for example, cases in the depression outcome sample who also completed the work absenteeism outcome scale – see Table 1), was non-significant as a moderator of the improvement in the primary outcome from Pre to Post. Thus, if the case had also completed another outcome measure, it made no difference in the results for that primary measure.

3.2 Representativeness of Longitudinal Samples

As the cases were not randomly selected to be included in this study and the final samples included the experiences of a minority of total the service users with starting outcome information collected, we wanted to first determine if the final valid samples of cases with longitudinal data for each outcome were a reasonable representation of the much larger population of research-relevant cases at this EAP during the same period. Statistical tests were conducted comparing the Pre-only sample (i.e., those who completed a measure at baseline but not at the follow-up) with the longitudinal samples for each outcome measure. Overall, the cases of interest in the longitudinal samples for each outcome had the same general profile of the initial outcome severity level, employee demographic factors, clinical use factors, and employer context factors as other employees at this EAP (see four tables in Appendix B). Thus, the results support the representativeness of the four longitudinal samples. Few of the nine demographic, clinical, and employer context factors

differed in these tests. The few exceptions identified were for variables of referral source, clinical issue, and sex of the client. These are described below.

The percentage of cases with a formal referral by management to the EAP was very low and similar for the depression outcome longitudinal sample (3%; 16 of 487) and the Pre-only group for depression (1%; 38 of 4,843). The other three outcome longitudinal samples each had a much higher percentage of cases who were formally referred into the EAP by management at their employer than the same outcome groups that lacked the follow-up data (these differences were all medium size effects). For alcohol outcome cases, formal management referrals were 22% of the longitudinal group ($n = 97$ of 440) but only 4% of the Pre-only group ($n = 82$ of 2,174). For work absence outcome cases, formal referrals were 19% of the longitudinal group ($n = 701$ of 3,732) but less than 1% of the Pre-only group ($n = 187$ of 24,710). For work productivity outcome cases, formal referrals were 17% of the longitudinal group ($n = 644$ of 3,854) but less than 1% of the Pre-only group. Apparently, for some outcomes, being referred into the EAP by one's employer contributed to a much higher participation rate in the follow-up survey.

The depression outcome longitudinal sample did not differ from the Pre-only group on any of the demographic, clinical use or employer-related factors examined (see Appendix B, Table B1). The alcohol outcome longitudinal sample also did not differ from the Pre-only large group on any of factors examined (see Table B2), other than referral source. Other than referral source, the work absence outcome longitudinal sample only differed from the Pre-only group in one more of the factors examined (see Table B3) – type of clinical issue. Possibly influenced by additional number of the management referral cases, the absence outcome longitudinal sample did have a higher percentage of cases with presenting issues of work stress (13% > 7%), drug use (7% > 1%), and problems with alcohol use (6% > 3%) than in the Pre-only group. The work productivity outcome longitudinal sample only differed from the Pre-only group in clinical issue (see Table B4), such that the longitudinal sample had a higher percentage of cases with presenting issues of work stress (12% > 8%), drugs (5% > 2%), and alcohol (7% > 1%) than the Pre-only group.

PART 2: Changes in Outcome Measures in Longitudinal Samples

3.3 Depression Outcome Results

Depression: Change in Risk Levels. Figure 2 shows the results for how the 487 cases with a primary or secondary depression issue were distributed across the five levels of depression symptom severity at Pre and at Post. A chi-square test revealed there was a significant shift from higher to lower severity levels after counseling for many cases, $\chi^2(16,487) = 218.33, p < .001, \eta_p^2 = .28$ large effect. On an individual level, at the start of counseling 60% ($n = 292$) of employees were classified as clinically at-risk. But at Post, only 12% of cases were at the clinical risk level ($n = 56$).

Depression: Clinically At-risk Cases. Analyses were also conducted among the subsample of the 292 cases with clinical depression disorder when starting EAP counseling. The vast majority of these cases, 84% ($n = 244$) had recovered at Post to no longer be at-risk. Moreover, partial remission (a score at Post in the 5-9 range) was achieved by 45% ($n = 129$) of the at-risk cases and full remission (a score at Post in the 0-4 range) was achieved by 39% ($n = 115$) of the at-risk cases.

Depression: Reliable Change Index. Figure 3 displays the results using the RCI methodology for depression cases. It found that 89% ($n = 262$ of the 292 total cases) who started counseling at with clinical depression succeeded in having a reliable improvement (i.e., an amount of change in symptom scores from Pre to Post that was larger than chance level based on the statistical reliability of the measure). Also, 10% of the at-risk cases ($n = 28$) had no change and only 1% ($n = 2$) had a reliable deterioration in their depression symptoms (i.e., got worse). In addition, about 4 of every 5 of the at-risk depression cases (81%, $n = 236$ cases) achieved the best result of “reliable recovery” after counseling (i.e., their symptom score at Pre declined at beyond a chance amount at the Post and their Post score was below the at-risk cutoff).

Depression: Change in Average Severity Score. The RM-ANOVA test found that the level of symptom severity for the average case was 59% lower at the follow-up for all employee with longitudinal data on the PHQ-9. The same test conducted among the just the subsample who started counseling at a clinical level of depression showed an average decrease of 61% in symptom severity. Both results were significant and very large size statistical effects (see Table 2). These differences in mean score are shown in Figure 4.

Depression: Moderator Tests. Exploratory tests (RM-ANOVA) examined if the depression outcome was different for certain client demographic or clinical use context factors. The moderator results indicated only one factor – match of the clinical issue – had different outcome profiles (see Table 3). The cases who had depression as the primary reason for using counseling had more severe depression and had greater score reduction in severity of depression symptoms after use than cases with a different primary issue (anxiety, other mental health issues, personal stress, work, marriage, or other topics) yet having depression as a secondary issue. When included in the same model as clinical issue, the sex of the client was not a meaningful moderator of improvement in depression (even though women had slightly greater depression severity than men). [Note: Referral type was not tested as it did not have enough management referral cases.]

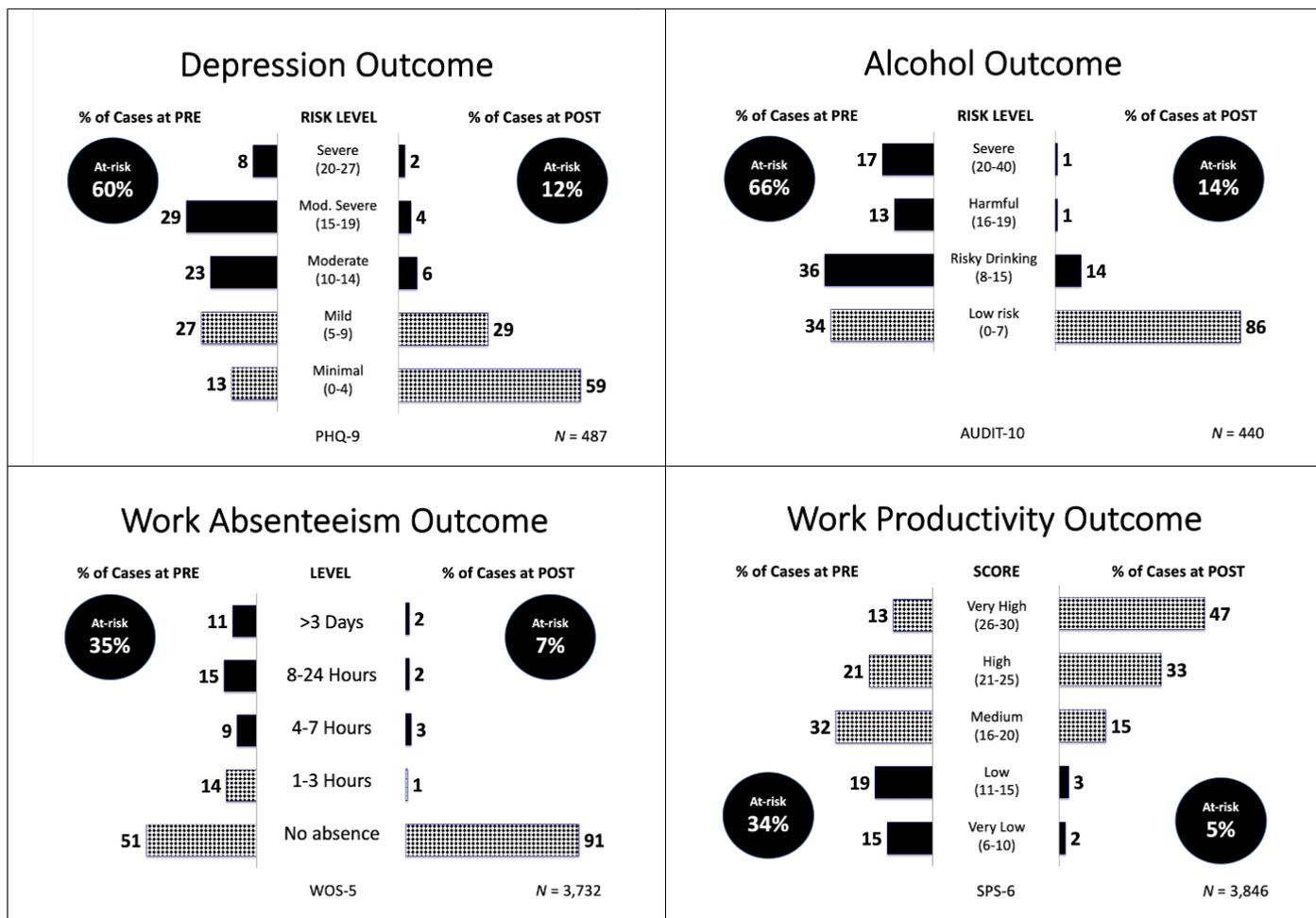


Figure 2. Percentage of cases at different levels of risk at Pre and Post in longitudinal sample: By outcome.

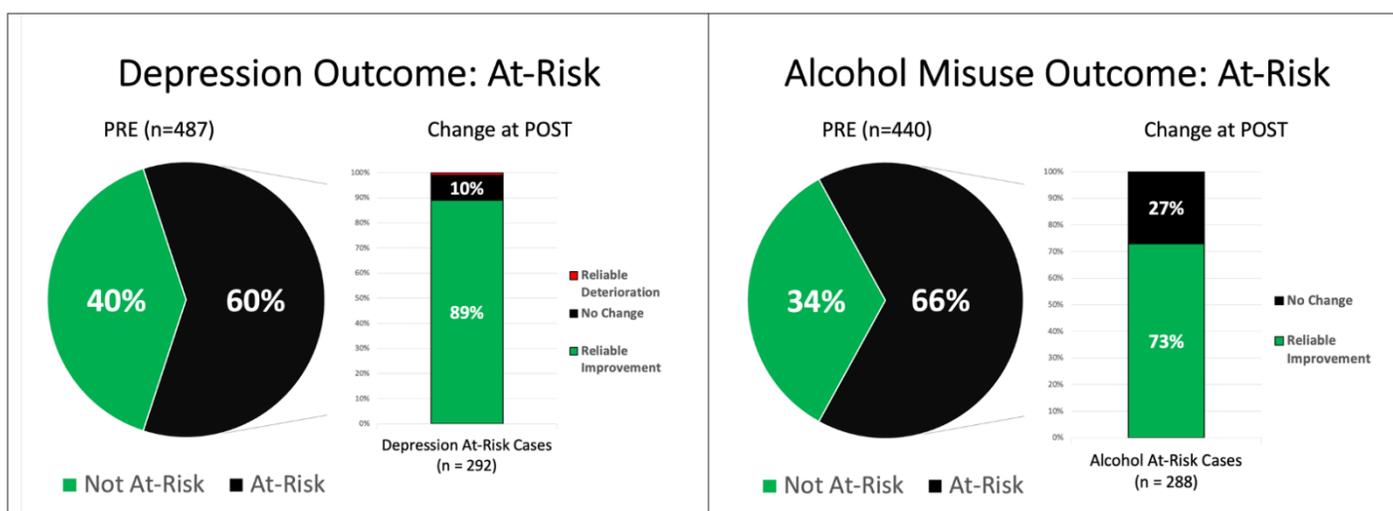


Figure 3. Reliable Change Index analysis results for cases clinically at-risk who used the EAP for a depression issue and for an alcohol issue.

Table 2. Results for longitudinal change in depression outcomes for employee users of EAP counseling.

Sample	Pre M (SD)	Post M (SD)	Change	Statistical Tests
Depression (PHQ-9)				
Full sample (<i>n</i> = 487)	11.60 (6.07)	4.73 (4.90)	-6.87 -59%	<i>Time</i> : $F(1,486) = 746.35, p < .001,$ $\eta_p^2 = .61$ very large effect
At-Risk (<i>n</i> = 292; 60%)	15.79 (3.50)	6.14 (4.31)	-9.65 -61%	<i>Time</i> : $F(1,291) = 1740.71, p < .001,$ $\eta_p^2 = .86$ very large effect
MODERATOR TESTS				
Depression issue primary (<i>n</i> = 265; 54%)	13.25 (5.47)	5.11 (4.35)	-8.14 -61%	<i>Time X Issue</i> : $F(1,485) = 32.96, p < .001,$ $\eta_p^2 = .064$ medium effect
Depression issue secondary (<i>n</i> = 222; 46%)	9.60 (6.16)	4.27 (5.47)	-5.33 -56%	<i>Issue</i> : $F(1,485) = 28.31, p < .001,$ $\eta_p^2 = .055$ small effect
Men (<i>n</i> = 223; 46%)	11.48 (0.97)	5.42 (1.18)	-6.06 -53%	<i>Time X Gender</i> : $F(1,482) = 3.07, p = .08,$ $\eta_p^2 = .006$ no effect
Women (<i>n</i> = 262; 54%)	14.07 (1.64)	5.61 (1.98)	-8.46 -60%	<i>Gender</i> : $F(1,482) = 0.03, p = .86,$ $\eta_p^2 < .001$ no effect

Factors with no effects for moderating depression outcome:

- Client sex
- Client age
- Modality of clinical use contact
- Duration of clinical treatment
- Session limit maximum
- Industry of employer
- Year of use

Note. PHQ-9 = Patient Health Questionnaire; higher scores indicate greater severity of depression experienced in the past two weeks (range 0-27). At-Risk = score 10-27. *F* tests and means for sex of client are adjusted for depression issue; with standard errors in (SE).

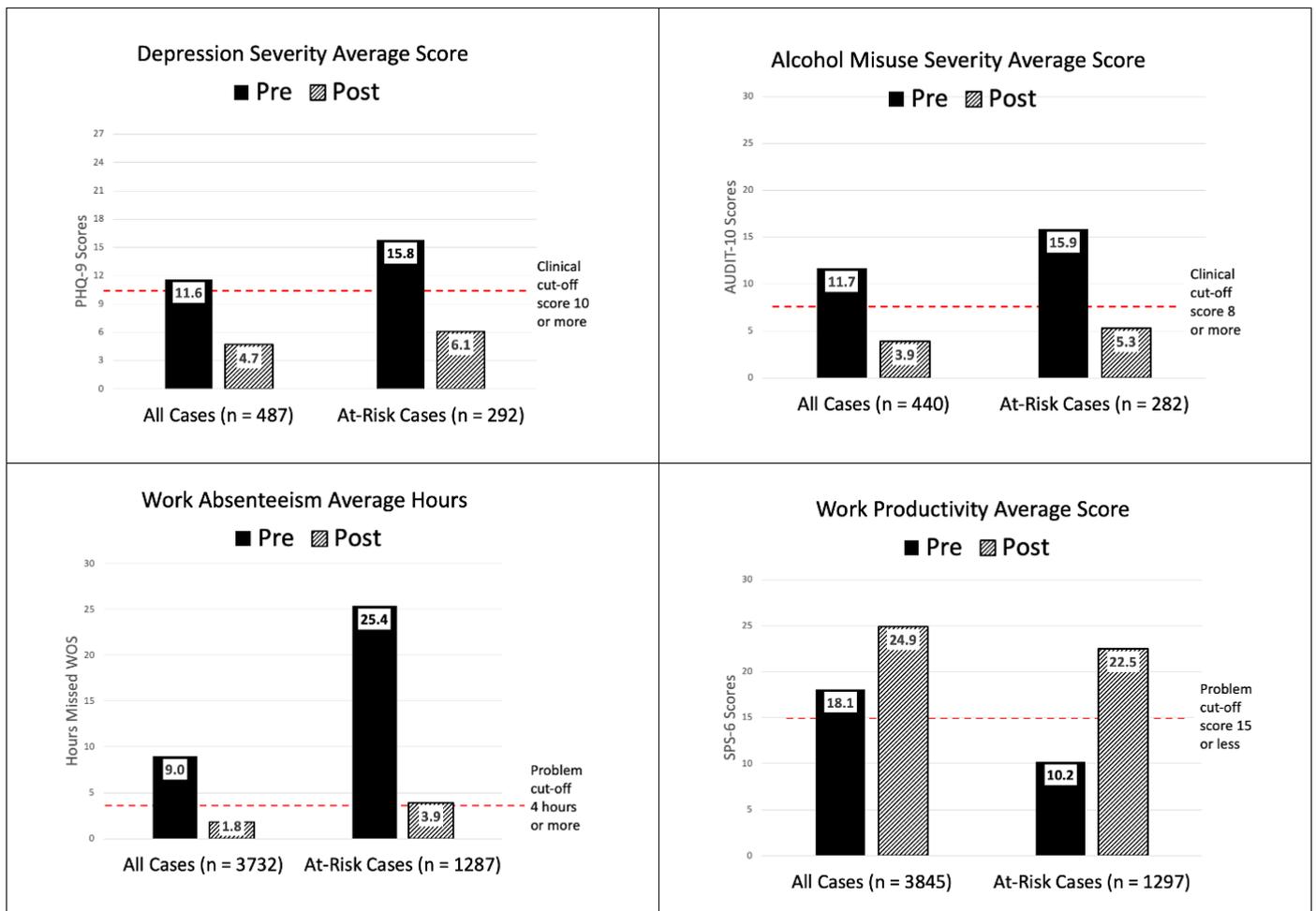


Figure 4. Mean scores at Pre and Post for full sample and at-risk subsamples: By outcome.

3.4 Alcohol Misuse Outcome Results

Alcohol: Change in Risk Levels. Figure 2 shows how the 440 cases who used the EAP for support with an alcohol issue were distributed across the four levels of alcohol misuse severity at Pre and at Post. There was a statistically significant change over time, with a shift from higher to lower severity after counseling for many cases, $\chi^2(9,440) = 81.3, p < .001$. At the start of counseling, 288 of the alcohol issue cases (66%) were initially classified as risky drinkers or at a more severe level of alcohol misuse, but at Post this number was reduced to 63 cases who were at-risk (14%).

Alcohol: Clinically At-risk Cases. Analyses were also conducted among the subsample of cases who started counseling being at-risk for alcohol misuse. For the average employee at-risk for alcohol misuse, their symptom severity was significantly lower at the follow-up. This change was a large size statistical effect (see Table 3 and Figure 4). Among individual cases, about 3 out of every 4 of the at-risk cases (78%; $n = 225$ of 288) improved to no longer be at-risk for alcohol misuse after use of EAP counseling.

Alcohol: Reliable Change Index. Figure 3 also shows the results using the RCI methodology with alcohol cases. It found that 73% of the at-risk cases had reliable improvement ($n = 210$ of 288), 27% did not have a reliable amount of change in their severity score ($n = 78$) and 0% had reliable deterioration in their alcohol misuse (see Figure 4). In addition, 175 cases had the best outcome of both a reliable reduction and improved at Post to no longer be at-risk. Thus, 61% of the at-risk alcohol cases experienced a “reliable recovery.”

Alcohol: Change in Average Severity Score. The RM-ANOVA test found that the average level of symptom severity was 67% lower at the follow-up for all employee with longitudinal data using the EAP for an alcohol issue. The same test conducted among the subsample who started counseling at a risky level of drinking or higher severity showed an average decrease of 67% in symptom severity. Both test results were significant and very large size statistical effects (see Table 3). These differences in mean score are shown in Figure 4.

Alcohol: Moderator Tests. Exploratory tests (RM-ANOVA) examined if the alcohol outcome was different for certain client demographic, clinical use, or context factors. The moderator results indicated three factors had different outcome profiles (see Table 3). For clinical issue, cases who had substance use as the primary reason for using counseling had the most severe alcohol misuse and had the greatest reduction in severity of symptoms after use than cases with a different primary issue (mental health, personal stress, etc.) with alcohol use as their secondary issue. Sex of client and referral source were also meaningful moderators in tests that controlled for alcohol as the primary issue and controlled for the other moderator factor. About twice as many men than women were had alcohol risk score data. Men also had greater severity levels of alcohol misuse and more improvement than women. For referral source, about 4 out of 5 cases who chose to use the EAP on their own choice and these cases had greater severity of alcohol misuse severity than the other 1 in 5 cases who were referred to the EAP by their employer. Self-referral cases also improved more over time than did the manager referral cases. Once the above factors were controlled for, all other factors did not have meaningful differences for the alcohol outcome.

Table 3. Results for longitudinal change in alcohol misuse outcomes for employee users of EAP counseling.

Outcome	Pre <i>M</i> (SD)	Post <i>M</i> (SD)	Change	Statistical Tests
Alcohol Misuse (AUDIT-10 scale scores)				
Full sample (<i>n</i> = 440)	11.68 (7.80)	3.93 (3.88)	-7.75 -67%	$F(1,439) = 624.15, p < .001,$ $\eta_p^2 = .58$ very large effect
At-Risk (<i>n</i> = 288; 66%)	15.90 (6.27)	5.25 (4.11)	-10.65 -67%	$F(1,287) = 857.61, p < .001,$ $\eta_p^2 = .75$ very large effect
MODERATOR TESTS				
Alcohol issue primary (<i>n</i> = 145; 33%)	15.14 (7.83)	4.99 (4.93)	-10.15 -67%	$Time \times Issue: F(1,438) = 31.80, p < .001,$ $\eta_p^2 = .068$ medium effect
Alcohol issue secondary (<i>n</i> = 295; 67%)	9.97 (7.20)	3.41 (3.11)	-6.56 -66%	$Issue: F(1,438) = 44.54, p < .001,$ $\eta_p^2 = .092$ medium effect
Men (<i>n</i> = 303; 67%)	12.51 (0.41)	4.20 (0.22)	-8.31 -66%	$Time \times Issue: F(1,436) = 7.74, p < .001,$ $\eta_p^2 = .017$ small effect
Women (<i>n</i> = 137; 31%)	9.80 (0.62)	3.32 (0.32)	-6.48 -66%	$Issue: F(1,438) = 12.50, p < .001,$ $\eta_p^2 = .028$ small effect
Referral by self (<i>n</i> = 343; 78%)	12.59 (0.39)	4.27 (0.21)	-8.32 -66%	$Time \times Referral: F(1,436) = 11.74, p < .001,$ $\eta_p^2 = .026$ small effect
Referral by manager (<i>n</i> = 97; 22%)	8.45 (0.76)	2.72 (0.40)	-5.73 -68%	$Referral: F(1,436) = 23.27, p < .001,$ $\eta_p^2 = .051$ small effect
Factors with no effects for moderating alcohol outcome:				
<ul style="list-style-type: none"> • Client age • Modality of clinical use contact • Duration of clinical treatment • Session limit maximum • Industry of employer • Year of use 				

Note. *N* = 440. AUDIT = Alcohol Use Disorders Identification Test; higher scores indicate greater severity of alcohol misuse (range 0-40). At-risk = score of 8-40. *F* tests and means for sex of client are adjusted for alcohol issue match and for referral type; with standard errors in (SE). *F* tests and means for referral are adjusted for alcohol issue match and sex of client; with standard errors in (SE).

3.5 Work Absence Outcome Results

Absence: Change in Levels of Work Absence. Figure 2 shows how the 3,732 cases who used the EAP for support with any kind of issue were distributed across the five levels of missed work at Pre and at Post. There was a statistically significant change over time, with a shift from higher to lower absence level after counseling for many cases, $\chi^2(16,3732) = 204.53, p < .001, \eta_p^2 = .048$ small. At the start of counseling, 35% of cases were classified as having an absence problem (i.e., missing more work than a typical healthy employee). At Post, only 7 % had a work absence problem.

Absence: Change in Average Hours of Absence Per Case. The RM-ANOVA test found that the average number of hours of absence in the past 30 days was 80% lower at the follow-up for all employee with longitudinal data, changing from 9 hours missed during the past 30 days at Pre to less than 2 hours during the month after counseling at Post. The same test conducted among the subsample of about 1 in 3 cases who started counseling at a problem level for absence also showed a large decrease of 85% in absenteeism level, changing from 25 hours missed at Pre to only 4 hours at Post. Both test results (using the square root transformed variable to reduce skew) were significant and large size statistical effects (see Table 4). These differences in mean score are shown in Figure 4.

Absence: Moderators Tests. Exploratory tests (RM-ANOVA) examined if the absenteeism outcome was different for certain client demographic, clinical use or context factors. The moderator results indicated two factors of referral source and issue topic had different outcome profiles in average levels of missed hours at Pre and Post (see Table 4).

There was a very wide range of average hours of absence before starting use of the counseling for cases using the EAP for different issues. The small percentage of employees with substance abuse issues involving drugs (8% of cases) or alcohol (5%) had the most absence, with both around two lost work days per month (15.4 and 14.5 hours, respectively). Cases using the EAP for depression (10%) was next with about a day and a half of missed work per month. Cases with work issues (12%) had 9.5 hours of absence per month. Cases with anxiety and other mental health issues (38%) had 8.7 hours of absence. Cases with general stress or personal life issues (10%) had 6.3 hours of absence. The lowest level of absence was found for the employees using the EAP for relationship and family issues (17%), at 4.8 hours per month. All of issue types had significant reductions after counseling, but some issues had more improvement than others (range 98% to 62% less absence). Employees with the two substance use issues had the most extreme change after counseling to average less than one hour of absence at Post.

Referral source was also meaningful moderator. For referral source, the 1 in 5 cases who were referred to the EAP by their employer had more work absence in the month before using the EAP (about 14 hours at Pre vs. 2 hours at Post) and improved more after counseling than the majority of the cases with absence data who chose to use the EAP on their own choice (about 8 hours at Pre vs. 2 hours at Post).

The combinations of certain cases for issue and referral type also indicated differences for work absenteeism levels at Pre and Post and for improvement in this outcome (see Figure 5). This interaction effect was significant [$F(4,3718) = 3.36, p = .003$] but a very small effect size ($\eta_p^2 = .004$). The cases who were referred to the EAP by their manager at work for a substance abuse issue ($n = 290$) had by far the most hours of absence during the month before counseling (17.9 hours) than all other cases. The other two groups with manager referral for mental health issues ($n = 194$) and work issues ($n = 181$) had about the same hours of missed work at Pre (10.7 and 9.6, respectively). Self-referral cases for these same three kinds of issues (substance $n = 176$; mental health $n = 1,600$; work $n = 286$) all were in same range of about 10 hours missed at Pre. The self-referral cases with personal stress ($n = 348$) and marriage/family issues ($n = 621$) were both much lower, each at around 5 hours of missed work at Pre.

Table 4. Results for longitudinal change in work absenteeism outcomes for employee users of EAP counseling.

Outcome	Pre <i>M</i> (SD)	Post <i>M</i> (SD)	Change	Statistical Tests
Work Absence (WOS)				
Full sample (<i>n</i> = 3,732)	8.98 (19.21)	1.82 (10.09)	-7.16 -80%	$F(1,3731) = 1247.22, p < .001,$ $\eta_p^2 = .25$ large effect
At-Risk (<i>n</i> = 1,287; 35%)	25.41 (25.60)	3.93 (14.84)	-10.65 -85%	$F(1,1286) = 3288.41, p < .001,$ $\eta_p^2 = .72$ very large effect
MODERATOR TESTS				
Referral by Self (<i>n</i> = 3,301; 81%)	7.89 (18.10)	2.18 (11.02)	-5.71 -72%	$Time \times Referral: F(1,3730) = 140.19, p < .001,$ $\eta_p^2 = .036$ small effect
Referral by Manager (<i>n</i> = 701; 19%)	13.70 (22.84)	1.82 (10.09)	-8.32 -66%	$Referral: F(1,3730) = 14.75, p < .001,$ $\eta_p^2 = .004$ trivial effect
Drugs (<i>n</i> = 287; 8%)	15.35 (23.85)	0.30 (2.84)	-15.05 -98%	
Alcohol (<i>n</i> = 179; 5%)	14.46 (20.33)	0.56 (2.67)	-13.90 -96%	
Depression (<i>n</i> = 392; 10%)	11.48 (25.44)	4.34 (16.66)	-7.14 -62%	$Time \times Issue: F(1,3725) = 24.97, p < .001,$ $\eta_p^2 = .039$ small effect
Work stress (<i>n</i> = 467; 12%)	9.54 (18.57)	1.38 (9.48)	-8.16 -86%	$Issue: F(6,3725) = 12.30, p < .001,$ $\eta_p^2 = .019$ small effect
Anxiety / other mental (<i>n</i> = 1403; 38%)	8.71 (18.92)	2.15 (11.13)	-6.56 -75%	
Personal stress / other (<i>n</i> = 381; 10%)	6.27 (15.85)	2.00 (9.05)	-4.27 -68%	
Marriage or family (<i>n</i> = 623; 17%)	4.76 (12.37)	0.80 (5.22)	-3.96 -83%	

Factors with no effects for moderating work absenteeism outcome:

- Client sex
- Client age
- Modality of clinical use contact
- Duration of clinical treatment
- Session limit maximum
- Industry of employer
- Year of use

Note. *N* = 3,732. WOS = Workplace Outcome Suite - Work Absence Scale; reported hours of missed work in past 30 days (range 0-159). Cases exclude if not working. At-risk = 4 or more hours of absence. *F* tests shown based on square root transformed variable of number of hours of absence (to reduce skew; means and variances for transformed data not shown).

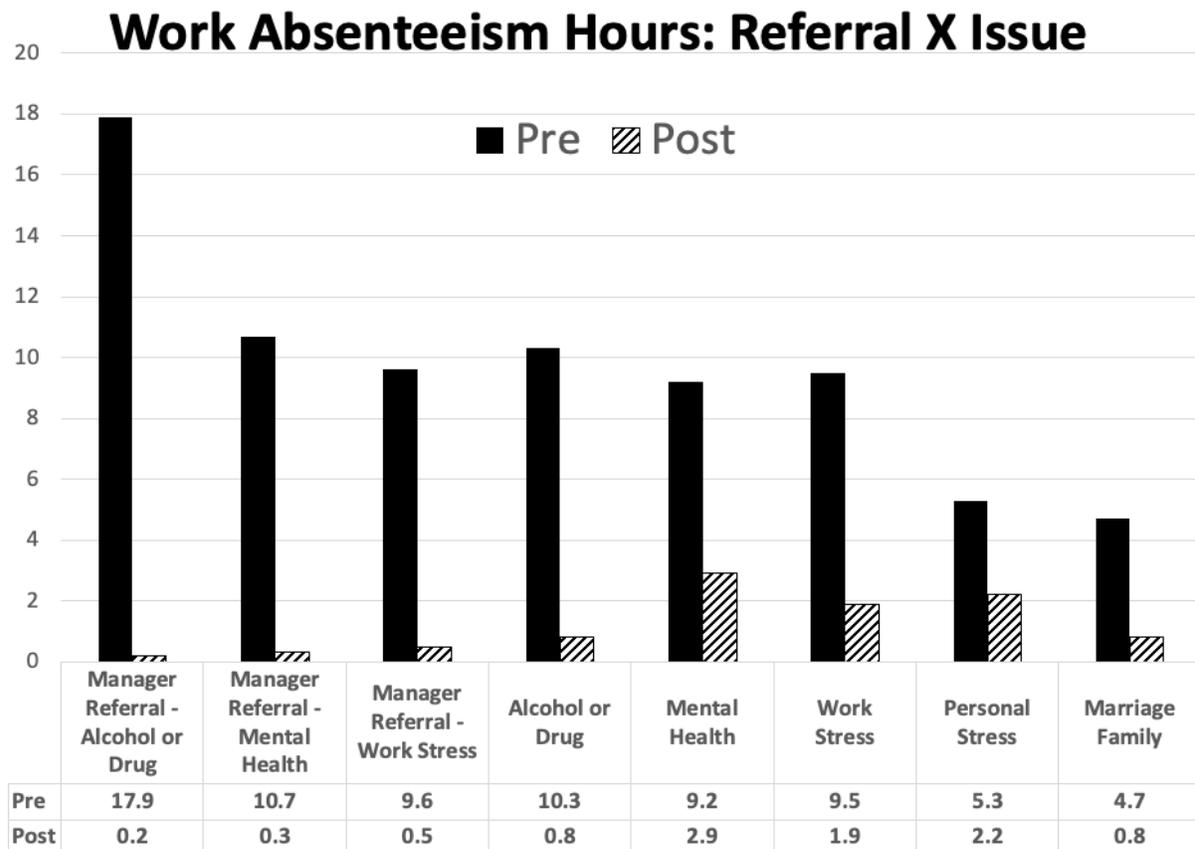


Figure 5. Mean hours of work absence at Pre and Post: By subgroups with combinations of management or self-referral into EAP and different types of issues.

3.6. Work Productivity Outcome Results

Productivity: Change in Levels of Work Productivity. Figure 2 shows how the 3,846 cases who used the EAP for support with any kind of issue were distributed across the five levels of missed work at Pre and at Post. There was a statistically significant change over time, with a shift from higher to lower absence level after counseling for many cases, $\chi^2(16,3846) = 941.60, p < .001, \eta_p^2 = .134$ medium effect. At the start of counseling, 34% cases were initially classified as having a problem with work productivity (i.e., low performance). But at Post this rate among all cases was reduced to just 5%.

Productivity: Change in Average Scores. The RM-ANOVA test found that the level of work productivity in the past 30 days for the average case was 38% higher at the follow-up for all employees with this kind of longitudinal data. The same test conducted among the just the subsample who started counseling at a problem level (about 1 in 3 cases) also showed an average increase of 38%. Both test results were significant and very large size statistical effects (see Table 5). These differences in mean score are shown in Figure 4.

Productivity: Moderator Tests. As the work productivity outcome sample shared 78% of its cases with the work absenteeism outcome sample, the results for moderator tests conducted for work productivity were very similar to the results obtained for the work absenteeism outcome sample (reported above). Exploratory tests (RM-ANOVA) examined if the work productivity outcome was different for certain client demographic, clinical use or context factors. The moderator results indicated the two factors of referral source and issue topic had different outcome profiles in average levels of productivity at Pre and Post (see Table 5). There was a very wide range of productivity before starting use of the counseling for cases using the EAP for different issues. The 4% of these cases with alcohol issues had the lowest productivity levels at Pre (the average was at the cut-off score for problem status). This was followed by cases with issues of work stress (12%), depression (11%), drugs (7%), other mental health issues (36%), and personal stress issues (10%), each of which scored in the “medium” level of work productivity at Pre. The best level of work productivity was found for cases using the

EAP for relationship and family issues (19%), with an average score in the “high” range of productivity at Pre. All of these types of issues had improvements after counseling, but some issues had more improvement than others (range 69% to 23%), generally following the same rank order as for productivity levels before counseling (i.e., those with worse productivity at the start had more opportunity to improve). For the referral source factor, the 1 in 6 cases who were referred to the EAP by their manager had slightly lower productivity during the month before using the EAP and improved significantly more after counseling than the majority of cases who chose to use the EAP on their own choice. The combinations of certain cases for issue and referral type also indicated differences for work productivity levels at Pre and Post and for improvement in this outcome (see Figure 6). This interaction effect was significant ($F[4,3835] = 3.57, p = .006$) but a very small effect size ($\eta_p^2 = .004$). Unlike with work absenteeism, these combinations of cases based on referral type and issue had more similar profiles on the work productivity outcome.

Table 5. Results for longitudinal change in work productivity outcomes for employee users of EAP counseling.

Outcome	Pre <i>M</i> (SD)	Post <i>M</i> (SD)	Change	Statistical Tests
Work Productivity (SPS-6)				
Full sample ($n = 3,845$)	18.05 (6.96)	24.87 (5.62)	6.82 38%	$F(1,3844) = 3575.94, p < .001,$ $\eta_p^2 = .482$ large effect
At-Risk ($n = 1,297; 34\%$)	10.24 (3.20)	22.53 (6.60)	12.29 38%	$F(1,1296) = 3789.09, p < .001,$ $\eta_p^2 = .745$ very large effect
MODERATOR TESTS				
Referral by Self ($n = 3,207; 83\%$)	18.31 (6.98)	24.62 (5.60)	6.31 34%	$Time \times Referral: F(1,3843) = 101.20, p < .001,$ $\eta_p^2 = .026$ small effect
Referral by Manager ($n = 638; 17\%$)	16.73 (6.71)	26.12 (5.99)	9.39 56%	$Referral: F(1,3843) = 0.40, p = .84$ $\eta_p^2 < .001$ no effect
Alcohol ($n = 170; 4\%$)	15.09 (7.54)	26.56 (4.98)	10.47 69%	
Work stress ($n = 451; 12\%$)	16.04 (5.78)	24.45 (5.57)	8.41 52%	
Depression ($n = 414; 11\%$)	16.95 (6.65)	23.65 (5.94)	6.70 40%	$Time \times Issue: F(1,3838) = 30.61, p < .001,$ $\eta_p^2 = .046$ small effect
Drugs ($n = 282; 7\%$)	17.88 (7.52)	24.97 (7.67)	7.09 40%	$Issue: F(6,3838) = 17.20, p < .001,$ $\eta_p^2 = .026$ small effect
Anxiety / other mental ($n = 1384; 36\%$)	17.96 (6.50)	25.10 (5.53)	7.14 40%	
Personal stress / other ($n = 396; 10\%$)	18.46 (7.81)	24.43 (5.48)	5.97 32%	
Marriage or family ($n = 748; 19\%$)	20.54 (6.50)	25.19 (4.77)	4.65 23%	

Factors with no effects for moderating work absenteeism outcome:

- Client sex
- Client age
- Modality of clinical use contact
- Duration of clinical treatment
- Session limit maximum
- Industry of employer
- Year of use

Note. SPS-6 = Stanford Presenteeism Scale; higher scores indicate greater focus and performance while working.

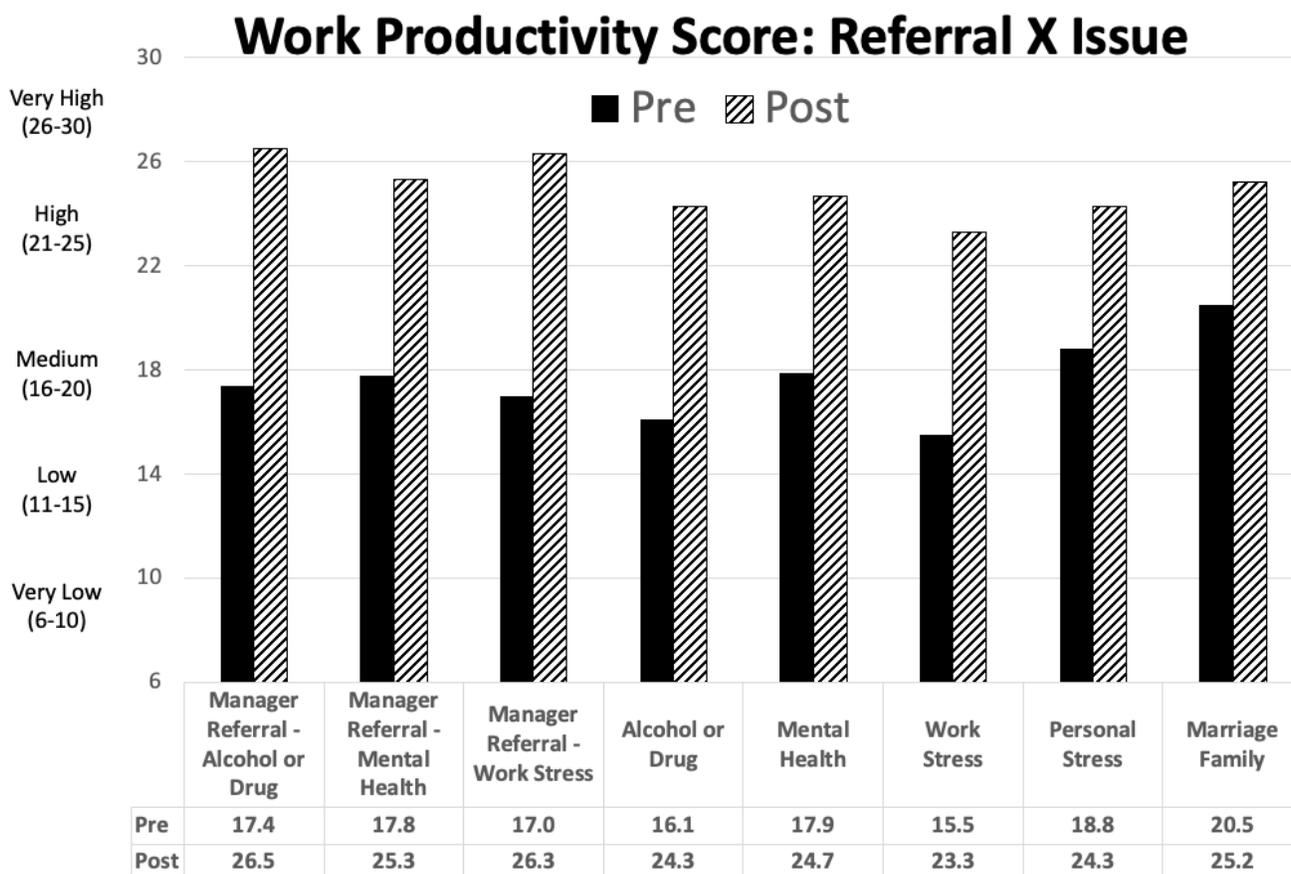


Figure 6. Average score on work productivity measure at Pre and Post: By subgroups with combinations of management or self-referral into EAP and different types of issues.

IV. DISCUSSION

Having data over a six-year calendar span from large samples of employees (over 33,000 at Pre and over 5,000 at Post) allowed us to examine the representativeness of the longitudinal test samples and the psychometric fitness of the four outcome measures. The applied naturalistic approach to the data collection process yielded groups of employee users for each outcome that had paired Pre and Post scores who fairly represented the much larger groups of cases who did not complete the follow-up survey part of the project. The outcome measures demonstrated high levels of measurement reliability and validity, with appropriate limitations for the absenteeism measure that differed in design from the other multi-item rating scales. Thus, the project provided favorable conditions to allow us to properly test for improvements in depression, alcohol misuse, work absence and work productivity after use of counseling.

4.1. Research Hypotheses Revisited

Each of the four hypotheses predicting a significant improvement in clinical or work outcomes after the use of EAP counseling were supported by the empirical findings. The average case for depression and for alcohol both had large size effects for reduction in symptom severity. More focused tests conducted only among the clinical level cases initially at-risk on depression or alcohol misuse had even greater improvement. It is important to emphasize that very few of the at-risk cases for either depression (1%) or alcohol issues (0%) had an adverse outcome of a reliable deterioration in clinical symptom severity after counseling. Thus, the counseling did no harm for almost all of the at-risk EAP users.

Both of the work outcomes also had large size statistical effects for improvement after counseling. Both work outcomes had a change from having about a third of cases starting therapy at a problem level. However, very few cases still had a problem with absence or with work productivity at the follow-up (absenteeism: 35% Pre vs. 7% Post; productivity: 34% Pre vs. 5% Post). Even though the majority of cases had zero absence at both before and after counseling, the average amount of absence per case was reduced by almost one full workday per month restored after counseling (from 9 hours at Pre to less than 2 at Post). Among the one-third of cases starting out at problem level of absence, their change was much greater, with a change from 25 to 4 hours.

One possible explanation for these positive and consistent findings is CuraLinc Healthcare's advocacy-based clinical model that drives the day to day operations. Unlike EAPs that offer participants an unverified list of mental health providers that they must contact on their own to confirm willingness to accept the referral, the advocacy-based clinical model ensured participants were connected to providers with the required clinical specialty and confirmed appointment availability. This process reduced the likelihood of failed referrals (referrals that don't lead to an appointment with a provider) which may have increased the likelihood of the study results for positive clinical and workplace outcomes, as well as the high level of client satisfaction.

4.2 Research Question on Moderators Revisited

Moderator tests indicated the improvement was generally consistent across different sub-groups of clients based on age, gender, clinical use characteristics and other study context factors. For example, for each year from 2017 to 2022 we found similar profiles of outcome levels at Pre and at Post and similar degree of improvements on each outcome at the follow-up. Similar results were also obtained for each outcome across the in-person and online video modalities of the clinical contact between counselors and clients.

Each outcome, however, did have moderator effects for clinical issue. The medium size effects found with depression and alcohol issue cases suggests the matching of primary or secondary issue (i.e., severity of the disorder) was important for testing both of these clinical outcomes. These findings support the gaps in the research literature described earlier in the Introduction concerning the value of using samples of EAP cases experiencing clinical conditions that are matched to the outcome measure for the same condition.

Other smaller size effects were also identified such that reductions in alcohol misuse severity occurred more often among cases who were self-referrals into counseling (compared to referrals from the manager at work) and also for male clients. Moderator tests found that the work outcomes had small effects for employees presenting at the EAP with different issues, with substance abuse, depression and work stress issues each being associated with more work absence and less productivity than employees with other issues (i.e., personal life stress and relationships). Note that finding that alcohol and depression issues had some of the highest levels of work loss burden before counseling supports the rationale in this project to focus on employees with alcohol or depression issues. Although accounting for a small part of the total cases, employees referred to using the EAP by their manager at work for issues involving alcohol or drugs had the most absence and also the lowest level of work productivity during the month before starting counseling. These same sub-groups also had the most improvement in these work outcomes after completing use of the EAP.

4.3 Comparisons with Other Research in EAP

The demographic and clinical use characteristics of the employees in this national study sample aligns well with other major studies of employee users of external vendors of EAP counseling services [29,31,55,56]. A strength of this study was how the representativeness of the longitudinal samples was validated by testing the user demographic characteristics, program use experiences and starting level of the outcome measures compared to the much larger group of cases with only the Pre-test data. These findings replicate those from another study that analyzed case-level data obtained from four different EAPs [see 55, Appendix C], which also found similar profiles of client age, client sex, mix of EAP issues, and initial levels of work outcomes for 3,063 cases who had longitudinal data compared with 2,681 other cases who had only Pre data. Another study compared 830 EAP cases who participated in follow-up survey with the full book of business data at the EAP and found similar profiles on all client demographic and clinical experience factors [107]. These results document the representativeness of the follow-up samples examined in some of the studies of EAP counseling effectiveness.

The present study also replicates the findings of clinical effectiveness found in several past studies of EAP counseling for cases with depression or alcohol outcomes [30,31,35-43]. More specifically, our findings for depression were compared to three other recent EAP counseling effectiveness studies [44-46] that also used the same Reliable Change Index analytic approach with the same outcome measure for depression (PHQ-9). As shown in Table 6, the results for at-risk depression cases in the present study from CuraLinc were slightly higher on all of the clinical success metrics than the findings from other providers (Lyra and Spring Health).

Our results for the work outcomes were also compared to most other studies in the literature on EAP effectiveness. The industry average is 9.7 hours absent in the past month at Pre and 4.1 hours at Post based on 6,961 counseling cases from 12 different EAPs with longitudinal data on the same five-item WOS absenteeism scale used in our study [53]. Results in the present study were 9.0 hours of work absenteeism at Pre and 1.8 hours at Post for the average EAP case. This comparison indicates that our study results were similar to the EAP industry averages for the level of work absenteeism before use and slightly better for the reduction in absence at Post.

Table 6. Comparison of present study results on depression outcome for clinically at-risk cases with three other EAP industry research studies with a similar design, outcome measure, and Reliable Change Index results.

Characteristic	Study			
	Schneider et al. [44]	Lungu et al. [45]	Bondar et al. [46]	This study
Service provider	Lyra Health	Lyra Health	Spring Health	CuraLine Healthcare
Country	United States	United States	United States	United States
Year when used	2018-2019	2018-2019	2018-2021	2017-2022
Study sample	1,256 unknown presenting issue at EAP and at least two dates of PHQ-9	225 unknown presenting issue at EAP issue and at least two dates of PHQ-9	903 unknown presenting issue at EAP and at least two dates of PHQ-9	487 with depression as a primary or secondary issue and two dates of PHQ-9
Valid sample size of EAP cases with clinical status of moderate or more severe depression (PHQ-9 = 10-27)	845 (67% of starting total)	225 (100% of starting total)	903 (100% of starting total)	292 (60% of starting total)
Intervention type	Counselors in community practice network of EAP	Blended care model of counselors in community practice network of EAP and optional dCBT	Counselors in community practice network of EAP	Blended care model of counselors in community practice network of EAP and optional dCBT
Intervention modality	Not specified (assume mostly in-person)	Online video	Not specified but a mix of in-person or online video technology	Mix of in-person (61%) or online video (39%)
Intervention intensity	Average of 9.4 sessions over 13.1 week period	Average of 5.2 sessions over 6.4 week period	Average of 5.6 sessions over 11 week period	Limit of 5.5 sessions over 5.3 week period
Design	Longitudinal with repeated measures every 4 weeks	Longitudinal with repeated measures every 4 weeks	Longitudinal pre and post	Longitudinal pre and post
Follow-up at	1 to 4 weeks post last session	63% at 1-to 4 weeks post last session and 37% before last session	Less than 4 weeks after last session	All at 4 weeks after last session
Test of representativeness of follow-up sample to larger sample with baseline measure only	Yes – similar on depression severity	Yes – similar on depression severity and also gender, age	Unknown	Yes – similar on severity of depression at Pre, age, sex, year, industry, referral, session limit, clinical duration, other
Outcome Measure	PHQ-9	PHQ-9	PHQ-9	PHQ-9
Average % reduction in severity for at-risk cases	47% lower score	48% lower score	Not shown	67% lower score
Statistical effect size for reduction in severity score	Large effect	Large effect	Large effect	Large effect
Reliable improvement beyond chance level	60% of cases	66% of cases	69% of cases	89% of cases
Recovery (no longer at-risk at post)	71% of cases	74% of cases	Not shown	84% of cases
Reliable recovery (both of above)	53% of cases	63% of cases	58% of cases	81% of cases

Note: dCBT = digital cognitive behavioral therapy for self-directed care. PHQ-9 = Patient Health Questionnaire. In each study, all tests conducted only for cases initially at-risk for clinical depression.

Our results on the work productivity outcome are more difficult to compare, as no other study in the EAP field (that we know of) has used the same Stanford Presenteeism Scale outcome measure. However, industry norms are available from over 39,000 cases with Pre and Post, from 47 different EAPs, on the Workplace Outcome Suite (WOS) single-item measure of work presenteeism [31]. These results were an average of 37% improvement in the presenteeism score after counseling, which represented a large statistical effect size.

The present study results were similar to the industry average result, as we found large 38% improvement after counseling in employee work productivity, which was also a large size statistical effect.

The present study also replicates other literature documenting the similarity in psychotherapeutic effectiveness between counseling delivered in-person when compared to counseling delivered via live video over the Internet [31,108]. This is important when the EAP industry had to adjust to offering technology-based remote options during the peak of the COVID-19 pandemic, although a return to the preference for in-person counseling was maintained during the challenges of the pandemic [109-110].

The level of individual user satisfaction with the counseling service (consistently at 95%) during the study time period is similar to the results at other EAP vendors [107]. For example, a major study [111] found an average of 94% of users satisfied with the counseling, based on results across 50 different EAP vendors in year 2011. What our results add to the literature is how satisfaction with EAP counseling was maintained during the challenges of the COVID-19 pandemic.

4.4 Limitations of the Study

There are certain limitations to this study that involve the research methodology. It was conducted on convenience samples of adults who were working for many different employers in the United States who had access to the same commercially available EAP service. Our reliance on self-report sources for the data as other records or external sources of the outcomes could have potentially provided more accurate measurements. Some studies with both sources of data, however, do show self-reports for work absence are closely aligned with company record data of employee absence [112-114]. Recent systematic reviews of the literature have also found support for the validity and reliability of employee self-reports of work presenteeism and work productivity [115,116].

Our measure of the maximum number of sessions of counseling allowed per case (from the business contract with the employer sponsor of the EAP) is not the same as the actual number of sessions of counseling used by each case. This aspect of the clinical use experience was only indirectly measured and tested.

Our use of data collected from a single group who used the counseling with repeated measures of outcomes is an example of a “pre-experimental” type of research design with no comparison group. The other two stronger kinds of designs are quasi-experimental (with a comparison group involved) and the experimental randomized control trial (RCT). We also did not measure the possible use of other health-enhancing treatments during the same period as when the EAP was used. Therefore, the causal mechanism of how use of the EAP was specifically related to the changes reported on the clinical and work outcome measures needs further scrutiny to determine what are the most impactful aspects of the clinical experience and supportive resources. However, to be fair, in the entire 90-year history of the EAP field, we are aware of no study that has used a true randomized control trial (RCT) design and only a handful of studies have used a quasi-experimental longitudinal study design with a matched comparison group [40-42] or other comparison groups. In McLeod’s 2008 review [62], five studies involving comparison groups all found that the EAP treatment group had superior improvement over time on clinical outcomes compared to other employees who did not use counseling. The two recent quasi-experimental small sample EAP studies with matched comparison groups of non-users, also both found superior improvements in most clinical and work outcomes for the EAP user groups. Thus, even though our study lacked a comparison sample, other past studies with comparison groups have determined that the EAP counseling users had superior outcomes compared to non-users of EAP.

V. CONCLUSION

This applied evaluation study provides evidence that brief counseling is associated with large size improvements for employees in both behavioral health and work domains. This study also shows that applied naturalistic research can be done in business settings that provide counseling. Other providers of EAP services are encouraged to also adopt the use of research-validated measurement scales for clinical and work outcomes and to conduct the testing necessary to ensure that longitudinal samples with outcomes are representative of the larger overall case mix at the EAP. Like some past research [31,35,46,55,61,70-72,107], future analyses could be done to estimate the potential cost-savings to employer sponsors of EAP services in areas of health care treatment costs for depression and alcohol and also for reduced absenteeism and restored work productivity.

APPENDIX A

A.1. Reliable Change Index for Depression Outcome

For the 292 cases with moderate or more severe symptoms of depression, the Reliable Change (RC) index was calculated. We used the study-specific standard deviation (SD) of the PHQ-9 at Pre of 3.50. However, the test-retest correlation of PHQ-9 scores within our at-risk sample ($r = .50$) was biased downward by the counseling intervention experience that occurred between Pre and Post. Following Hageman and Arrindel [51]), the Cronbach alpha coefficient for the depression scale (full study sample at Pre, $n = 5,331$, $\alpha = .79$) was used instead of the test-retest r for the reliability level for the PHQ-9 scale. Note that α in our study was similar to the test-retest correlations found in prior studies with short-term re-assessment of PHQ-9 scores in clinical populations ($r = .81$ to $.96$, [83,84]) and in normal adult populations ($r = .86$, [86]) that did not have an intervention between Time 1 and 2. Using these inputs, the RC index for depression was calculated as follows for the Standard Error (SE) and the difference in SE (SE_{diff}):

SD of PHQ-9 scores at Pre = 3.50
Reliability of PHQ-9 scores at Pre = .79
 $SE = 3.50 \times (\text{square root of } 1.00 - 0.79)$
 $SE = 3.50 \times (\text{square root of } 0.21)$
 $SE = 3.50 \times 0.458$
 $SE = 1.60$
 $SE \text{ squared} = 1.60 \times 1.60 = 2.57$
 $SE_{diff} = \text{square root of } (2 \times SE \text{ squared})$
 $SE_{diff} = \text{square root of } (2 \times 2.57)$
 $SE_{diff} = \text{square root of } 5.14$
 $SE_{diff} = 2.27$

RC index score for each case in the group at-risk for depression was then calculated in three steps: 1) taking the difference between the Pre and Post scores on the PHQ-9 measure; 2) dividing that difference by the RC index of 2.27; and 3) comparing that result to the probability chance-level cutoff of 1.96. If a case had RC effect score greater than 1.96, that client had a reliable improvement (or a reliable deterioration for a negative score > -1.96). For example, a case had a Pre score of 20 and a Post score of 12, the difference was 8. When this difference was divided by RC index of 2.27 the result is 3.52. This final number is greater than the 1.96 probability cutoff and thus this case is declared as having a reliable improvement.

B.2. Reliable Change Index for Alcohol Misuse Outcome

For the 288 cases with risky drinking or more severe alcohol misuse, the Reliable Change index was calculated. We used the study-specific at-risk subsample's standard deviation of the AUDIT-10 at Pre of 6.27. However, the test-retest correlation of PHQ-9 scores within the at-risk sample ($r = .35$) in our study was biased downward by the counseling intervention experienced in between the Pre and Post. The Cronbach alpha reliability coefficient for the AUDIT-10 scale for the Pre-only sample ($n = 2,174$; $\alpha = .87$) was used instead as the reliability level for the AUDIT-10 to calculate the RC index. Note that this reliability coefficient in our study was very similar to test-retest correlations found in other studies ($r = .86$ [90]). Using these inputs, the RC index for alcohol was calculated in a similar manner as for depression, with data inputs as follows:

SD of AUDIT-10 scores at Pre for at-risk cases = 6.27
Reliability of AUDIT-10 at Pre for at-risk cases = 0.87
 $SE = 6.27 \times (\text{square root of } 1.00 - 0.87)$
 $SE = 6.27 \times (\text{square root of } 0.13)$
 $SE = 6.27 \times 0.360$
 $SE = 2.26$
 $SE \text{ squared} = 2.26 \times 2.26$
 $SE \text{ squared} = 5.09$
 $SE_{diff} = \text{square root of } 2 \times SE \text{ squared}$
 $SE_{diff} = \text{square root of } 2 \times 5.09$
 $SE_{diff} = \text{square root of } 10.19$
 $SE_{diff} = 3.19$

RC index score for each case in the group at-risk for alcohol misuse was then calculated in three steps: 1) taking the difference between the Pre and Post scores on the AUDIT-10 measure; 2) dividing that difference by the RC index of 3.19; and 3) comparing that result to the probability chance-level cutoff of 1.96.

APPENDIX B

Table B1. Depression outcome: Tests of representativeness of longitudinal sample.

	Group		Statistical Test	
	Pre only	Longitudinal		
<i>n</i> cases	4,844	487		
Depression outcome (PHQ-9 at Pre)			$F(1,5330) = 6.59, p = .01,$	
<i>M</i> (SD)	10.9 (5.3)	11.6 (6.1)	$\eta_p^2 < .001$ no effect	
Clinical issue as primary focus during treatment				
Depression (outcome)	46%	56%	$\chi^2(8,5331) = 80.34, p < .001,$ $\eta_p^2 = .015$ small effect	
Personal stress	12%	11%		
Other MH	12%	10%		
Anxiety	18%	6%		
Work stress	3%	5%		
Marital	4%	4%		
Family	3%	3%		
Alcohol	2%	1%		
Drugs	1%	3%		
Referral source into EAP				
Self	99%	97%	$\chi^2(1,5331) = 127.61, p < .001,$ $\eta_p^2 = .005$ no effect	
Management	1%	3%		
Age of client				
Years <i>M</i> (SD)	38.8 (12.5)	35.7 (10.9)	$F(1,2486) = 27.45, p = .03,$ $\eta_p^2 = .005$ no effect	
	<i>n</i> = 4771	<i>n</i> = 479		
Sex of client				
Male	37%	46%	$\chi^2(1,5306) = 16.51, p < .001,$ $\eta_p^2 = .002$ no effect	
Female	63%	54%		
Clinical modality				
In-person	68%	61%	$\chi^2(2,5331) = 12.62, p = .002,$ $\eta_p^2 = .002$ no effect	
Online video	32%	39%		
Other technology	<1%	-		
Year of data				
2017	5%	6%	$\chi^2(5,5331) = 287.88, p < .001,$ $\eta_p^2 = .05$ small effect	
2018	9%	6%		
2019	7%	18%		
2020	12%	34%		
2021	52%	27%		
2022 Jan-June.	15%	9%		
Industry of employer				
Manufacturing	18%	23%	$\chi^2(8,5331) = 24.50, p < .001,$ $\eta_p^2 = .005$ no effect	
Healthcare	25%	21%		
Education	13%	13%		
Retail/Restaurant	5%	12%		
Other	7%	10%		
Gov./Public Service	8%	6%		
Financial/Insurance	9%	6%		
Blue collar	6%	5%		
Technology	7%	3%		
Maximum sessions allowed per case in employer contract				
3 or 4 sessions	12%	9%		$F(1,5330) = 2.54, p = .11,$ $\eta_p^2 < .001$ no effect
5 sessions	43%	47%		
6 sessions	26%	28%		
7 or more sessions	19%	15%		
<i>M</i> (SD)	5.8 (1.8)	5.7 (1.5)		

Note. PHQ = Patient Health Questionnaire; higher scores indicate greater severity of depression experienced in the past two weeks (range 0-27).

Table B2. Alcohol misuse outcome: Tests of representativeness of longitudinal sample.

	Group		Statistical Test
	Pre only <i>n</i> cases	Longitudinal	
Alcohol misuse outcome (AUDIT-10 at Pre)	2,174	440	
<i>M</i> (SD)	12.0 (8.9)	11.7 (7.8)	$F(1,2612) = 0.36, p = .55,$ $\eta_p^2 < .001$ no effect
Clinical issue as primary focus during treatment			
Alcohol (outcome)	37%	35%	$\chi^2(8,2614) = 27.10, p < .001,$ $\eta_p^2 < .001$ no effect
Depression	13%	15%	
Other MH	10%	13%	
Personal stress	12%	11%	
Anxiety	13%	11%	
Work stress	3%	6%	
Marital	7%	5%	
Drugs	2%	4%	
Family	2%	1%	
Referral source into EAP			
Self	96%	78%	$\chi^2(1,2614) = 191.56, p < .001,$ $\eta_p^2 = .073$ medium effect
Management	4%	22%	
Age of client			
Years <i>M</i> (SD)	40.5 (11.5)	42.2 (12.8)	$F(1,2581) = 7.70, p = .01,$ $\eta_p^2 = .003$ no effect
<i>n</i>	2,150	433	
Sex of client			
Male	61%	69%	$\chi^2(1,2604) = 10.53, p < .001,$ $\eta_p^2 = .004$ no effect
Female	39%	31%	
Clinical modality			
In-person	64%	62%	$\chi^2(2,2614) = 2.15, p = .34,$ $\eta_p^2 < .001$ no effect
Online video	35%	37%	
Other technology	1%	<1%	
Year of data			
2017	5%	6%	$\chi^2(5,5331) = 287.88, p < .001,$ $\eta_p^2 = .05$ small effect
2018	9%	6%	
2019	7%	18%	
2020	12%	34%	
2021	52%	27%	
2022 Jan-June.	15%	9%	
Industry of employer			
Manufacturing	30%	31%	$\chi^2(8,2614) = 35.27, p < .001,$ $\eta_p^2 = .003$ no effect
Blue collar	8%	13%	
Healthcare	14%	17%	
Education	9%	10%	
Gov./Public Service	9%	4%	
Financial/Insurance	8%	4%	
Retail/Restaurant	11%	11%	
Technology	4%	4%	
Other	7%	6%	
Maximum sessions allowed per case in employer contract			
3 or 4 sessions	15%	8%	$F(1,2613) = 1.05, p = .31,$ $\eta_p^2 < .001$ no effect
5 sessions	47%	50%	
6 sessions	26%	32%	
7 or more sessions	13%	10%	
<i>M</i> (SD)	5.4 (1.6)	5.5 (1.3)	

Note. AUDIT = Alcohol Use Disorders Identification Test; higher scores indicating greater severity of alcohol misuse.

Table B3. Work absenteeism outcome: Tests of representativeness of longitudinal sample.

	Group		Statistical Test
	Pre only <i>n</i> cases	Longitudinal	
Work absenteeism hours outcome (WOS at Pre)	24,697	3,733	
Hours <i>M</i> (SD)	5.7 (14.1)	9.0 (19.2)	$F(1,28242) = 1218.62, p < .001,$ $\eta_p^2 < .008$ no effect
SQRT <i>M</i> (SD)	1.2 (2.1)	1.8 (2.4)	
Clinical issue as primary focus during treatment			
Other MH	18%	19%	
Anxiety	18%	18%	
Marital	16%	13%	
Work stress (outcome)	7%	13%	$\chi^2(8,28425) = 1246.97, p < .001,$ $\eta_p^2 = .044$ small effect
Depression	14%	11%	
Personal stress	19%	10%	
Drugs	1%	7%	
Alcohol	3%	6%	
Family	5%	4%	
Referral source into EAP			
Self	99%	81%	$\chi^2(1,28430) = 3480.50, p < .001,$ $\eta_p^2 = .123$ medium effect
Management	1%	19%	
Age of client			
Years <i>M</i> (SD)	39.6 (11.4)	40.2 (11.6)	$F(1,27367) = 9.38, p = .002,$ $\eta_p^2 < .001$ no effect
	<i>n</i> = 23,836	<i>n</i> = 3,532	
Sex of client			
Male	37%	45%	$\chi^2(1,28321) = 86.81, p < .001,$ $\eta_p^2 = .003$ no effect
Female	63%	55%	
Clinical modality			
In-person	73%	78%	$\chi^2(2,28430) = 69.90, p < .001,$ $\eta_p^2 = .003$ no effect
Telephone	24%	18%	
Other technology	3%	4%	
Year of data			
2017	6%	10%	
2018	16%	21%	
2019	19%	19%	$\chi^2(5,28430) = 172.99, p < .001,$ $\eta_p^2 = .006$ no effect
2020	26%	25%	
2021	26%	21%	
2022 Jan-June.	8%	6%	
Industry of employer			
Manufacturing	20%	23%	
Healthcare	21%	17%	
Education	13%	11%	
Gov./Public Service	11%	11%	$\chi^2(8,28430) = 106.23, p < .001,$ $\eta_p^2 = .004$ no effect
Financial/Insurance	10%	8%	
Technology	6%	8%	
Retail/Restaurant	10%	9%	
Blue collar	5%	7%	
Other	5%	6%	
Maximum sessions allowed per case in employer contract			
3 or 4 sessions	13%	11%	
5 sessions	45%	49%	$F(1,28429) = 13.63, p < .001,$ $\eta_p^2 < .001$ no effect
6 sessions	27%	29%	
7 or more sessions	15%	11%	
<i>M</i> (SD)	5.6 (1.6)	5.5 (1.4)	

Note. WOS = Workplace Outcome Suite; higher scores indicate more absence (range 0-159 hours). Absence was transformed with a square root procedure (SQRT) for statistical testing; but the reported hours of absence are shown in this table.

Table B4. Work productivity outcome: Tests of representativeness of longitudinal sample.

	Group		Statistical Test
	Pre only <i>n</i> cases	Longitudinal	
Work productivity outcome (SPS-6 at Pre)	22,941	3,846	$F(1,26786) = 24.96, p < .001,$ $\eta_p^2 < .001$ no effect
<i>M</i> (SD)	18.7 (7.5)	18.1 (7.0)	
Clinical issue as primary focus during treatment			
Other MH	18%	18%	$\chi^2(8,26783) = 1117.38, p < .001,$ $\eta_p^2 = .042$ small effect
Anxiety	18%	17%	
Marital	16%	15%	
Depression	13%	12%	
Work stress (outcome)	8%	12%	
Personal stress	19%	10%	
Alcohol	2%	5%	
Drugs	<1%	7%	
Family	5%	5%	
Referral source into EAP			
Self	99%	83%	$\chi^2(1,26787) = 2893.13, p < .001,$ $\eta_p^2 = .108$ medium effect
Management	1%	17%	
Age of client			
Years <i>M</i> (SD)	39.6 (11.5)	40.2 (11.4)	$F(1,25320) = 9.48, p = .002,$ $\eta_p^2 < .001$ no effect
<i>n</i>	21,765	3,556	
Sex of client			
Male	37%	46%	$\chi^2(1,26693) = 117.92, p < .001,$ $\eta_p^2 = .004$ no effect
Female	63%	54%	
Clinical modality			
In-person	74%	78%	$\chi^2(2,26787) = 30.00, p = .34,$ $\eta_p^2 < .001$ no effect
Telephone	23%	19%	
Other technology	3%	3%	
Year of data			
2017	6%	8%	$\chi^2(5,26787) = 59.51, p < .001,$ $\eta_p^2 = .002$ no effect
2018	17%	19%	
2019	20%	20%	
2020	27%	26%	
2021	24%	21%	
2022 Jan-June.	7%	6%	
Industry of employer			
Manufacturing	19%	23%	$\chi^2(8,26787) = 140.39, p < .001,$ $\eta_p^2 = .005$ no effect
Blue collar	5%	7%	
Healthcare	21%	17%	
Education	13%	10%	
Gov./Public Service	11%	11%	
Financial/Insurance	10%	8%	
Retail/Restaurant	9%	10%	
Technology	7%	9%	
Other	5%	6%	
Maximum sessions allowed per case in employer contract			
3 or 4 sessions	13%	10%	$F(1,26786) = 6.12, p = .01,$ $\eta_p^2 < .001$ no effect
5 sessions	45%	49%	
6 sessions	27%	29%	
7 or more sessions	15%	12%	
<i>M</i> (SD)	5.6 (1.7)	5.5 (1.4)	

Note. SPS = Stanford Presenteeism Scale; higher scores indicate greater work productivity and focus while at work in past month (range 6-30).

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Conflict of interest/Competing interests: MA is an independent research scholar and consultant who received financial support from CuraLinc Healthcare for preparing this research manuscript. MA has also occasionally worked on other projects for this company. DP and SF work for CuraLinc Healthcare company.

Institutional Review Board Statement: No formal ethical approval of the study was required due to the retrospective archival naturalistic design of the study. All employees who used the counseling and completed the outcome measures participated voluntarily and had their personal identity protected as all unique identifiers were removed from the data prior to analysis. All counselors involved in the delivery of the clinical treatment services were fully licensed and trained professionals. All aspects of this evaluation project and preparation of the manuscript followed the ethical guidelines of the American Psychological Association (2017).

Informed Consent Statement: All data was collected as part of the normal business practices and not for a separate specific research project. Consent for participation in a research study and use of data for publication of study results was therefore not necessary.

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AUTHORS

First Author – Mark Attridge, Ph.D., M.A., President, Attridge Consulting, Inc., 1129 Cedar Lake Road South, Minneapolis, MN 55405, USA; mark@attridgeconsulting.com; ORCID = orcid.org/0000-0003-1852-2168

Second Author – David Pawlowski, M.S., Senior Vice President of Operations, CuraLinc Healthcare, 314 W. Superior Street, Suite 601, Chicago, IL 60654, USA; dpawlowski@curalinc.com

Third Author – Sean Fogarty, M.B.A., President, CuraLinc Healthcare, 314 W. Superior Street, Suite 601, Chicago, IL 60654, USA; sfogarty@curalinc.com

Correspondence Author – Dr. Mark Attridge, mark@attridgeconsulting.com; phone: 1+612-889-2398

Merger & Acquisition and Non-financial performance of Banks in Aguata LGA, Anambra State, Nigeria.

Udodiugwu, Michael Ikenna

Chukwuemeka Odumegwu Ojukwu University

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Abstract- The banking sector in Nigeria underwent a drastic restructuring exercise to standardize its operation, and to return trust to stakeholders of deposit money banks in Nigeria, as a result of failing banks that were no longer able to meet up the trends of strategic adjustment exercises by the Central Bank of Nigeria (CBN). However, this study was carried out to examine the effect of merger and acquisition on the non financial performance of banks in Aguata LGA, Anambra State, Nigeria. The study adopted a survey research design method, and its population consisted of only deposit money banks that were involved in merger and acquisition exercise between the periods of 2009-2019. The simple random sampling method was adopted for a sample size of 316. The one way anova and pearson correlation was used to analyze data gotten from the field of study, while the likert style questionnaire was used to obtain relevant data from the respondents. The finding from the study revealed that there is a significant positive effect of M&A on the non financial performance of deposit money banks.

Index Terms- Downsizing, Demotion, Performance, Consolidation, Recapitalization

I. INTRODUCTION

The efficient functioning of a nation's economy depends on the strength of its financial system (CBN, 2005). Banks are foremost and highly visible in their roles though with some survival measures. Such measures are restructuring, diversification, mergers and acquisition. etc. (Odukapa, 2000). Soludo (2004) opined that, the Central Bank of Nigeria (CBN) chose to begin the Nigerian banking sector reforms process with the consolidation and recapitalization policy through mergers and acquisitions (Onaolapo and Ajala, 2012). However, the banking sector in Nigeria underwent a drastic restructuring exercise to standardize its operations and to return trust to stakeholders of several banks in Nigeria, as a result of failing banks that were no longer able to meet up the trends of strategic adjustment exercises by the Central Bank of Nigeria (CBN) (Agu, Olajide, Ikenwilo and Orji, 2011).

Ukandu, (2011) identified merger as the aspect of management strategy dealing the amalgamation of two or more equal businesses with the sole purpose of combining resources,

operations and finances to form a single legal entity. This transition is aimed in the long term to improve the value of shareholders and company's performance in the competitive business world. Acquisitions, on the other hand, are usually described as having the control security of one business by another business usually a bigger business in a manner that the subordinate company becomes the business that is acquired.

Similarly, the then Governor of CBN, Prof Chukwuma Soludo, on July 6, 2004, announced a 13 point reform program expected to repositioning the Nigerian banking industry, with the sole aim of enhancing the growth and development of the economic sector. One of the important aspect of the transition program was the recapitalization of banks with a minimum benchmark of its shareholders fund of twenty five billion naira (N25, 000, 000, 000), prescribed to be met by December 31, 2005. Towards this end, the CBN mandated banks to recapitalize, and those who could not increase their assets base were encouraged to enter into mergers and acquisitions (M&A) (Agu et. al., 2011).

The CBN also provided a range of incentives to accompany the implementation of the program. For example, a number of committees were instituted, whose terms of reference were expected to assist weaker and problem banks in facilitating their M&As (CBN 2004, 2005). These and many more, act as a spring board to achieving improved performance. In terms of work force, the planned degree of integration of the two or more banks through merger or acquisition will influence the type and extent of change in human resource practices in each firm (Malhotra and Sharma, 2013).

1.2 Statement of Problem

Banks in Nigeria are faced with challenges of adjusting to current economic policies and financial regulatory bodies which must be adhere to for their smooth and efficient functioning. Merger and acquisition posed challenges not only in the financial aspect of the banking sector, but also in the reduction of their work force. Considering the inability of most Nigerian banks to perform well due to operational hardship, expansion bottlenecks from their heavy fixed and operating costs coupled with volatility between deposits and lending rates (Onaolapo and Ajala, 2012). Cartwright and Cooper (1992) revealed that merger and acquisition can create feelings of uncertainty, powerlessness, reduced morale, job and career dissatisfaction and other negative behavior such as : Acts of sabotage and petty theft, increased staff turnover, increased

sickness and absenteeism if management is unable to integrate organizational members and their values.

Akinsulire (2017) is of the opinion that even after a successful implementation of merger and acquisition processes by participating industries, there can still be failure in accordance with the opinions of Rhoades (1993) and Straub (2007). Morgan (2004) opined that a merger and acquisition deal that is financially sound may prove to be a disaster if it is operated in a way that goes contrary to the human resources and corporate culture. There may be varying differences between the cultures, values of the participating companies especially if it is a cross-border synergy (Anderibom and Obute, (2015). It is against these established facts from extant literatures, that this study was carried out to examine the effect of mergers & acquisition on the non financial performance of banks in Aguata LGA, Anambra state, Nigeria, that underwent the process of mergers and acquisition between the period of 2011 – 2022.

1.3 Objectives of the study

- i. To examine the effect of Downsizing on internal workplace performance.
- ii. To examine the effect of Demotion on quality of service delivery

1.4 Research Questions

- i. To what extent does downsizing pose threat on internal workplace performance?
- ii. To what extent does demotion affect the quality of service delivery?

1.5 Research Hypotheses

H₀₁: Downsizing does not pose threat on internal workplace performance.

H₀₂: Demotion does not have any effect on the quality of service delivery.

II. REVIEW OF RELATED LITERATURE

2.1 Conceptual Review

2.1.1 Mergers and Acquisitions.

Merger and acquisition strategy is one of the key corporate strategies that many corporate entities like commercial banks, manufacturing firms adopt to gain competitive advantage and enjoy economies of scale. Merger involves external approach to expansion and is often mentioned with acquisitions in academic and management literature. Some strategic management and finance scholars; Hoskisson, Hitt and Johnson (2002); Thompson and Strickland (2007); Kazmi (2008) and Pandey (2010) defines merger and acquisition strategy as the combination of two or more businesses in which one acquires the assets and liabilities of the other in exchange for shares or cash or both. The companies are dissolve and their assets and liabilities are combined and new stock is issued. Such actions are commonly voluntary and often result in a new organizational name (often combining the names of the original organizations). According to Anthony (2008) an acquisition, on the other hand, is the purchase of one organization by another. Such actions can be hostile or friendly and the acquirer maintains control over the acquired firm.

Similarly, Umar (2009), a merger is a transaction involving two or more companies in which shares are exchanged but in which only one company survives. Mergers usually occur between firms of somewhat similar size and are usually friendly. The resulting firm is likely to have a name derived from its composite firms, while an acquisition is the purchase of a company that is completely absorbed as an operating subsidiary or division of the acquiring company. Okpanachi (2011), views mergers and acquisitions as global business terms used in achieving business growth and survival.

A merger entails the coming together of two or more firms to become one big firm while acquisition is the taking over or purchase of a small firm by a big firm, both of which are pursuing similar motives. Therefore, a merger can be seen as the combination or amalgamation of two or more separate companies into a single company where one survives and the others lose their corporate existence while acquisitions can be seen as the taking over of the controlling shareholding interest of another company. Usually, at the end of the process, there exist two separate entities or companies.

2.1.2 Downsizing

Downsizing can be defined as set of activities designed to improve organizational effectiveness and competitiveness. Downsizing describes the process in which firms remove temporarily or indefinitely a number of employees from their payroll. The general purpose is to reduce the firm's burden of excess labour costs. Amabile and Conti (1995) defined downsizing as an international management action involving a reduction in force and de-signed to improve a company's competitive position. Downsizing can be defined as set of activities designed to improve organizational effectiveness and competitiveness. Downsizing describes the process in which firms remove temporarily or indefinitely a number of employees from their payroll. The general purpose is to reduce the firm's burden of excess labour costs. Amabile and Conti (1995) defined downsizing as an international management action involving a reduction in force and de-signed to improve a company's competitive position

The concept of downsizing emerged from a number of disciplines and draws upon a wide range of management and organizational theories (Agwu and Kadiri, 2014). Hence a single definition of downsizing does not exist across studies, in a layman's point of view; downsizing means a contraction or shrinkage in the size of a firms' workforce. There are palpable fears of job loss in the financial sector as banks move to contain rising high operating costs. In the first quarter of the year, the cost of diesel rose from N225 to over N750, an increase of over 230 per cent (Nwafor, 2022). The impact on business operations has forced some banks to adopt new survival measures, including office hour rationalization. Official banking hours, which used to be 8am to 4pm, now vary depending on specific organization and branches.

Agwu and Kadiri (2014) who asserts that downsizing engenders a variety of psychological states in survivors, namely, guilt, positive inequity, anger, relief, and job insecurity.

Participant 4 also states that within the first two quarters after the major downsizing exercise, the survivors showed signs of decreased levels of morale and displayed attitudes such as lack of trust towards management. However, Datta, Guthrie, Basuil, and Pandey (2010) argued that the human costs of downsizing are far reaching as well as extensive. Within the banks, downsizing was viewed from various angles, however, the executioners, victims and survivors. The executioners in this context are the bank management teams, the victims are those affected and the survivors are the employees that remain with the banks after the downsizing have taken place.

Various downsizing scholars have studied and still studying the survivor syndrome and the exhibited behaviours at the workplace by individuals. In conclusion, many survivors exhibit work behaviours and attitudes that are dysfunctional (Macky 2004; Itami and Nishino 2010) to the firm and to the individuals work performance. Agwu and Kadiri (2014) stressed that the impact of downsizing on the survivors is believed to be one of the major reasons for the failure of downsizing efforts and their ensuring long-term problems.

2.1.3 Internal workplace performance

Performance can be understood as a quantitative and qualitative expression of a person or group to carry out and complete work in order to achieve set goals, while utilizing the knowledge, skills, competences and abilities possessed (Altındağ & Köseadağı, 2015). Thus, internal workplace performance of an employee can be said to be a source of strategic advantage and is the key to success for the most organization, (Diamantidis & Chatzoglou, 2019). Sustainable employee performance is a solution to maintain the existence of the organization in a dynamic and turbulent socio-economic environment (Diamantidis & Chatzoglou, 2019). To find out whether the performance of employees is good or bad at the workplace, a performance appraisal can be carried out by management of an organization, in which the assessment must be adjusted to the peculiarities and conditions of each organization (Rusu, Avasilcăi, and Huțu, 2016). With performance appraisals, organizational leaders can make administrative decisions, either in the form of dismissals or promotions or remuneration, (Altındağ & Köseadağı, 2015).

Dehaghi & Rouhani (2014) suggest that there are various ways that organizations can do to evaluate employee performance, but the most important thing is to determine the right method according to organizational goals, and usually employee performance appraisal can use more than one way. Furthermore (Molapo, 2002; Rusu et al., 2016) explains that every organization must also have standards for evaluating employee performance, taking into account internal and external factors. The availability of facilities and infrastructure as well as the organizational environment can determine whether the quality of employee performance is good or bad. In addition, social conditions also affect employee performance, such as leader behavior, employee trust in team management, and relationships between employees, as well as employee relationships with leaders (Pulakos et al., 2015).

2.1.4 Demotion

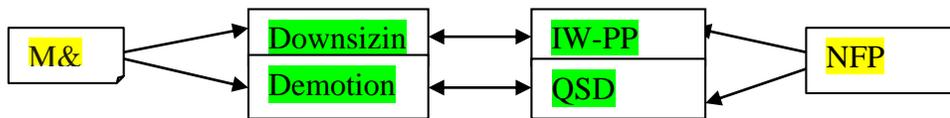
Stepping down of the position or demotion as it can be rightly put may be defined as a reduction of dignity, importance, responsibility, power or status of an employee even if his or her salary, benefit, and rank are retained (Conyon and Lind, 2002). This often happens when an employee escapes dismissal and employer opts to punish the employee by giving him/her a position that is lower than the one they held. Being demoted in a department can be so awkward, as the employee co-workers will be well aware of his or her fall from grace which afterwards causes psychological challenges. In the case of merger when staff suddenly becomes redundant due to the nature of the merger, the bank may want to retain the employee because he or she is valuable, but the organization has to move the employee to another department. According to Isaac and Agyer (2013) valuable and more rich in talent and skilled employees of retained banks whose roles are more crucial and viable are communicated on the new intention of the employer to step down his position haven given obvious reasons but the assurance that all remunerations and benefits remained untouched.

2.1.5 Quality of Service Delivery

Service delivery is a service that has the ability to provide and satisfy a need to customers (Murithi, 2009). According Newman (2001) the need for service delivery is brought about by the volatile market environment which in return alters the preferences of customers and the need for employees to continuously re-evaluate and redesign their business processes to enhance efficiency. The ultimate reason for the continuous implementation of technology is to improve service delivery (Chai, Ding, and Xing, 2009). Implementation of technology has played a huge role in improving the banking support systems, internet banking and Automated Teller Machines (Atms).

Chai et, al (2009) asserts that Banks provide bank services to attract customers, from giving loans, credit and debit cards, digital financial services, and even personal services. However, some essential modern services are offered by most commercial banks. Bank employees, also known as bank tellers, are responsible for most of the everyday operations at financial institutions. It is their job to keep track of all the money that goes in and out of a bank. This is no easy task, as a single bank may have dozens of transactions every day. In addition to a bank's obligations under law, the bank also owes its customers a duty to: receive money and collect bills for credit to its customer's account; honour customers' checks – which must be drawn in the proper manner, with the account sufficiently funded, presented during banking hours at a branch of the bank and also perform other functions as wealth management, providing Credit and Debit Cards, Overdraft services (Chung and Hoag, 1990). Employees faces lot of challenges as compared to manual banking like create frustration in getting the work done electronically, lack of knowledge regarding e-banking services, lack of proper training, obsolete technology, lack of technical up-gradation, rural customers will not accept e-channels, improper response (Gaughan, 2007).

2.1.6 figure 1 Conceptual framework



2.2 Theoretical Review

“Eat or Be Eaten” Theory of Merger

The “Eat or be eaten” theory of mergers was propounded by Gorton, Kahl and Rosen (2005), as a response to the various merger waves experienced in the United State in the 1960s up to the late 1990s. Gorton, Kahl and Rosen (2005) combine elements of neoclassical and behavioural theories in a new theoretical framework called Eat or Be Eaten. The Eat or be eaten theory presents a model of defensive mergers and acquisitions. The theory argues that mergers and acquisitions can occur when managers prefer that their firms remain independent rather than be acquired. The theory further assumes that managers can reduce their chances of being acquired by acquiring another firm and hence increasing the size of their own firm. According to Gorton et al (2005), the basic elements of the “eat or be eaten” theory is based on the following assumptions:

- i. First, managers may have a preference for keeping their firms independent. Managers of acquired firms are likely to play subordinated roles in the new firms or may even lose their jobs.
- ii. Secondly, there is a state of the world in which at least some mergers generate value.
- iii. Thirdly, a firm of a given size cannot acquire a larger firm. The larger the acquisition, the more difficult it is to finance.

The assumption that a firm cannot acquire a firm that is larger than itself implies that a firm can reduce its chance of being acquired by acquiring another firm smaller than it. This increases its size, which then reduces the number of other firms that are potential acquirers. Merger waves arise because of the externalities involved in defensive mergers: one firm’s defensive acquisition makes other firms more vulnerable as takeover targets, which induces them to make defensive acquisitions themselves, resulting in a race for firm size.

2.3 Empirical Review

This section discusses some empirical works on the effects of mergers and acquisitions on the performances of banks. Soludo (2004) argued that mergers and acquisitions are aimed at achieving cost efficiency through economies of scale, and to diversify and expand the range of business activities for improved performance.

Ajayi (2005) and Uchendu (2005) also support this view. To Oladejo and Oladipupo (2011), the major purpose of the various financial sector reforms is to strengthen the banking industry and position it to meet world standards. Bank supervision entails not only the enforcement of rules and regulations, but also judgment concerning the soundness of banks’ capital adequacy, assets, management, earnings and liquidity.

Kouser and Saba (2012), postulated that Capital, Assets, Management, Earnings and Liquidity (CAMEL) is an appropriate and simple model for the evaluation of the financial and managerial performance of institutions. They argue that the CAMEL is commonly used for the evaluation of performance and ranking. The study made comparison between the performance of pure Islamic banks, conventional and mixed banks in Pakistan. The ratios of the banks’ performance defined by the CAMEL model were analyzed using ANOVA to investigate any significant difference. The analysis found that, Islamic banks had developing set up. In other words, Islamic banks fare better than conventional and mixed banks in Pakistan.

Okpanachi (2011) conducted a comparative analysis of the impact of mergers and acquisitions on financial efficiency of banks in Nigeria. The study major objective was to make a comparative analysis of the impact of mergers and acquisitions on the financial efficiency of banks in Nigeria, made use of gross earnings, profit after tax and net assets of three selected banks namely, Access Bank Plc, First Bank of Nigeria Plc and Wema Bank Plc, extracted from their annual reports and accounts as indices to determine financial efficiency of the banks by comparing pre-mergers and acquisitions indices with the post-mergers and acquisitions indices for the period 2002 to 2008. The period 2002 to 2004 was considered as pre-merger period, 2005 as base year while year 2006 to 2008 was considered as post-merger period. This was done to determine if there were any significant difference between the efficiency of the banks in terms of gross earnings, profit after tax and net assets. The secondary data (gross earnings, profit after tax and net assets), were analyzed by applying the t-statistic, using the Statistical Package for Social Sciences. The results showed that the post-mergers and acquisition period was more financially efficient than the pre-mergers and acquisitions period and recommended that banks should be more aggressive in their profit drive to improve their financial position and thereby reap the benefits of mergers and acquisitions.

Similarly, Berger and Humphrey (1992), found that banking organizations significantly improved their profit efficiency ranking after mergers. De Young (1997) also found that when both the acquirer and the target were poor performers, mergers resulted in improved cost efficiency. However, an examination of all commercial banks and bank holding company mergers and acquisitions occurring between 1982 and 1986 by Healy et al. (1992), revealed that mergers and acquisitions did not reduce non-interest expenses that could have led to improved efficiency.

In same vein, a research conducted by Umar (2009) on the impact of banking industry recapitalization on employment in Nigerian banks revealed that there was a reduction in employment in the banking industry between 1999 and 2001 and an appreciable

increase in employment in the Nigerian banking industry after the consolidation exercise, from 2006 up to 2008. This increase in employment was attributed to significant increases in the banks' total assets, shareholders' funds and branch networks of the banks after consolidation.

Ebong (2001), also opined that consolidation would have a positive effect on employment in the long run and would drastically alter and redefine the nature of competition in the banking industry. However, the work of John (2006), indicates that mergers were followed by a decrease in the number of staff employed by the bank.

Similarly, Adegbaju and Olokoyo (2008) found that return on equity was quite low after recapitalization which implies that share holders receive low returns as dividend after recapitalization. Return on assets also fell after recapitalization which shows that management of the banks had not been able to effectively convert the bank's assets into net earnings after the recapitalization.

2.4 Gaps in Literature

It is assumed that the effect of mergers and acquisition had been felt in the banking sector of the economy through the growth in the efficiency of banking operation, maximization of shareholders wealth, creating an enabling business environment so friendly and worthy to rely upon by investors, reduction in interest rate as enjoyed now by depositors and increased in bank reserve with the central bank of Nigeria. Yet, pertinent and subtle areas with regards to addressing the ill effect of mergers and acquisition with respect to downsizing, merger syndrome, demotion and measures to assisting employees adjust to the new change process as posed by merger and acquisition exercise in the banking sector of the economy had been left unattended to. These gaps identified have been created by this consolidation process thereby providing a direction for the researcher to investigating further the non financial performance of banks in Nigeria, it area of weakness and threat which have not been properly addressed by several literatures and providing yardstick that may serve as measures for bridging the gaps.

III. 3.1 METHODOLOGY

The Researcher adopted the descriptive survey research design method. A population of 316 employees working at the three (3) deposit money banks whose consolidation took place between 2009 and 2019 was selected for the study, using the simple random sampling technique. Banks selected for the study

included, Access Bank Plc (Acquired Diamond bank in 2019), First City Monument Bank (FCMB) Plc (merged with NAMBL, First City Bank, Cooperative Development bank and Finbank in 2012) and Keystone bank (acquired Bank PHB in 2011).

Structured questionnaire were used for the collection of data. However, the questionnaire was divided into two sections vis A and B. Section A contained demographic data of the respondents, while Section B contained data relating to the research questions. The measurement construct for Merger and Acquisition (Downsizing and Demotion) were raised from the extant literature of (Amabile and Conti, 1995; Isaac and Agyer (2013), while the measurement construct for Non Financial Performance (Internal workplace performance and Quality of service delivery) were gotten from (Altındağ and Köseadağı, 2015; Dehaghi and Rouhani, 2014; Molapo, 2002; Rusu et al., 2016).

The questions were structured in a likert-style scale pattern ranging from 5-strongly agree to 1-strongly disagree, While the questionnaire was validated by a statistician, the reliability was checked by Crombach Alpha test. The coefficient of the reliability text was considered acceptable at a value that ranges between 75-90 (0.75-0.90), which shows that the instrument was highly reliable according to Pallant, J. (2001), benchmark for testing reliability of a research instrument. Data were analyzed using One way anova and hypotheses were tested using Pearson Correlation contained in the statistical package for social sciences (IBM SPSS, Version 23).

IV. 4.1 DATA PRESENTATION AND ANALYSIS

Based on the questionnaire issued to the respondents of the 3banks in Aguata LGA, Anambra State, Nigeria under examination, data were collated, gathered, analyzed and interpreted. The One Way Anova was used to analyze the research questions, while the Pearson correlation was used to interpret and test the hypotheses. The interpretation and analyses which started up with the research questions and afterwards hypotheses are therefore presented below.

4.2 Presentation and Interpretation of Research Questions 1 & 2

- i. To what extent does downsizing pose threat on internal workplace performance?
- ii. To what extent does demotion affect the quality of service delivery?

Table 4.1

Response Option	No of Questionnaire	Percentage
Returned Questionnaire	290	91.77%
Unreturned Questionnaire	26	8.23%

Total

316

100%

SOURCE: Field Survey 2022

Research Question 1:

- i. To what extent does downsizing pose threat on internal workplace performance?

TABLE 4.2 One Way Anova

Sub questions	Sum of Squares	Df	Mean Square	F	Sig.
Layoff have effect on the internal management control	Between Groups	4	51.790	102.631	0.000
	Within Groups	285	.505		
	Total	289			
Forceful retrenchment pose psychological trauma on workforce	Between Groups	4	5.490	7.071	0.000
	Within Groups	285	.776		
	Total	289			
Downsizing of workforce may result to workplace conflict	Between Groups	4	.996	1.640	0.014
	Within Groups	285	.607		
	Total	289			
Bank customers are deleveraged when their trusted officers are layoff	Between Groups	4	9.826	18.354	0.000
	Within Groups	285	.535		
	Total	289			

Source: SPSS Version 23

The table above illustrates the relationship between the independent variable x mergers and acquisition proxy with downsizing and the dependent variable y bank performance proxy with internal workplace performance. Roll 1 show a positive one way anova at 0.000 which indicates that layoff have effect on internal management control. Roll 2 indicates a positive one way anova at 0.000 which depicts that forceful retrenchment pose psychological trauma on workforce. Roll 3 shows a positive one

way anova at 0.014 which indicates that conflict may arise from downsizing of workforce. Roll 4 also shows a positive one way anova at 0.000 which indicates that customer's loyalty are threatened when their trusted bank officers are laid off.

Research question 2

- ii. To what extent does demotion affect the quality of service delivery?

Table 4.3 One-Way Anova

Sub questions	Sum of Squares	df	Mean Square	F	Sig.
Quality of service is affected by the mode of employees	Between Groups	4	1.685	1.760	0.037
	Within Groups	285	.957		
	Total	289			
Better customers service relation could be hampered by demotion	Between Groups	4	1.049	.938	-.0442
	Within Groups	285	1.118		
	Total	289			
Demotion of employee may cause anxiety and create an uncertain state of mindset	Between Groups	4	28.913	40.238	0.000
	Within Groups	285	.719		
	Total	289			
When the quality of service rendered is good customers are said to be satisfied	Between Groups	4	15.193	15.581	0.000
	Within Groups	285	.975		
	Total	289			

Source: SPSS Version 23

The table above shows that there exists a subtle change in the performance, as a result of the effect merger and acquisition posed on performance with esteem regard to the stepping down of the position of the acquired/merged staff of the banks. The changes in the quality of service delivery most times are not intentional, they could linger in the mind of employees as anxiety

and fear which in turn affect the discharge of their responsibility. Quality of service indicated and reflected at 0.037, -0.442, 0.000 and 0.000 respectively which confirms that demotion have a negative effect on the quality of service delivery of employees,

4.3 Presentation and Interpretation of hypotheses 1 & 2

H0₁: Downsizing does not pose threat on internal workplace performance.

TABLE 4.4 PEARSON CORRELATIONS

	Sub questions	Internal workplace performance	Internal workplace performance	Internal workplace performance	Sum p-value test
Downsizing of workforce	Pearson Correlation Sig. (2-tailed)	0.000	0.000	0.026	0.026 0.026
Downsizing of workforce	Pearson Correlation Sig. (2-tailed)	-0.132*	-1.000	-0.158**	-1.290 -1.290
Downsizing of workforce	Pearson Correlation Sig. (2-tailed)	0.026	-.1580**	0.000	-1.554 -1.554
Sum of p=value	Pearson Correlation Sig. (2-tailed)	-0.060	-0.385**	-0.116*	-0.561 -0.561

*. Correlation is significant at the 0.05 level (2-tailed).

Interpretation

The relationship result on Table 4.3 shows a positive correlation 0.026, -1.290,-1.554 and the sum of p=value at -0.561 this illustration above indicates that downsizing of workforce have a negative effect on internal workplace performance this negative threat which includes anxiety, fear of uncertainty, job insecurity and absenteeism of the workforce all together affects their attitude to work which automatically reduces the overall bank performance in a given financial year.

Decision Rule: As the rule of thumb the p-value of the computed correlation is less than 0.05 .i.e $-0.561 < 0.05$

Decision: Since the p-value of the test is less than 0.05 at -0.561 there exists enough evidence to reject the null hypotheses and conclude that there exists a significant effect of Downsizing on internal workplace performance

H0₂: Demotion does not have any effect on the quality of service delivery.

TABLE 4.5 PEARSON CORRELATIONS

	Sub questions	Quality of service	Quality of service	Quality of service	p-value Test
Demotion	Pearson Correlation Sig. (2-tailed)	0.000	0.000	0.000	0.000 0.000
Demotion	Pearson Correlation Sig. (2-tailed)	-0.033	-0.033	-0.033	-0.033 -0.033
Demotion	Pearson Correlation Sig. (2-tailed)	0.000	.0.000	0.000	0.000 .0.000
Sum of p=values	Pearson Correlation Sig. (2-tailed)	.089 .131	.274** .000	.067 .257	-0.033

** . Correlation is significant at the 0.05 level (2-tailed).

Interpretation

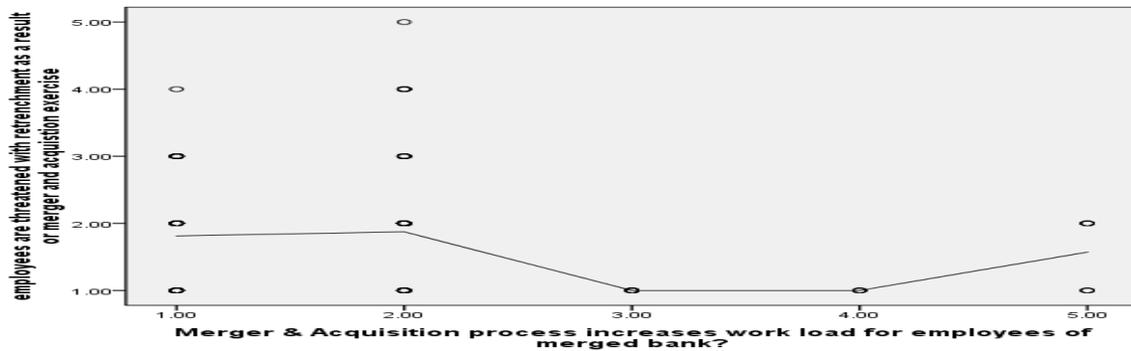
The relationship result on table 4.7 above shows a positive correlation between demotion and quality of service delivery at 0,000, -0.033, 0,000 and the sum of p= value at -0.033 , this implies that employees have the feelings that the bank is no longer suitable to guarantee their welfare in the area of appraisal and promotion..More so, that the quality of services rendered by a demoted employee will drop or reduced from what it used to be before mergers and acquisition

Decision Rule As the rule of thumb the p-value of the computed correlation is less than 0.05 i.e $-0.033 < 0.05$.

Decision: Since the sums p-value of the test is less than to 0.05 at -0.033, there exists enough evidence to reject the null hypotheses and accept the alternate hypothesis and conclude that demotion have effect on the quality of service delivery;

4.4 Discussion of findings

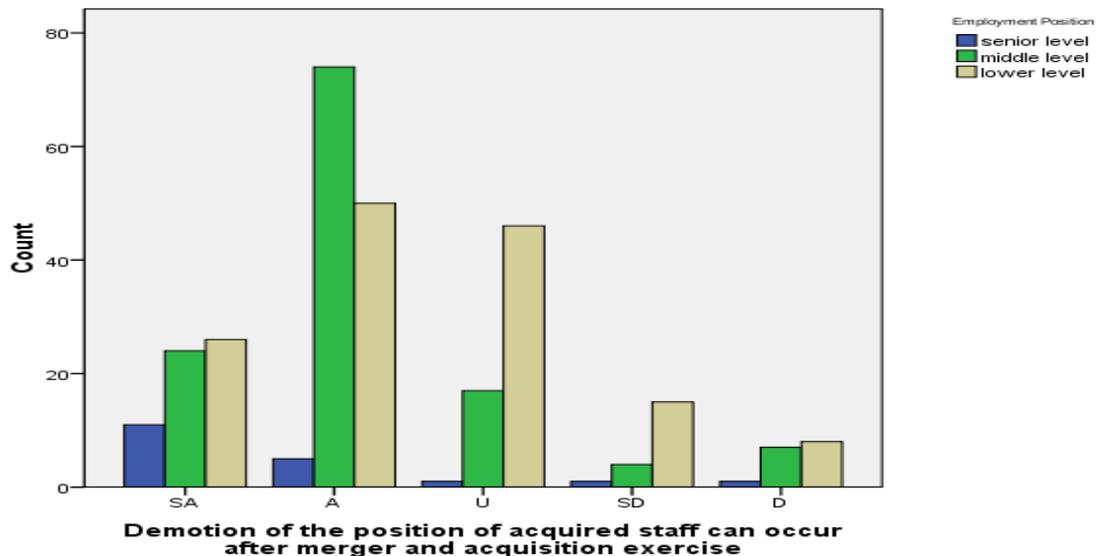
Figure 2



To affirm the illustration, figure 2 presents dotted small circles with a broken line at each point which shows the effect of downsizing on internal workplace performance. In between the straight dotted lines before 2.00, the immediate slope downwards shows that after downsizing exercise a larger number of employees are relieved of their jobs thereby creating gap in their job positions. The resultant effect of this as shown in the graphic

presentation is that the workload and job description of merged /acquired employees automatically increase, this is because they are now saddled to perform an additional task. However, there is a significant positive effect of downsizing on internal workplace performance.

Figure 10



The chart above shows the represented views of various cadres of management and/ or employees; the long bar reaching 60 counts denote the populous views of the senior level management that agrees with the fact that demotion or stepping down of the positions of acquired/merged staff may occur as soon as merger and acquisition processes are finalized in the banking

industry. And also before count 20 just lesser than count 10 at the right space of the bar represents a supporting view of staff who agreed that demotion of the position of acquired employees have a positive effect on their output. The study concludes that demotion of staff have an adverse effect on the quality of service delivery, as supported by the work of Galpin and Herndon (2000)

that posited a significant positive effect of mergers and acquisitions in achieving organizational effectiveness, profit maximization, increase in productivity, career opportunities, and better job opportunities, the associated job losses and redundancies, stepping down of acquired staff, increase workload, redesigning jobs to eliminate job duplication, initiating training and effective communication programs are issues that could not be ignored if successful mergers and acquisitions would be achieved.

V. 5.1 RECOMMENDATIONS

Firstly, to addressing the issue of downsizing efforts should be made to establish support services in form of career counseling, small scale business seminar, financial and retirement counseling and employees should be given the leverage to further study so that the adverse effect of downsizing which usually comes as wave may be remedied before hand and also management should realize that employees are human being created to function with blood and not robot that can be overload with task under automatic manipulation. Similarly, there should be the provision and prompt payment of severance package so that those who inevitably lost their jobs would have access to enough money to re-establish themselves.

Similarly, It is pertinent that the management of the acquired and/or merged banks put into consideration before demotion, the key talents in the acquired and/or merged bank and their efforts, competence and also capacity to building a whole vibrant and sustainable bank that can compete aggressively with its competitors, yet satisfying the demands of their customers while rapidly adjusting to the current consolidation process.

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AUTHORS

First Author – Udodiugwu, Michael Ikenna
Chukwuemeka Odumegwu Ojukwu University
udodiugwu@gmail.com

Case Analysis " Analysis Of Income Tax Planning Article 21 As An Efforts To Save Corporate Income Tax Expense At Pt. CAS "

CHAIRANI NOER - BC211120174

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Abstract- Income tax is an important component of the company, where the tax information in the financial statements has its administration. This tax planning is used by almost every company in carrying out tax management to get the highest possible income and reduce the lowest possible costs. This study aims to formulate the form of corporate policy in planning PPh Article 21, whether it is following the applicable taxation tax provisions, and to see the effectiveness and optimization of PPh Article 21 planning at PT CAS to minimize corporate tax payments. The calculating PPh Article 21 uses the Net method, a method of withholding tax where the company bears Income Tax Article 21 for employees. The Gross-Up method is a method of withholding taxes. The company provides tax allowances for Income Tax Article 21, which is formulated as the amount equal to the amount of Income Tax Article 21, which will be deducted from employees. This type of research is grounded research. Types and sources of data are secondary data in the form of Annual SPT and Periodic Income Tax articles 21 years 2016, 2017, and 2018. Data analysis uses taxonomic analysis. The findings of this study resulted in policies formulated by corporations, including (1) payment of health insurance benefits from insurance companies, particularly employees of class IV; (2) pension payments to pension funds are designated for employees in groups III and IV to be registered as pension fund participants, while groups I and II are registered one year before entering retirement age; (3) PT CAS uses two methods of withholding income tax article 21, namely the Net method and the Gross-Up method in saving corporate tax.

The writing of the final project aims to compare the calculation of income PPh 21 using the Gross Method, Net, Gross up Method, or an alternative method of PPh method supported in part. Comparison of the calculation aims to find out which methods can be used by the company, assuming the method that can provide just repayments between companies or employees. Data collection methods are used by way of interviews, observation, and documentation. The results of this study showed that each method has advantages and disadvantages.

Index Terms- Tax Planning, Tax Article 21, Net Method, Gross Method, Gross-up Method

I. INTRODUCTION

Tax is one of the important instruments in state revenue to finance government expenditures. According to Suandy (2013: 1), these expenditures can be in the form of routine expenditures and investment expenditures to finance expenditures related to state development. Based on a copy of the Director General of Taxes Decree Number KEP 95/PJ/2015 concerning the Strategic Plan of the Directorate General of Taxes for 2015-2019 in the context of optimizing audits to reduce transfer pricing, tax avoidance, and tax evasion practices in the context of data matching that focuses on leading sectors from each Regional Office (Kanwil) (Husain & Alang, 2019). These practices are part of the company's tax planning. On the other hand, taxes are a burden that will reduce the net profit of the company (Prawasti, 2014). The goal of seeking maximum or maximum profit (profit-oriented) will certainly be covered by the company as a business entity. Income Tax which is an important component of the company, where the existence of tax information in the financial statements has its administration as regulated in the Statement of Financial Accounting Standards (PSAK) Number 46 concerning Income Tax Accounting. There are many types of income tax, namely Income Tax Articles 21, 22, 23, 24, 25, 26 and ends in Article 28/29. As a practitioner or accountant, of course, I will highlight the calculation of Income Tax planning (hereinafter referred to as 'PPh'). Tax planning practices can be carried out by the object of Article 21 Income Tax on employees in carrying out the analysis and calculations. There are 3 (three) methods, including (1) Gross Method, namely the employee bears the tax burden himself; (2) Net Basis, namely the company bears the employee tax burden in the form of benefits in kind; (3) The tax allowance method is given on a flat basis or the Gross-Up method. The benefits of this tax planning can be used by the company as a strategic consideration to regulate cash flow (liquidity) and savings (profitability) of corporate taxes (Pohan, 2017, p. 44). The

interests mentioned above as well as the condition of the company, make management look for ways so that both can be achieved. One way that can be used is tax planning (Endriati, Hidayati, & Junaidi, 2017). This tax planning is used by almost every company in tax management, as is the case with PT. "CAS" to get the highest possible revenue and keep expenses as low as possible. This profitability benefit is expected by PT CAS because the corporate tax burden and Article 21 tax burden borne by the company is large enough that tax planning is needed which is part of the corporate strategy. Corporate Income Tax) from 2016 to 2017, from 6 billion to 26 billion and in 2018 it decreased to 13 billion while the Income Tax Article 21 in 2016 was 10 billion, in 2017 it was Rp. 8 billion and in 2018 it was Rp. 8 billion.

This research is motivated by several previous research findings regarding tax planning on the object of PPh Article 21: 1) A study in analyzing the role of tax planning to minimize the PPh burden that must be paid by PT "ESP" to provide an overview of tax planning analysis and find the best alternative for tax savings which has an impact on net income after tax. The research method uses case study analysis. The results of the analysis are PT. ESP has not implemented comprehensive tax planning and there are still many tax plans made by companies that contain high tax risk, both on the tax base and sanctions (Sumadi, 2004). 2) Study in analyzing PPh Article 21 to minimize tax costs at PT. XYZ aims to explain the provisions of the affected tax law and to find out whether the tax planning carried out can minimize the amount of tax burden that must be paid. The research method uses descriptive analysis. The results of the analysis are PT. XYZ agrees to the requirements that affect taxes and achieves the planning objectives themselves so that the implementation of tax planning at PT. XYZ becomes better and more effective (Herman, 2006). 3) Case Studies in the application at PT. A for the analysis of tax planning which aims to optimize Income Tax legally so as not to harm the state and companies. The results of the study resulted in tax planning with 2 (two) techniques, namely the provision of cash allowances and the provision of in-kind, then the difference in the application of tax planning can save the tax generated by the company and following applicable regulations (Novayanti, 2012). 4) Studies in analyzing the calculation of interest rewards and tax sanctions on Tax Court Decisions (Gunawan, 2013). 5) A study on profit shifting and tax planning aggressiveness by multinational companies that contributed to the results, namely the existence of profit shifts and IP-based profit shifting-based profit shifting arrangements in tax avoidance practices then the provision of tax cuts in an internationally coordinated manner (Fuest, Spengel, Finke, Heckemeyer, & Nusser, 2013). 6) The study in analyzing the Article 21 Income Tax of employees with a comparison of the Net and Gross-Up methods at PT. Pegadaian (Persero) Tuminting Branch. The research method uses comparative descriptive analysis. The results of the analysis conclude that there is a company error in the calculation of PTKP which has an impact on increasing the calculation of employee income tax. The importance of applying the Net method in calculating Article 21 Income Tax so that the income tax paid by the company is following the actual situation and can reduce the amount of Article 21 income tax paid by employees (Arham, 2016). 7) Study in analyzing Article 21 Income Tax at PT. X in Mojokerto using the Net Basis, Gross Method, Tax Allowance Method, and Gross-Up Method. The results of the analysis conclude that companies using

a Net Basis in the application of the calculation of Income Tax Article 21 and the Gross-Up Method can save corporate taxes (Roring, 2018). 8) Case Study in the application at PT. XYZ on the analysis of Article 21 income tax planning which aims to streamline the corporate income tax burden. The research method uses descriptive quantitative. The results of the study resulted in the efficiency of the corporate income tax burden of PT. XYZ on the implementation of tax planning by maximizing the salary component related to Income Tax Article 21 by choosing the gross-up method as a deduction from income (Sihotang, 2018).

Based on the general description of the company's data on profitability and corporate tax burden and the findings of previous research in analyzing and implementing tax planning, the above provides an overview for PT CAS to identify the factors that underlie corporate policy in planning Income Tax Article 21 with the research objectives, namely: (1) Formulate the form of corporate policy in the planning of Income Tax Article 21 whether it is following the applicable taxation provisions; and (2) Seeing the effectiveness and optimization of Article 21 PPh planning at PT CAS to minimize corporate tax payments.

B.1 THEORY BASIS

1. Tax Analysis and Planning

Tax Planning according to Mr. Dr. Prianto Budi S, Ak., CA., MBA (2019) is the first step in tax management (a means to fulfill tax obligations properly but the amount of tax paid can be reduced as low as possible to obtain the expected profit and liquidity). The next step is the implementation of tax obligations (tax implementation) and tax control (tax control). At this tax planning stage, collection and research on tax regulations are carried out. The goal is to select the type of tax-saving measures to be taken. In general, the emphasis on tax planning is to minimize tax obligations.

An analysis is an important component in starting an activity. In the context of accounting science, this analysis can enrich information about company finances and help to create and design for its users, namely accountants (Kuang & Tin, 2010). The process of gathering requirements is carried out intensively to be able to specify the needs of the device so that it can be like what is needed by the user (Husain T., 2017). This information can be specifically addressed to internal and external stakeholders of the company. The size of the tax sector in generating state revenues and tax management for corporations in tax planning. Tax planning (tax planning) is the organization of taxpayers, both individuals and business entities, by carrying out a process in such a way that is still within the tax provisions so that corporations can formulate a minimum amount of tax payments (Pohan, 2017).

2. Tax Planning and Methods of Withholding Income Tax Article 21

According to Pohan (2013:104), tax planning can begin with the analysis stage, using the tax calculation method and its calculation of income tax to save the tax burden while still paying attention to the principle of legality (taxability deductible). The Directorate General of Taxes defines tax planning as the initial stage in tax management activities to minimize the tax burden without violating the applicable Taxation Law and refers to taxpayer transactions so as not to violate the provisions on tax debts borne by corporations (Klikpajak @Mekari, 2018). The

principle of taxability deductibility is the principle that explains items that can/cannot be subject to income tax (tax objects and non-income tax objects) and items that can/cannot be financed (gross income reduction), the mechanism of which is if the party providing remuneration/income can be paid for (deduction of gross income), then on the employee's side it is taxable income. On the other hand, if on the part of the employee the provision of remuneration/income is not income, then on the part of the employer it cannot be financed (not a deduction from gross income) (Pohan, 2017, p. 84). This principle is commonly used and applied in tax planning, Generally, this is done by changing or converting income that is a tax object into income that is not a tax object, or vice versa by changing a non-deductible expense into a deductible expense, with the consequence of a change in the tax payable due to the change in composition. Changes in the amount of tax payable due to fiscal corrections, of course, must be considered which one is more profitable for the company.

The application for calculating Income Tax Article 21 can use the following 3 (three) methods:

- **Net Method:** The net method is a method of withholding taxes carried out by the employer with the amount of Article 21 Income Tax borne by the employer's company. In this method, employees receive a net salary, and Article 21 income tax is borne by the employer. According to Kep. Director General of Taxes No. 31/PJ/2008 article 8 paragraph 1 which explains that non-taxable income withheld income tax article 21 or income tax article 26 includes receipts in kind and enjoyment obtained in any name and form. Article 8 paragraph 2 confirms the statement of the previous article that income in the form of enjoyment is income tax withheld by the employer and income tax borne by the government.
- **Gross Method:** The gross method is a tax deduction method carried out by the employer by deducting Article 21 Income Tax directly from the salaries of its employees. In this method, Article 21 Income Tax is borne by the employee. This method is usually used in start-up companies.
- **Gross-Up Method:** The gross-up method is a tax deduction method carried out by the employer in which the company provides tax allowances to its employees following the amount of tax that must be paid. In this method, employees receive additional allowances following the amount of Article 21 Income Tax. In the Gross-Up Method, the company provides Article 21 income tax benefits which are formulated in the same amount as the amount of Article 21 Income Tax to be deducted from employees (Setiawan, 2013).

3. Definition of Income Tax Article 21

According to Per Director General of Taxes No.16/PJ/2016 Article 1 paragraph 2 Income Tax, namely Income Tax in connection with work, services, and activities carried out by individual Taxpayers of Domestic Tax Subjects, hereinafter referred to as Income Tax Article 21, is a tax on income in the form of salaries, wages, honorarium, allowances, and other payments in any name and any form in connection with work or position, services, and activities carried out by individual domestic

Tax Subjects, as referred to in Article 21 of the Income Tax Law. . In simple terms, Article 21 Income Tax deducts the income received by the taxpayer in his work. Article 21 Income Tax is a special income tax imposed on Individual Taxpayers (WPOP). (Adityaningsih, et al, 2016). For employees or individuals who are taxpayers and earn income other than income that has been withheld or paid at the end of the tax year, they are required to report an individual annual income tax return on Article 21 Income Tax which has been withheld by the employer, which can be used as a credit for income tax payable. at the end of the year. (Adityaningsih, et al, 2016).

4. Withholding Income Tax Article 21 (PPh Article 21)

(Adityaningsih, et al, 2016) it is stated that the withholding of Article 21 Income Tax, namely individual and corporate taxpayers included in the Permanent Establishment should withhold tax on income related to work, services, and activities.

5. Income Recipients who are objects of PPh 21

According to (Official, Tax Theory and Cases (10th Edition), states that an individual with the status of a domestic tax object who receives or earns income from activities, work, and services including pension recipients is the recipient of income deducted by Article 21 income tax and/or income tax.

The following are the taxpayers of Article 21 Income Tax:

- Employee
- Recipients of severance pay, pensions, or pension beneficiaries
- Experts (Lawyers, architects, accountants, doctors, consultants, notaries, appraisers/actuaries)
- Art worker
- Athlete
- Educator workers (teachers, trainers, lecturers, extension workers, moderators)
- Authors, researchers, translators
- Service providers in all fields such as computer engineering, application systems, telecommunications, electronics, photography, etc.
- Board of commissioners
- Former employee
- Activity participants

C. RESEARCH ELABORATIONS:

This research is a type of grounded research, which is a type of qualitative research that seeks to build a theory based on the data collected and analyzed. According to Martin and Turner, grounded research is defined as research that seeks to inductively find theory using researchers developing theories of a topic and simultaneously basing theory on empirical Based on the identification of the problem above, the formulation of the problem can be expressed is :

1. How to apply tax planning to save the tax burden on corporate income at PT. CAS
2. Why apply tax planning using the Net Method have not been able to save the burden of corporate income tax?
3. What is the amount of employee salary expense if it is calculated using Gross Method and Gross-Up Method?

C.1 RESEARCH METHODS

1. Types Of Research

This research is a type of grounded research, which is a type of qualitative research that seeks to build a theory based on the data collected and analyzed. According to Martin and Turner, grounded research is defined as research that seeks to inductively find theory using researchers developing theories of a topic and simultaneously basing theory on empirical data or observations (Sarosa, 2012). The types and sources of data used are secondary data in the form of Annual SPT data and Article 21 Income Tax Period, 2016, 2017, and 2018.

2. Data Collection Technique

Data collection techniques in the form of literature studies and documentation obtained from book articles, the internet, and agency documents related to the topic of this research. In addition, field studies and interviews were also conducted using face-to-face and direct question and answer from authorized sources at PT CAS, with tax consultants and tax office employees. The data used in this study is the data for the Annual and Periodic Income Tax Returns article 21 of 2016, 2017, and 2018.

3. Data Analysis Technique

The data analysis method is a data collection process that is then interpreted with techniques and efforts to work through the data, organize the data, group it into a unit that can be further

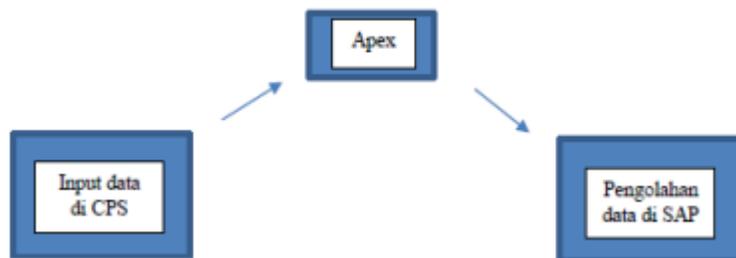
processed, take the essence, seek and find patterns to be important to study and conclude what things can be learned. interpreted to other parties (Bogdan, 1982; Moleong, 2014). The taxonomic analysis method is an analysis of the overall data collected based on a predetermined domain that is the focus of research (Sugiyono, 2017).

D. RESULT OF FINDING

Gross Income, Income Deduction, Taxable Income of PT CAS, and Article 21 Income Tax of PT CAS in conducting tax planning only for permanent employees because for non-permanent employees the taxable income is still below the Non-Taxable Income (PTKP), so there is no tax payable, the number of permanent employees of PT CAS is above a thousand people, so the researcher displays employee data grouped by type of position group and income layer. The following is a table of Gross Income for permanent employees based on employee positions and types of costs for 2016 to 2018:

Article 21 Income Tax Calculation Process

The calculation of income tax article 21 at PT CAS is carried out at the head office using SAP (System Application and Processing), but before entering SAP there is a system developed by a company called CPS to bridge the gap between CPS and SAP there is called the Apex system. description of the system flow in the calculation of PPh 21:



Picture: 21 PPh calculation system flow chart

Transactions are inputted in the CPS system then before the data is withdrawn by SAP it must pass through the Apex system as a medium to bridge between the CPS and SAP systems. After the data is processed by SAP, the value of the tax payable will appear. After the tax payable appears it will automatically be entered into the CPS to be posted to the GL (general ledger). Although the calculation of PPh 21 has been carried out by SAP, reconciliation is still needed between the Human Resources Department (HRD) and Accounting. The reconciliation process is carried out manually between employee cost data per name owned by HRD and general ledger employee cost data per unit owned by Accounting.

Income Tax Planning Article 21

PT CAS to save taxes carries out tax planning practices related to Income Tax Article 21, namely:

1. Payment of health insurance benefits through insurance companies;
2. Payment of pension contributions to pension funds; and
3. The method of withholding Income Tax Article 21.

Barriers to the Implementation of Tax Planning

The corporate policy proposed by the Tax Department to Management in terms of planning income tax article 21 at PT CAS has become the responsibility of the Finance & Accounting Manager and Human Resources Manager in all business units so that whether or not the tax planning method that has become company policy is the responsible business unit. This Article 21 PPh tax planning becomes an obstacle even though there is an adequate system but the implementation of reconciliation between Human Resources and Accounting is still done manually, this causes data inaccuracies in the calculation of PPh 21 in SAP, besides that if the reconciliation is done manually it is feared that late payments and tax reporting, especially in this case PPh article 21, the risk of late payment of a fine of 2% per month and late reporting of IDR 100,000 per mass tax return. Researchers suggest doing a search on the Apex and CPS systems.

Discussion

Interviews were conducted on the management of PT. CAS that tax planning is applied to permanent employees with the following types:

- Payment of Health Insurance Benefits from Guided Insurance Companies to Per-Directorate General of Taxes no. PER-31/PJ./2012 that “payment of insurance benefits or compensation from health, accident, dual life, and scholarship insurance companies” is not included in the definition of income withheld from Article 21 Income Tax. In addition, the implementation of the policy sees from the benefit and cost data that medical expense claims made by class IV employees against the company are greater in value than if they pay premiums to insurance companies, in addition to paying premiums to insurance companies, the costs incurred in the company will be controlled. because it is permanent.
- Payment of Pension Contributions to Pension Funds Referring to Per-Directorate General of Taxes no. PER-31/PJ./2012 that “pension contributions paid to pension funds whose establishment has been approved by the Minister of Finance, and old-age security contributions to Jamsostek organizing bodies paid by the employer” are not included in the definition of income withholding income tax article 21. PT CAS implements a policy for employees of classes III and IV to be registered as participants in the pension fund, while groups I and II are registered 1 year before entering retirement age. The pension fund used is an external pension fund outside the group. The rationale of the corporation for the enactment of employees of class III and IV being registered as participants in the pension fund while groups I and II are registered 1 year before entering retirement age is for employees of class III and IV the pension received is above Rp. 100,000,000,- the applicable rate the final income tax of severance pay for layers of income of Rp100,000,000 up to Rp500,000,000 is 15% while income layers above Rp500,000,000 are 25%. When compared to the pension benefits paid by the pension fund, it is subject to a single rate of 5%.
- Article 21 Withholding Income Tax Method Following the theory presented by Pohan (2013) that there are three methods of withholding Article 21 Income Tax, two of which are used by PT CAS, namely the Net method and the Gross-Up method, the Net method in 2016 was used for class IV employees while class employees I, II and III use the Gross-Up method. In 2017 and 2018 the Net method was used for employees of class III and IV while employees of class I and II used the Gross-Up method. The selection of the method of withholding income tax article 21 is a corporate policy that is adapted to the company's conditions to save tax. The rationale of the corporation for the implementation of a different deduction method from 2016 to 2018 and in each group is the income layer for group IV employees above Rp. 500,000,000, - so that if you choose the gross-up method, you will be subject to an Article 21 income tax rate of 30% because the tax benefits provided by the company are income for employees, whereas if you choose the Net method, the tax borne by the company does not increase income for employees so that a fiscal correction must be made, this fiscal correction causes tax costs incurred by the company to be not recognized fiscally. After all, the costs are not recognized The tax resulted in an increase in the company's taxable income and automatically the tax payable for Corporate Income Tax at a rate of 25% increased as well. This difference in rates is the basis for corporate thinking in applying different deduction methods to types of employee groups.
- Analysis of PT CAS Article 21 PPh Tax Planning with Withholding Method PT CAS' corporate policy in 2016 in terms of PPh 21 tax planning is for employees of positions I, II, and III using the gross-up method, while for employees of position IV using the Net method. The use of the gross-up method for employees of classes I, II, and III means that the company provides income tax benefits article 21 which is formulated in the amount of Article 21 PPh tax to be deducted from employees. So that the value of Article 21 income tax for employees of classes I, II, and III is Rp. 5,174,583,215, - which is an allowance from the company for employees, fiscally, it can be financed by the company because it is following the principle of Taxability Deductibility, the mechanism of which is if the employer gives compensation/ income can be financed (deduction of gross income), then on the employee's side it is income that is subject to tax. For class IV employees, the method of withholding Income Tax Article 21 uses the Net method, in this case, the company bears Income Tax Article 21 for employees, following the principle of Taxability Deductibility, if on the part of the employee the compensation/income is not income, then the employer cannot pay for it (not income). gross income deduction). So that the value of PPh article 21 for class IV employees is Rp. 6,283.972,585, - fiscally it cannot be financed or cannot be a deduction from company income. From the description above, the following analysis will be obtained:
 - a. For employees of classes I, II, and III, the majority of their taxable income are in layers 1 and 2 with tax rates of 5% and 15%.
 - b. Group IV employees are mostly in the 4th layer of taxable income with a tax rate of 30%.
 - c. The gross-up method used in the Article 21 PPh tax planning for employees classes I, II, and III is appropriate because with this method the tax benefits provided by the company will become the object of Article 21 income tax so that the applicable rate is Article 17 of Law no. 36/2008, the tax rate will be lower in layers 1, 2 and 3 of taxable income, namely 5%, 15%, and 25%, compared to using the Net method, the employee tax borne by the company cannot reduce the company's income so that the company will pay 25% more tax because it will become the object of Corporate Income Tax with a single rate of 25%. The difference in rates between PPh article 21 and the corporate income tax is used by the company as tax planning.
 - d. The net method used in planning PPh article 21 for employees class IV is appropriate because by using

this method the employee tax borne by the company does not become the object of PPh article 21 but will become the object of corporate income tax, if it becomes the object of PPh 21 it will be subject to the 4th layer tariff, namely by 30%, while if it becomes the object of corporate income tax, it will be subject to a single rate of 25%, so there is a tax savings of 5% from the difference in the rate of Article 21 PPh with Corporate Income Tax. The corporate policy in 2017 and 2018 in terms of tax planning for PPh 21 is for employees in positions I and II using the gross-up method, while for employees in position groups III and IV using the Net method. The value of PPh article 21 in 2017 and 2018 for employees of classes I and II amounting to Rp.2,292,089,107,- and Rp.2,419,676,641, respectively, is a tax allowance for employees of the company so the allowance for PPh article 21 will increase income. Employees who, of course, comply with the Taxability Deductibility principle of Article 21 income tax allowances can become a cost for the company and are objects of Article 21 income tax which has 4 layers of tariffs, namely 5%, 15%, 25%, and 30%. While the value of PPh article 21 in 2017 and 2018 for employees of class III and IV TAX PLANNING ANALYSIS Lasmini, Astriani, Rachpriliani Universitas Buana Perjuangan Karawang AKBIS|125 amounted to Rp6,879,864,805,- and Rp7,019,334,520, respectively. is a tax borne by the company, so that following the principle of Taxability Deductibility, the tax borne by the company cannot be a deduction for income for the company, in this case, the tax borne by the company is not an object of PPh article 21 but is an object of corporate income tax which has a single rate that is 25%.

From the description above, the following analysis will be obtained:

- For employees of classes I and II, the majority of their taxable income is in layers 1 and 2 with tax rates of 5% and 15%.
- Employees of class III and IV have no taxable income that is in the 1st layer so the tax rates start from the 2nd layer to the 4th layer, namely 15%, 25%, and 30%, for the 4th layer taxable income in groups III and IV this is the majority.
- The gross-up method used in the planning of PPh Article 21 tax for employees of classes I and II is appropriate because with this method the tax benefits provided by the company will become the object of the Article 21 PPh tax so that the applicable rate is Article 17 of Law no. 36/2008, the tax rate will be lower in layers 1, 2 and 3 of taxable income, namely 5%, 15%, and 25%, compared to using the Net method, the employee tax borne by the company cannot reduce the company's income so that

the company will pay 25% more tax because it will become the object of Corporate Income Tax with a single rate of 25%. The difference in rates between PPh article 21 and the corporate income tax is used by the company as tax planning.

- The net method used in planning PPh Article 21 for employees class III and IV is appropriate because by using this method, the employee tax borne by the company will not become the object of PPh article 21 but will become the object of corporate income tax if it becomes the object of PPh 21, it will be subject to layer rates. 4th, which is 30%, while if it becomes the object of Corporate Income Tax, it will be subject to a single rate of 25%, so there is a tax savings of 5% from the difference in the rate of Article 21 PPh with Corporate Income Tax.
- Article 21 PPh planning based on the PPh Law can be done in 2 (two) ways, namely (Pohan, 2013):
 1. Mechanism of Taxability and Deductibility of Income Tax object article 21, and
 2. Withholding Methode
- The legal basis for the application of Article 21 PPh planning is in Government Regulation Article 4 letter d number 138 of 2000. This study seeks the legality of the implementation of tax planning by conducting interviews with tax officials who have a background in auditing and consulting, while the opinion is "In general, the two methods This is not contrary to the tax regulations. However, in implementing the two methods for tax planning, it may be done technically, including violating tax regulations, for example by making an incorrect supporting document or making an incorrect agreement".

PT CAS's corporate policy in planning PPh article 21 tax from 2016 to 2018 is different in the use of the withholding method for position groups, this is due to the condition of the company as a group. The difference in the use of the withholding method based on the type of position group according to the researcher is not effective, it should be TAX PLANNING ANALYSIS Lasmini, Astriani, Rachpriliani Universitas Buana Perjuangan Karawang AKBIS|126 the difference in the use of the withholding method based on layers of income because in the highest position group, namely group IV, there are still employees whose taxable income is are in the 2nd and 3rd layers. The following is the analysis:

- a. In 2016. The taxable income of class I, II, and III employees in the 4th layer is Rp. 6,861,907,066, with a tax value of Rp. 2,058,572,120, using a 30% rate, whereas it would be more profitable to use the Corporate Income Tax rate, namely 25% so that employees of classes I, II, and III who are in the 4th layer should use the Net method, with the Net method the income tax

planning article 21 will be more optimal. The taxable income of class IV employees in the 2nd layer is Rp. 296,727.200,- with a tax value of Rp. 44,509,080,- using a 15% rate, but because employees who are in this layer use the net method, the tax rate imposed is 25%, so it should be for employees of class IV who are in this layer. The second one should use the gross-up method so that it is subject to a 15% tariff. Meanwhile, the taxable income of class IV employees who are in the 3rd layer using either the gross-up method or the net method has no effect because the tax rate is the same, namely 25%.

- b. In 2017. The taxable income of employees class III and IV in the second layer is Rp. 6,396,482,400,- with a tax value of Rp. 959,472,360, - using a 15% rate, but for employees who are in this layer using the net method so that the tax rate imposed is 25%, so that class IV employees who are in the 2nd layer should use the gross-up method so that they are subject to a 15% rate. Meanwhile, the taxable income of class IV employees who are in the 3rd layer using either the gross-up method or the net method has no effect because the tax rate is the same, namely 25%.
- c. In 2018. The taxable income of class III and IV employees in the second layer is Rp. 6,291,191,134,- with a tax value of Rp. 943,678,670,- using a 15% rate, but for employees who are in this layer using the net method so that the tax rate imposed is 25%, so that class IV employees who are in the 2nd layer should use the gross-up method so that they are subject to a 15% rate. Meanwhile, the taxable income of class III and IV employees as well as employees of class I and II who are in the 3rd layer using either the gross-up method or the net method has no effect because the tax rate is the same, namely 25%.

E. CONCLUSION

The results of the research and discussion above conclude that Article 21 Income Tax Planning that has been carried out by PT CAS has 3 (three) techniques, namely:

1. Payment of health insurance benefits from the Insurance company. PT CAS in providing health facilities to employees, especially TAX PLANNING ANALYSIS Lasmini, Astriani, Rachpriliani Universitas Buana

Perjuangan Karawang AKBIS|127 employees group IV is health insurance. After we conducted an interview with the Management of the cost and benefits division within the Human Resources Department, the background for the adoption of this corporate policy regarding health insurance was that after a group analysis, the cost of treatment for group IV employees was higher than if the employee was included as a participant in health insurance. because the majority of group IV employees seek treatment abroad. Medical expenses and health insurance premiums are objects of Article 21 income tax so that management in choosing health insurance as an effort to save taxes is correct.

2. Payment of pensions to pension funds. PT CAS applies a policy for employees of class III and IV to be registered as participants in the pension fund, while groups I and II are registered 1 (one) year before entering retirement age. The pension fund used is an external pension fund outside the group. This corporate policy aims to save tax because pension benefits paid by pension funds are subject to a single rate of 5%, whereas if the company pays the pension for its employees, it will be subject to PPh rates on severance pay according to income layers starting at 0%, 5%, 15%, and 25%.
3. The method of withholding PPh Article 21. PT CAS to save taxes uses 2 (two) methods of withholding PPh article 21, namely the Net method and the Gross-Up method, the use of the withholding method is applied differently between employees of classes I, II, III, and IV each year, the application of different cutting methods depending on the condition of the company as a group. The method of withholding income tax article 21 because it is closely related to corporate income tax, the company's fiscal condition must also be considered, if the company is losing money, management does not use the gross-up method, while if the company is fiscally profitable, the gross-up method will result in tax savings due to the difference in rates between Corporate Income Tax at the rate of Article 21 PPh.
4. PT CAS in implementing tax planning related to PPh article 21 is following tax regulations, this is following Government Regulation article 4 letter d number 138 of 2000 as well as the results of interviews with researchers with tax officials with the examiner and consulting backgrounds as well as with consultants "MI" tax that In general, the method of withholding income tax article 21 and the taxability and deductibility mechanism is not contrary to tax regulations. Article 21 PPh tax planning carried out by PT CAS based on the results of the optimization analysis carried out are:
 - a. The payment of health insurance benefits from the insurance company applied by PT CAS to class IV employees is appropriate and optimal because it can reduce the costs that are the object of the Article 21 income tax, namely employee medical expenses, if this class IV employee is not provided with health insurance facilities, the treatment costs will be reduced. This is because of the tendency of employees in group IV to seek treatment abroad and

this does not violate company regulations that give rights to group IV employees to seek treatment abroad, this right is not granted to other groups of employees, due to high medical costs, the cost of income tax article 21 would be high too.

- b. Payment of pensions to pension funds carried out by PT CAS for all employees is the right and optimal effort from the company to reduce tax costs, namely by taking advantage of the difference in rates between pensions paid by the company and TAX PLANNING ANALYSIS Lasmini, Astriani, Rachpriliani Buana Perjuangan Karawang AKBIS|128 pension funds.
- c. The PPh 21 withholding method applied by PT CAS, namely the Net method and the Gross-Up method, is less than optimal because in its application the company is only based on position class if it wants to get optimal tax costs in its application based on the layer of employee taxable income.

F. Suggestion

With the results of the research that have been obtained, it is hoped that the results of this analysis can be useful for all parties as reference material for academics. For future research, it is hoped that this research will be able to expand and develop again. Suggestions for this research are that 3 (three) tax planning techniques that have been carried out by the company can continue to be carried out while taking into account the existing obstacles and other forms of tax planning should always be sought so that the company can optimally make tax savings. Other forms of tax planning that will be carried out by the company must not conflict with the applicable laws and regulations. The root of the problem must be found and then a solution so that manual reconciliation does not occur again, because this causes inaccuracies in the data in the calculation of PPh 21 in SAP, in addition, if the reconciliation is done manually, it is feared that there will be delays in payment and tax reporting, especially in this case PPh article 21, the risk of late payment of a fine of 2% per month and late reporting of Rp. 100,000,- per mass tax return. Researchers suggest searching for the Apex and CPS systems. Tax planning is not only for PPh article 21 but can be done on other types of taxes such as VAT, PPh article 23, and PPh article 22, it takes individuals who can understand taxation and accounting so that they can provide suggestions to management. For this reason, the researcher recommends that management in business units or subsidiaries be given training or workshops regularly to update tax knowledge.

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AUTHORS

First Author – CHAIRANI NOER - BC211120174

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Effect Of Leadership Styles On Employees' Motivation: A Case Of Muhoroni Sugar Company, Kisumu County, Kenya.

Nyang'or, Benson Otieno
Mwamba, Godfrey
Kibanga, Jane

A RESEARCH THESIS SUBMITTED TO THE SCHOOL OF BUSINESS AND ECONOMICS IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE CONFERMENT OF THE DEGREE OF MASTER OF ARTS IN ORGANIZATIONAL LEADERSHIP, AFRICA INTERNATIONAL UNIVERSITY

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Abstract- The study sought to examine the effect of leadership styles on employee motivation-a case of Muhoroni Sugar Company Limited in Kisumu County, Kenya. Specifically, the study aimed to determine how directive leadership style affect employee motivation, assess how participative leadership style affect employee motivation, establish how transformational leadership style affect employee motivation, and examine how transactional leadership style affect employee motivation of Muhoroni Sugar Company. Situational Leadership theories and Full-Range Leadership models underpinned the investigation. Research adopted a descriptive research methodology to evaluate the study variables. A descriptive survey design, aided by self-administered questionnaires and a 5-factor Likert scale were used to collect primary data and eventual analysis of the study. The target population was 785 employees. 102 respondents, representing 13% of target population were selected for investigation. The questions were evaluated using quantitative analysis techniques, specifically Statistical Package for Social Sciences (SPSS). Regression results were summarized using the Regression model: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$. The findings established that directive leadership style had a negative effect on employees' motivation. Therefore, directive leadership style is likely to worsen performance problem at Muhoroni Sugar Company. Participative leadership, transformational leadership and transactional leadership styles had positive effect on employee's motivation. Consequently, participative leadership, transformational leadership, and transactional leadership styles are likely to improve levels of employee motivation at Muhoroni Sugar Company. Further investigation may be needed to establish reasons for the negative effect of directive leadership style on employees' motivation. Findings will contribute to the literature on sustainable leadership in the sugar industry. Also, outcomes may enable aligning human resource policy.

Index Terms- Leadership styles, Directive, Participative, Transformational, Transactional, Employees' Motivation

I. INTRODUCTION

Background of the Study

Leadership style refers to a method or behavior a leader adopts to provide direction, implement plans, and motivate people to improve organization performance (Kotter, 2001). Major leadership styles include directive, participative, delegative (laissez-faire), transactional and transformational models (Cherry, 2017). A motivated team is critical in ensuring an organizational leader achieves defined objectives since employees create value for society, deliver on performance benchmarks thus ensuring stability and survival of the firm (Nayal, Pandey & Paul, 2021).

Extensive studies have been carried out on effects of leadership styles on employee motivation in the sugar industry in diverse regions, geographical and cultural contexts. Inquiries in Thailand (Srichaipanya, Praditbatuga & Treetipbut, 2020), Indonesia (Soedarto & Sumarsono, 2017), South Africa (Dlamini, Prochess & Singh.,2020), Swaziland (Knowledge, 2016) and Kenya (Wanjala, Awuor & Ngala, 2021) indicate a relationship between leadership styles and motivation.

The Food and Agriculture Organization paints a very favorable outlook for the global sugar industry, and in particular forecasting a growth in Africa's sugar output projected to increase by thirty six percent (36%) by the end of 2027 over the preceding decade (OECD-FAO Report, 2018-2027). According to the Common Market for East and Southern Africa (COMESA,2019), Africa accounted for six percent (6%) of the total global sugar production in 2018, with COMESA member states accounting for fifty two percent (52%) at 5,288,456 MT of the total African sugar production of 10,078,61 MT. Despite the above favorable industry performance, performance of Kenya's sugar sector is dismal.

The performance challenges are attributable to low motivation of employees, among other factors (Wachilonga, 2020; Kegoro, Akoyo & Otieno, 2020; Mbithe, Mwabu & Awiti, 2017).

Leadership plays a critical role in empowering people to build sustainable societies by unlocking latent potentials and motivating them to better respond to change. It is imperative for leaders to adapt an organizational style, beneficial to motivational needs of followers, thus enhancing performance (Chiamaka, Stephen & Collins, 2020).

No specific study has been undertaken at Muhoroni Sugar Company focusing on the study variables. A study was therefore necessary to establish the effect of leadership styles on employee motivation. Specifically, to establish effects of directive leadership style, participative leadership style, transformational leadership style and finally transactional leadership on employees of Muhoroni Sugar Company.

Profile of Muhoroni Sugar Company

Muhoroni Sugar Company Limited located approximately 70 km from Kisumu City is engaged in sugarcane growing, processing, and marketing of processed sugar. According to Musco, (2022), Eighty-two-point seven eight percent (82.78%) of the firm's shares are owned by the Kenya Government, while UKETA Limited and other private shareholders control the remaining seventeen-point twenty-two percent (17.22%). Owing to performance challenges, the company was placed under protective receivership in 2001 with the main objective of preserving the assets while restructuring the Balance Sheet

Statement of the Problem

Kenya's sugar sector is performing dismally in an industry that is thriving at regional and global levels. The poor sectoral performance is attributable to employee motivation among other factors (Kegoro, Akoyo & Otieno, 2020). Lawrence (2009) established that low employees' motivation and demoralized staff explained some of the problems in Kenya's sugar industry, and specifically at Mumias Sugar Company. The performance problems caused Muhoroni Sugar Company to be placed under protective receivership. This exacerbated job insecurity to already demotivated employees. Erosion of employee motivation negatively influences performance. Extensive research has been carried out globally, regionally, and locally establishing a relationship between leadership styles and employee motivation. Findings reveal that the influence of leadership style on employee motivation may be positive or negative (Mwaisaka, K'Aol & Ouma, 2019).

However, since no evidence was found of specific investigation on the variables of this study on Muhoroni Sugar company, this inquiry sought to investigate the effect of directive, participative, transformational, and transactional leadership styles on employee motivation of Muhoroni Sugar Company in Kisumu County, Kenya.

Objectives of the Study

The General Objective

The study sought to evaluate the effect of leadership styles on employee motivation: A case of Muhoroni Sugar Company, Kisumu County, Kenya.

The Specific Objectives

- i) To determine how directive leadership style affect employee motivation of Muhoroni Sugar Company, Kisumu County, Kenya.
- ii) To assess how participative leadership style affect employee motivation of Muhoroni Sugar Company, Kisumu County, Kenya.
- iii) To establish how transformational leadership style affect employee motivation of Muhoroni Sugar Company, Kisumu County, Kenya.
- iv) To examine how transactional leadership style affect employee motivation of Muhoroni Sugar Company, Kisumu County, Kenya.

Research Questions

- i) How does directive leadership style affect employee motivation of Muhoroni Sugar Company, Kisumu County, Kenya?
- ii) How does participative leadership style affect employee motivation of Muhoroni Sugar Company, Kisumu County, Kenya?
- iii) How does transformational leadership style affect employee motivation of Muhoroni Sugar Company, Kisumu County, Kenya?
- iv) How does transactional leadership style affect employee motivation of Muhoroni Sugar Company, Kisumu County, Kenya?
- v)

Justification of the Study

The sugarcane industry in Kenya accounts for approximately fifteen percent (15%) of Agricultural Gross Domestic Product (KSB, 2014). Relatively, this requires establishing sustainable leadership as envisaged by the Government of Kenya and the United Nations equity debate, enshrined in 2015 blue-print – “people, planet and prosperity” (Kippra, 2018; UNOSD, 2015). In addition, improving motivation of employees through specific leadership styles will assist in aligning human resource policy towards future sustainability of the company.

Scope of the Study

The scope of study was Muhoroni Sugar Company Limited, located approximately 60 km from Kisumu City, within Kisumu County in the Western region of Kenya.

Significance of the Study

Findings of this inquiry will inform applicable leadership styles which are organization-specific for motivating employees in delivering performance objectives in the sugar industry.

Limitations/ Delimitation of the Study

Limitations

Establishing accurate measures of effect of leadership styles on motivation would require extended observation. Periodically, fear of sharing views about an employer tend to undermine participation. Consequently, respondents tended to be guarded regarding the extent of information they could disclose, without attracting executive sanctions.

Delimitation of the Study

Having obtained the Research Permit from the Kenya government (NACOSTI), and considering the firm is quasi-government owned, the researcher channeled the same through the relevant Government pipeline. With approval letters from the Kisumu County Commissioner and Kisumu Director of Education, the researcher received cooperation and support from the company management and staff to collect data.

II. LITERATURE REVIEW

Theoretical Review

This study was guided by the Situational (Contingency), Behavioral, and Full Range theories of leadership as well as theories of employee motivation. The theoretical framework considered the Contingency model originally presented by Fred Fiedler (1967) and the Situational Leadership theory as postulated by Blanchard & Hersey (1970). The Situational model was considered applicable in the sugar sector in that a leader can study

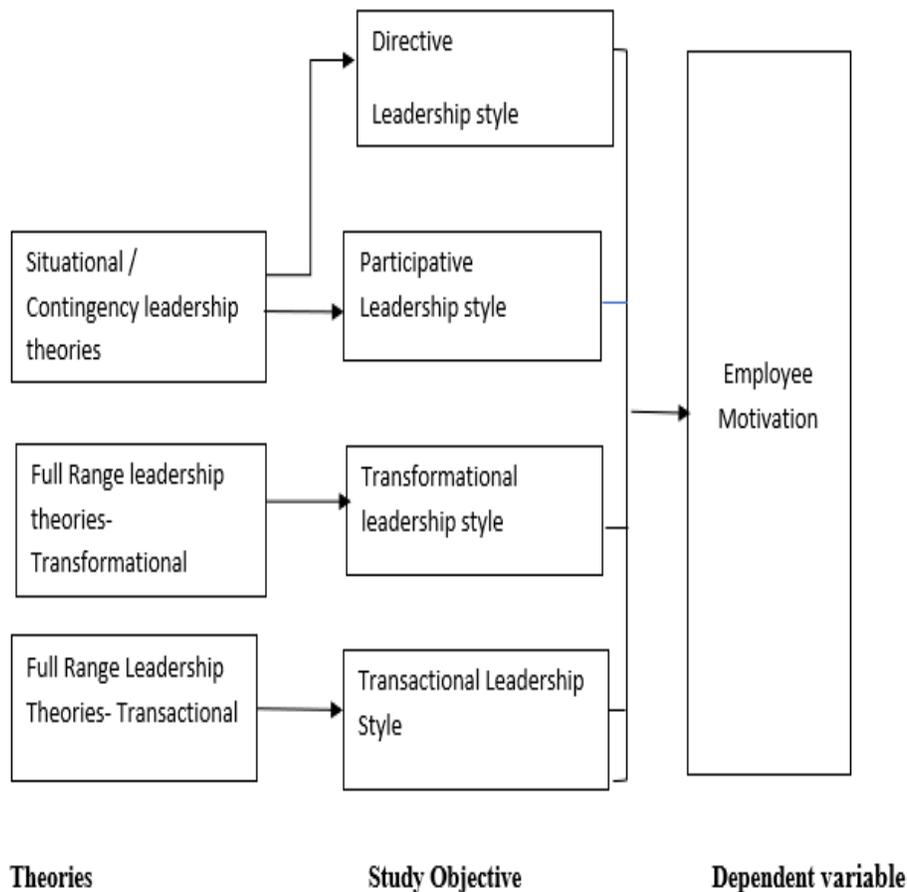
the situation and adapt to a leadership style that will lead to greater effort and produce better performance.

In addition, review integrated behavioral leadership studies by Kurt Lewin (1939), Full Range leadership models by Burns (1978) and subsequent studies on transformational and transactional leadership styles by Bass & Avolio (1991). The Full Range Leadership theory was applicable to this study since the leader can stimulate positive change to motivate employees by either transactional or transformational styles.

Theories of employee motivation also underpinned this inquiry. The review considered Maslow’s hierarchy of needs, the two-factor theory (Herzberg, 1959), and theory X and Y (McGregor, 1960). The usefulness of theories of Employee Motivation in this study was that they enabled a scientific basis for measuring and evaluating the study variables. This study focused on effects of leadership styles on employee motivation, which are best explained by theories of motivation.

The following theoretical framework summarizes the theoretical review:

Figure 2.1 Theoretical Framework



Empirical Review

Directive Leadership Style and Employee Motivation

Mwaisaka, K'Aol & Ouma (2019) investigated the influence of directive and supportive leadership styles on employee job satisfaction in commercial banks in Kenya. Study established that directive leadership style positively and significantly affect job satisfaction and enhances employee motivation. However, the study focused on middle level managers in the banking sector, where performance is task-specific and may not be apply to Muhuroni sugar Company.

Directive leaders set clear performance standards and procedures, provide strict guidance on the roles, and expected tasks and provide clear instructions (Jones & George, 2011, as cited by Mwaisaka, K'Aol & Ouma, 2019).

Similarly, an inquiry was conducted on effects of leadership styles on employee motivation in auditing companies in Ho Chi Minh City of Vietnam (Khuong & Hoang, 2015, as cited by Amah, 2017). Findings established a positive correlation of directive (autocratic) leadership style on employee motivation. Audit is task-oriented, and staff work with strict deadlines. This may explain why employees find motivation in leadership that set clear performance standards on tasks with clear instructions on performance expectations.

Li, Liu & Luo (2018) recommend that by adopting more directive leadership behavior in situations where a task deadline is approaching, the leader is likely to improve team efficiency. Elsewhere, Chukwusa (2018), maintains that leaders should exercise restraint in applying directive or autocratic style because it apparently discourages creative problem-solving in the workplace.

It is therefore imperative that a leader develops self-awareness that informs when this leadership style could prove disadvantageous in achieving desired motivational outcomes. Mwaisaka, K'Aol & Ouma (2019) prefer directive leadership in situations where employees require guidance to effectively accomplish goals and enhance their job satisfaction and motivation levels.

Transformational Leadership Style and Employee Motivation

Islam, Karunarathne & Tatiane (2019) reviewed Impact of Leadership Styles on employee motivation: a case study of Shahjalal Islamic Bank Limited in Bangladesh. Findings established transformational leadership positively correlates to employee motivation. According to Al-Haj (2017), transformational leadership strongly influenced employee motivation in Qatar organizations. The transformational leader is supportive and demonstrates individualized consideration.

Hadi & Tola (2019) explain that the employee appreciates the personal caring style of the transformational leader. They add that such a leader inspires positive energy in the employee through charm and charisma. This stimulates innovation and creativity in the workplace. Finally, Hadi & Tola (2019) conclude that charismatic leaders inspire work motivation and can stimulate rational problem solving (intellectual skill) through individualization of subordinates.

Intellectually stimulating leadership generates significant influence on team innovativeness. Moreover, by role-modeling his

ideals and beliefs and casting a vision for the desired future, the leader can sustain increased effort over time (Khan, 2017). Because of the positive energy, the employee is motivated and intrinsically increases effort and performance output. Findings of an investigation of transformational leadership in South Korea prove aspects of transformational leadership style encourage innovation. Specifically providing intellectual stimulation, inspiring followers with appealing vision and setting higher expectations help to maintain its effectiveness in organization settings (Gemedda & Lee, 2020)

Alghazo & Al-Anazi (2016) in a study conducted in Saudi Arabia on impact of leadership on employee motivation confirmed transformational leadership positively impacted employee motivation. Srichaipanya, Praditbatuga, Treetipbut (2020) established individualized consideration significantly influenced employee engagement in a sugar manufacturing company in Thailand. Uddin (2019) affirmed transformational leadership certainly impacts both intrinsic and extrinsic motivation and recommends creating a work environment that allows employees to flourish. This contributes to improved output.

Participative Leadership and Employee Motivation

Rahbi, Khalid & Khan (2017) observed a strong relationship between participative leadership style and employee motivation. Specifically, Rahbi, Khalid & Khan indicated shared decision-making energized teams to increase effort. Also, Rahbi, Khalid & Khan underscore the need for a leader to actively encourage and support the team to realize desired goals. Efficiency and potential of a leader significantly impact the motivational levels of the team.

Aunga & Masare (2017) inquired the effects of leadership styles on primary school teachers in the Arusha region of Tanzania. Results revealed sharing decision-making with teachers increased motivation and improved performance. Making major decisions without stakeholder participation tends to be demoralizing. This vents out in activism and protests evident in trade unionism.

According to Wilson (2020), benefits of participative style include encouraging involvement, variety of opinions, inclusivity, dedication, synergy, motivation, and fulfillment. However, it is possible culture could be influencing findings as demonstrated by Al-Sada, Al-Esmael, & Faisal (2017) in another study related to the educational sector in Qatar, which established that a supportive culture significantly influenced job satisfaction. Similarly, supportive culture invigorated organizational commitment, job satisfaction and work motivation.

However, a supportive cultural research context of Qatar and sense of faith-respecting community, probably impact work ethics. Likewise, religious philosophy could necessitate closeness and self-efficacy (Villani, Sorgente, Lanello & Antonietti, 2019). Nevertheless, unique moments exclude shared responsibility for decisions. For example, in crisis situations leaders need to assume control to forestall indecision. Besides, organizations with consistent company processes and quality procedures, must habitually maintain strategic focus. These discourage participative style ((Pirtle, 2019).

Transactional Leadership and Employee Motivation

Transactional leadership rewards or disciplines a follower, depending on performance metrics (Avolio, Walumbwa and Weber, 2009, as cited by Khan, 2017). The relationship between the employee and the leader is perceived as an exchange of values. Transactional leaders reinforce constructive employee behavior by offering “contingent rewards”. Conversely, they apply “management by exception” to deter undesirable employee behavior (Gemeda & Lee, 2020). The leader also places strong emphasis on standard operating procedures and rules in this exchange process.

Almer, Djamhur & Iqbal (2017) considered the effect of leadership style on employee motivation and performance in Russian financial institutions. Findings established a strong relationship of transactional leadership style on employee motivation. According to Sougui, Bon, Mahamat & Hassan (2016), transactional leaders attempt to meet the current needs of the subordinates through bargaining and exchanging value. The study, however, points out that transactional leaders expect followers to attain agreed-upon goals without encouraging personal development or initiative to grow into leadership roles. Lee (2020) asserts that transactional leadership style is suitable in the context of performance contracting. Lee explains that transactional leadership style can enhance the motivational effect of performance management because role clarity is greatly emphasized in public sector performance. Gemeda & Lee (2020) reasoned that whereas transactional leadership style positively affects motivation, organizational leaders should apply a mix of both transactional and transformational leadership styles rather than adopting a single style. It is therefore incumbent upon the leader to consider the situation and the assigned task as explained in the situational leadership theory.

Purwanto, Bernarto, Asbari, Wijayanti & Hyun (2020) documented strong influence of transactional leadership on motivation of employees in healthcare in Java, Indonesia.

Conceptual Framework

Figure 2.2 presents a diagrammatic illustration of the relationship between the independent variables under investigation, namely, directive leadership, participative leadership, transformational and transactional leadership styles, and their influence on employee motivation, being the dependent variable.

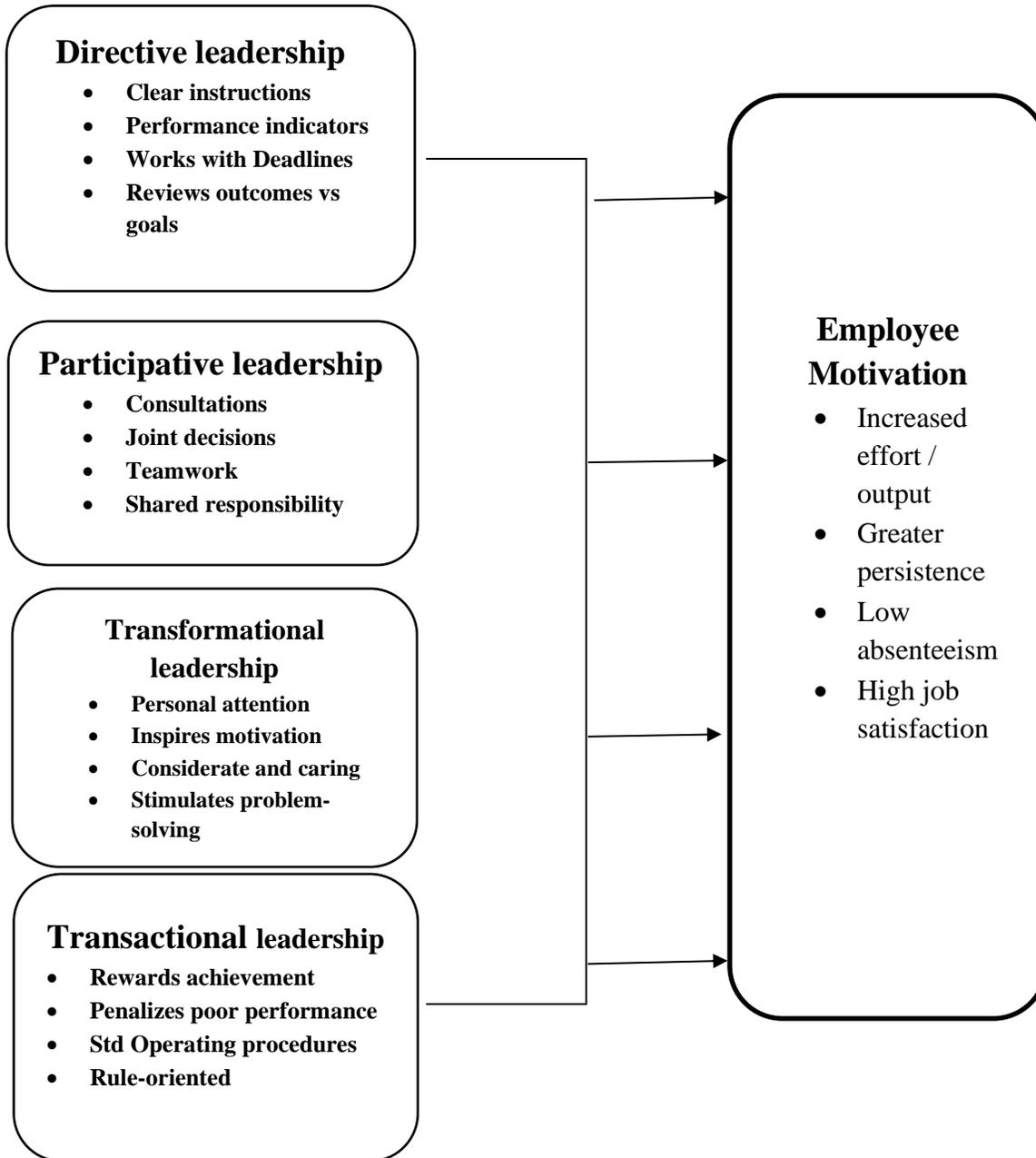


Figure 2.2 Conceptual Framework

III. ANALYSIS OF STUDY FINDINGS

Introduction

This chapter presents the analysis of study findings.

Regression Analysis

Regression analysis was conducted to determine the effect of independent variables (Directive Leadership Style, Participative Leadership Style, Transformational Leadership Style, and Transactional Leadership Style) on the dependent variable (Employee Motivation). The results of the regression analysis are presented in Tables 4.8, 4.9 and 4.10.

Table 4.8
Regression Model Summary

Model	R	Adjusted R Square	Std. Error of the Estimate
1	.556 ^a	.310	.73799

a. Predictors: (Constant), Transactional leadership style, Participative leadership style, Transformational leadership style, Directive Leadership style

The results in Table 4.8 show that the R square is 0.310 which implies that transactional leadership style, participative leadership style, transformational leadership style and directive leadership style explain 31% of employee motivation while the remaining 69% is explained by factors not covered in this research. The 0.556 R value shows that there is a strong relationship between employee motivation and the predictor variables (Transactional leadership style, Participative leadership

style, Transformational leadership style and Directive Leadership style).

The analysis of variance (ANOVA) was conducted to determine the strength of the overall regression model. The results are as shown in Table 4.9

Table 4.9
ANOVA Results

ANOVA	Sum of Squares	Df	Mean Square	F	Sig.
Regression	23.211	4	5.803	10.655	.000 ^b
Residual	51.740	95	.545		
Total	74.952	99			

a. Dependent Variable: Employee Motivation

b. Predictors: (Constant), Transactional leadership style, Participative leadership style, Transformational leadership style, Directive Leadership style

The analysis reflects an F-value of 10.655 with a p-value of 0.000 indicating that the overall regression model is significant at 10% significance level hence the joint of the independent variables (Transactional leadership style, Participative leadership style, Transformational leadership style and Directive Leadership style) is significant in predicting employee motivation. This indicates that the variations in the dependent variable can be explained by the predictors. Further evaluation of the regression coefficients was conducted to determine the strength and direction of relationships. The results are presented in Table 4.10.

Table 4.10
Regression Coefficient Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.	90.0% Confidence Interval for B	
	β	Std. Error	Beta	t		Lower Bound	Upper Bound
(Constant)	1.046	.525		1.992	.049	.174	1.919
Directive leadership style	-.004	.149	-.003	-.027	.979	-.252	.244
Participative leadership style	.116	.136	.096	.858	.393	-.109	.341
Transformational leadership style	.177	.114	.179	1.548	.125	-.013	.367
Transactional leadership style	.475	.118	.396	4.007	.000	.278	.671

a. Dependent Variable: Employee Motivation

Table 4.10 presents the regression results on the effect of individual predictor variables on the dependent variable. The

coefficients indicate the increase in the value of employee motivation for each unit change in the predictor variables. The

four predictor variables namely, transactional leadership style, participative leadership style, transformational leadership style and directive leadership style are the factors that predict employee motivation. The evaluation generated the following regression model:

The linear regression model; $Y = 1.046 - 0.004X_1 + 0.116X_2 + 0.177X_3 + 0.475X_4 + \varepsilon$

Where, Y= Employee Motivation.

X_1 = Directive Leadership style, X_2 = Participative leadership Style, X_3 = Transformational leadership Style and X_4 = Transactional leadership Style.

1.046= Constant, -0.004= Effect of Directive Leadership style on Employee Motivation, 0.116= Effect of Participative leadership Style on Employee Motivation, 0.117= Effect of Transformational leadership Style on Employee Motivation and 0.475= Effect of Transactional leadership Style on Employee Motivation.

According to the regression model, holding all other variables (transactional leadership style, participative leadership style, transformational leadership style and directive leadership style) constant at zero, predicts that employee motivation would be 1.046. The results show that directive leadership style had a negative effect on employee motivation with a p value of 0.979. This finding implies that a unit change in directive leadership style decreases level of employee motivation by 0.004 units when holding other factors constant. Therefore, directive leadership style is likely to worsen performance problem at Muhoroni Sugar company.

Additionally, the regression model reveals that participative leadership style had a positive effect on employee motivation with a p value of 0.393. This result implies that a unit change in participative leadership style increases level of employee motivation by 0.116 units when holding other factors constant. Therefore, participative leadership style is likely to improve the level of performance of employees of Muhoroni Sugar Company.

The results further show that transformational leadership style had a positive effect on employee motivation with a p value of 0.125. This result implies that a unit change in transformational leadership style increases level of employee motivation by 0.177 units when holding other factors constant. Consequently, transformational leadership style is likely to improve level of performance by employees of Muhoroni Sugar Company.

Finally, the findings show that transactional leadership style has a significant positive effect on employee motivation of Muhoroni Sugar Company with p value of 0.000. This result implies that a unit change in transformational leadership style increases level of employee motivation by 0.475 units when holding other factors constant. Therefore, transactional leadership style is likely to improve level of performance by employees of Muhoroni Sugar Company.

Based on the regression analysis, the researcher concluded that directive leadership style significantly affects employees' motivation at Muhoroni Sugar Company ($\beta = -0.004$, p-value = 0.979), participative leadership style significantly affects employees' motivation at Muhoroni Sugar Company ($\beta = 0.116$, p-value = 0.393), transformational leadership style significantly

affects employees' motivation at Muhoroni Sugar Company ($\beta = 0.177$, p-value = 0.125) and that transactional leadership style affect employees' motivation at Muhoroni Sugar Company ($\beta = 0.475$, p-value = 0.000).

Summary of the Findings

The research sought to address four objectives and answer four related questions. This summary presents the findings with the aim of addressing the above objectives and questions.

- i). Objective one sought to determine how directive leadership style affect employees' motivation of Muhoroni Sugar Company. Regression analysis established that directive leadership style negatively affects employees' motivation at Muhoroni Sugar Company ($\beta = -0.004$, p-value = 0.979). Therefore, directive leadership style is likely to worsen performance problem at Muhoroni Sugar company.
- ii). Objective two aimed to assess how participative leadership style affect employees' motivation of Muhoroni Sugar Company, Kisumu County, Kenya. Regression analysis on the data determined that participative leadership style significantly affects employees' motivation at Muhoroni Sugar Company ($\beta = 0.116$, p-value = 0.393). Therefore, participative leadership style is likely to improve the level of employee performance at Muhoroni Sugar company.
- iii). Objective three sought establish how transformational leadership style affect employees' motivation of Muhoroni Sugar Company, Kisumu County, Kenya. Regression analysis on the data concluded that transformational leadership style significantly affects employees' motivation at Muhoroni Sugar Company ($\beta = 0.177$, p-value = 0.125). Therefore, transformational leadership style is likely to improve the level of employee performance at Muhoroni Sugar company.
- iv). The fourth objective was to examine how transactional leadership style affect employees' motivation of Muhoroni Sugar Company, Kisumu County, Kenya. Regression results established that transactional leadership style significantly affects employees' motivation at Muhoroni Sugar Company ($\beta = 0.475$, p-value = 0.000). Consequently, transactional leadership style is likely to improve the level of employee performance at Muhoroni Sugar company.

Overall, the regression analysis, with R square = 0.310 established that at least 31% of factors that affect employee's motivation at Muhoroni Sugar Company may be explained by leadership styles.

The research deduced the following linear regression model summarizing the relationship between the predictor variables and employees' motivation:

$Y = 1.046 - 0.004X_1 + 0.116X_2 + 0.177X_3 + 0.475X_4 + \varepsilon$

Where, Y= Employee Motivation.

X_1 = Directive Leadership style, X_2 = Participative leadership Style, X_3 = Transformational leadership Style and X_4 = Transactional leadership Style.

These findings on participative leadership style, transformational leadership style and transactional leadership styles confirm studies by Aunga, D. A., & Masare, O. (2017); Al-Haj, A. (2017), Alghazo, A. M., & Al-Anazi, M. (2016); Khuong, M. N., & Hoang, D. T. (2015; and Mwaisaka, D.M., K'Aol, G., & Ouma, C. (2019). However, the observation of negative regression in the relationship between directive leadership style and employees' motivation is non-normative. It may point to the unique situation of the organization being in protective receivership and may be a silent protest to orders and strict directions.

IV. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter presents a summary of the study, conclusions, and recommendations from the research conclusions.

Summary

The study sought to investigate the effect of leadership styles on employees' motivation: a case of Muhoroni Sugar Company in Kisumu County, Kenya. It specifically aimed to:

- i) To determine how directive leadership style affect employee motivation of Muhoroni Sugar Company, Kisumu County, Kenya.
- ii) To assess how participative leadership style affect employee motivation of Muhoroni Sugar Company, Kisumu County, Kenya.
- iii) To establish how transformational leadership style affect employee motivation of Muhoroni Sugar Company, Kisumu County, Kenya.

Conclusions

Research focused on investigating the effect of leadership styles on employees' motivation: a case of Muhoroni Sugar Company in Kisumu County, Kenya.

The study determined that 31% of the employee motivation is attributable to leadership styles while the remaining 69% can be explained by other variables not covered by this research.

Research Questions

The research aimed at answering the following research questions:

- i. How does directive leadership style affect employee's motivation of Muhoroni Sugar Company, Kisumu County, Kenya?
- ii. How does the participative leadership style affect employee motivation of Muhoroni Sugar Company, Kisumu County, Kenya?
- iii. How does transformational leadership style affect employee motivation of Muhoroni Sugar Company, Kisumu County, Kenya?

- iv. How does transactional leadership style affect employee motivation of Muhoroni Sugar Company, Kisumu County, Kenya?

The researcher deduced the following conclusions:

- i. that directive leadership style had a negative effect on employee motivation with a p value of 0.979. This finding implies that a unit change in directive leadership style decreases level of employee motivation by 0.004 units when holding other factors constant. Therefore, directive leadership style is likely to worsen performance problem at Muhoroni Sugar company.
- ii. that participative leadership style had a positive effect on employee motivation with a p value of 0.393 on the regression model. This result implies that a unit change in participative leadership style increases level of employee motivation by 0.116 units when holding other factors constant. Therefore, participative leadership style is likely to improve the level of employee performance at Muhoroni Sugar company.
- iii. that transformational leadership style had a positive effect on employee motivation with a p value of 0.125. This result implies that a unit change in transformational leadership style increases level of employee motivation by 0.177 units when holding other factors constant. Therefore, transformational leadership style is likely to improve the level of employee performance at Muhoroni Sugar company.
- iv. Finally, the regression results show that transactional leadership style had a significant positive effect on employee motivation at Muhoroni Sugar Company at a p value of 0.000. This implies that a unit change in transformational leadership style increases level of employee motivation by 0.475 units when holding other factors constant. Therefore, transactional leadership style is likely to improve the level of employee performance at Muhoroni Sugar company.

Recommendations

From the study findings, the researcher suggests the following recommendations:

- i) Management of Muhoroni Sugar Company should be cautious in applying directive leadership style because it is likely to demotivate employees in their work performance, worsen those aspects of performance problems that are attributable to motivation.
- ii) Management of Muhoroni Sugar Company may consider using more participative leadership styles and encourage greater participation and teamwork in major decisions affecting staff in efforts to improve performance levels, since style positively affected motivation.
- iii) Management of Muhoroni Sugar Company should encourage greater use of transformational leadership style as a way of improving employee performance. Researcher recommends showing greater interest in team members, strengthening

personal relationships, and care for staff welfare while striving to help staff find meaning in their work.

- iv) Management may apply transactional leadership style in efforts to improve performance levels of employees of the Company. However, assessment of the situation should be done, and care taken to avoid being perceived as manipulating motivation. Whereas clarifying performance expectations and investigating deviations both scored high, the leaders did not score well in appreciating accomplishments and rewarding performance. Praise and recognition are alternative methods of rewarding performance where financial rewards are not possible.

Suggestions for Further Research

The researcher recommends further study to establish why directive leadership style was found to have a negative regression on employee motivation at Muhoroni Sugar Company. Also, more elaborate studies need to be conducted on organizations in distressed financial situations to generate findings that may be generalized in similar situations.

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AUTHORS

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INTERNATIONAL UNIVERSITY

Co-Authors: MWAMBA, GODFREY, Dr.
School of Business & Economics, Africa International University

KIBANGA, JANE, Dr.
School of Business & Economics, Africa International University

Effect of The Application of the Final Income Tax Against State Revenue

Stanly Harimisa

BC211120112, Graduated Student Institute STIAM I Jakarta

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Abstract- State revenues from the tax sector have changed from year to year, the need for development from the tax sector is still the main source of supporting state development, whether state revenues from the final income tax are able to make a significant contribution to state revenues or actually create a tax gap or stagnate state revenues in the tax sector.

Index Terms- Income Tax, Final Income Tax, Tax Law, State Revenue

Government by authorizing the Minister of Finance to conduct collections as stipulated in the law. Information on the state budget and state budget is clearly detailed in the state budget which is published to the public through the information channel of the Ministry of Finance. Tax revenue is one of the sources of state revenue in supporting the availability of funds in the state treasury. The Minister of Finance in carrying out the task of collecting state revenue delegates the authority to collect taxes to the Directorate General of Taxes (DGT). In Indonesia, taxes are divided into two according to their authority, namely central taxes and regional taxes. Central tax is a type of tax that is collected and managed by the central government through the Directorate General of Taxes (DGT). Meanwhile, local tax is a type of tax that is collected and managed by local governments through the Regional Revenue Service or related agencies. Because of this difference, the central government can only collect taxes to which it is entitled. What are the types of taxes that are categorized as central taxes?

I. INTRODUCTION

Referring to Law Number 17 of 2003, state income is the right of the central government which is recognized as an increase in the value of net worth consisting of tax revenues, non-tax state revenues, and grant receipts. This state revenue is obtained by the

Types of central taxes	Information
Income Tax (Income Tax)	Taxes that an individual or entity bears on income received or earned in a tax year.
Value Added Tax (VAT)	Taxes apply to the consumption of taxable goods or services within the customs area.
Sales Tax on Luxury Goods (PPnBM)	Taxes that apply to goods that are not basic needs, consumed by certain people, consumed by high-income people, goods that show status, and can damage people's health and morals.
Stamp Duty	Taxes that apply to the use of documents, such as letters of agreement, notarial deeds, payment receipts, securities, and securities containing a nominal amount of money above a certain amount.
Land and Building Tax (PBB)	Taxes that apply to the ownership or utilization of land and buildings.

Income Tax

The definition of Income Tax or Income Tax is a tax charged on an income earned by a taxpayer, both from Indonesia and from abroad. The legal basis of income tax is Law (UU) Number 7 of 1983 concerning Income Tax. This law has undergone four changes, namely:

- Law Number 7 of 1991 concerning Amendments to Law No.7/1983 concerning Income Tax

- Law Number 10 of 1994 concerning the Second Amendment to Law No.7/1983 concerning Income Tax
- Law Number 17 of 2000 concerning the Third Amendment to Law No.7/1983 on Income Tax
- Law Number 36 of 2008 concerning the Fourth Amendment to Law No.7/1983 concerning Income Tax.

In addition, the latest regulation on income tax is also in the Job Creation Law No. 11 of 2020 and through the HPP Law Number 7 of 2021 concerning Harmonization of Tax Regulations.

Income Tax Categories

Income tax is divided into several categories, namely:

Income tax imposed on individual taxpayers, which is divided into employees and non-employees or entrepreneurs. Income tax charged on the income of a corporate or corporate taxpayer, up to the object subject to the income tax itself. Broadly speaking, the objects of income tax here are grouped into three categories, which will lead to the types of income tax that are the obligations of the taxpayer, namely:

a. Income as a Tax Object

The objects of income tax in the Income Tax Law are detailed as follows:

1. Reimbursement or remuneration with respect to work or services received or obtained including salaries, wages, benefits, honorariums, commissions, bonuses, gratuities, industry money, or other forms of remuneration, unless otherwise provided in this law.
2. Prizes from sweepstakes or jobs or activities, and awards
3. Operating profit
4. Profits due to the sale or due to the transfer of property include:

- Profits due to the transfer of assets to companies, partnerships, and other entities in lieu of shares or capital participation
- Profits due to the transfer of property to shareholders, allies, or members acquired by the company, partnerships, and other bodies
- Profits due to liquidation, merger, amalgamation, expansion, splitting, expropriation of a business, or reorganization under any name and in any form
- Profits due to the transfer of property in the form of grants, assistance, or donations, except those given to inbred families in a straight lineage of one degree and religious bodies, educational bodies, social bodies including industries, cooperatives, or private persons running micro and small enterprises, the provisions of which are further regulated by the Regulation of the Minister of Finance, so long as there is no connection with business, employment, ownership, or possession between the parties concerned
- Profits due to the sale or transfer of part or all of the mining rights, the sign of participation in financing, or capitalization within the mining company.

5. Re-receipt of tax payments that have been charged as fees and additional payment of tax refunds.
6. Interest including premiums, discounts, and rewards due to guaranteed debt repayment
7. Dividends, in name and in any form, including dividends from the insurance company to the policyholder, and the distribution of the remaining proceeds of the cooperative's business
8. Royalties or rewards for the use of rights
9. Rent and other income in connection with the use of property

10. Receipt or acquisition of periodic payments
11. Profits due to debt relief, except up to a certain amount stipulated by a Government Regulation
12. Foreign exchange difference profit
13. The difference is more due to the reassessment of assets
14. Insurance premiums
15. Dues received or obtained by the association from its members consisting of Taxpayers who carry on business or free work;
16. Additional net wealth derived from income that has not been taxed
17. Income from industry-based enterprises
18. Interest compensation as referred to in the Law governing the general provisions and procedures for taxation
19. Bank Indonesia Surplus.

b. Income Subject to Final Income Tax

While the income that can be subject to income tax is final are:

- Income in the form of interest on deposits and other savings, interest on bonds and government bonds, and interest on deposits paid by the cooperative to members of the cooperative of private persons
- Earnings in the form of raffle prizes
- Income from stock and other securities transactions, exchange-traded industrial transactions, and stock sales transactions or transfers of capital participation in its partner companies received by venture capital firms
- Income from property transfer transactions in the form of land and/or buildings, construction service businesses, real estate businesses, and land and/or building rentals
- Certain other incomes are regulated by or under a Government Regulation.

The definition of Income Tax Article 4 paragraph 2 or also called Final Income Tax is income tax that is imposed on several types of income earned and the withholding tax is final and cannot be credited with income tax owed.

The term 'Final' here means that the withholding of taxes is carried out only once in a tax period. This type of Income Tax Article 4 paragraph (2) or Final Income Tax is imposed on corporate taxpayers and personal taxpayers for several types of income they get and the withholding tax is final.

The collection of the type of Income Tax Article 4 paragraph (2) or Final Income Tax is carried out by the income earner in connection with the payment for a particular object.

The latest tax regulation in the HPP Law No. 7 of 2021, for taxpayers who use the Final Income Tax rate of 23/2018 and have a turnover below IDR 500,000,000 free of final income tax for MSMEs. The definition of Income Tax Article 15 is income tax imposed or collected from taxpayers engaged in certain industries stipulated in the Income Tax Law and subject to Final on Turnover or Business Circulation.

The definition of Income Tax Article 29 is income tax or Income Tax Underpayment listed in the Annual Income Tax Return, namely the rest of the income tax owed in the relevant tax year minus the income tax credit (type of Income Tax Article 21, type of Income Tax 22, type of Income Tax 23, type of Income Tax 24) and Income Tax Article 25.

Furthermore, along with the changes in the Income Tax Law, the proportion of the imposition of final income tax in

Indonesia is actually getting wider. Currently, both explicitly and implicitly, the final income tax is spread in several articles, such as Article 4 paragraph (2), Article 15, Article 17 paragraph (2c), Article 19, Article 21, Article 22, and Article 26.

Each type of final income tax has its own tax rules, and almost all of its taxation systems ranging from determining the basis for taxation, tax rates, to the mechanism for withholding or collecting them are delegated to rules outside the law.

II. THEORETICAL FOUNDATIONS

Based on Government Finance Statistics Manual released by the IMF - and adopted by the OECD -, there are six general categories of tax levies. The six categories include taxes on goods and services, wealth taxes, taxes on international transactions and trade, etc., which are then categorized as advanced subcategories. From the document search, the final Income Tax terminology was not found. That is, Income Tax final is not a particular type of tax that has certain characteristics and characteristics.

According to IBFD International Tax Glossary (2009), Income Tax finals are usually used to describe the income charged withholding tax and does not include income calculated in calculating taxes at progressive rates. Income Tax final is given a different treatment from Income Tax which is not final, so it has its own calculation. Outline, Income Tax final has a special tariff scheme for each type of income and the costs associated with that income cannot be a reduction in gross income. Simply put, Income Tax final is a tax that is levied on a certain rate and tax basis that is different from the general tax scheme on income received or obtained during the year. Payment, deduction or final Income Tax collection, both deducted and deposited, is not an advance payment for the outstanding Income Tax, but rather repayment. Accordingly, taxpayers who have been deducted or deposited their own Income Tax final payable are deemed to have paid their taxes. In addition, this final tax collection is considered 'streamlining' the ideal tax principle, especially the justice aspect (equality) and ability to pay (ability to pay) which should be applied in Income Tax. Income Tax final is also considered to be succumbing Income Tax as a subjective tax. On the other hand, given the final Income Tax which is part of the third party cutting system (withholding tax), the imposition of final Income Tax can also create administrative burdens for taxpayers who are given the obligation to make tax cuts (Thomas G. Vitez). Each country has the freedom to provide different tax treatment for certain tax subjects and / or income objects. Without an affirmation of the clear separation between special treatment (special regime) with generally applicable tax provisions (general regime), behavior will arise tax arbitrage. That is, clear separation is needed to prevent the behavior of exploiting weaknesses arising from the interactions of the two regimes. For example, avoiding regimes that have a higher tax burden through the characterization of types of income or transferring fiscal losses from one regime to another. In order to prevent this, a ring fencing. This term is often used in the banking, insurance, financial sector and public services areas. Concept ring fencing generally interpreted as an effort to clearly separate portfolios in order to prevent the spread of risks and responsibilities from one area to another. Concept ring fencing in the tax sector underlines the separation of (isolation) tax treatment of a transaction or certain

circumstances. Mixing between tax treatment that applies specifically to conditions or transactions that have been subject to generally accepted tax treatment is not permitted, as is the opposite. For example, compensation for losses on financial transactions (having a special tax regime) is only allowed for profits derived from these financial transactions in the future. Therefore, indirectly, the concept ring fencing also related to the principle of symmetry (symmetry principle) in the tax system. Income Tax final itself can be stated as one of the manifestations of ring fencing. In the event that a certain income is treated specifically, the calculation of the tax burden on that income may not be mixed / connected with the calculation of taxes on other income. However, it needs to be emphasized that application ring fencing it does not have to be followed by the imposition of final taxes (*B.Bawono Kristiaji and Awwaliatul Mukarromah*).

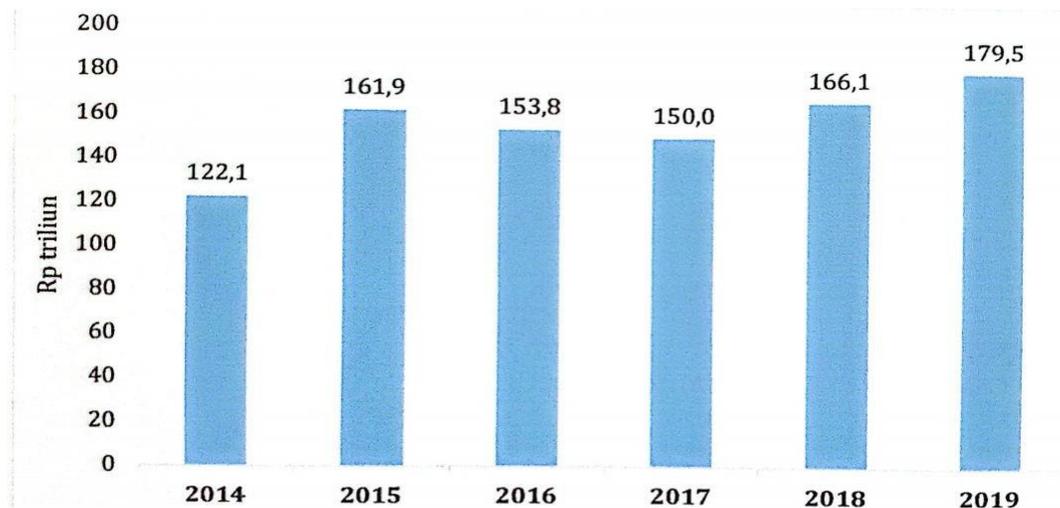
The final Income Tax in Indonesia is as strong as the consequences of the tax system adopted by Indonesia, viz schedular tax system, dual income tax, as well as family tax unit, as well as for certain policies that apply specifically, i.e presumptive tax and withholding tax. In terms of ensuring the implementation of the system and the policy, the final Income Tax is chosen as a solution. Thus, on the type and / or flow of income and / or characteristics of certain taxpayers, the taxation is different and **isolated** from the imposition of generally accepted Income Tax (ring fencing). Furthermore, the calculation and payment of the isolated Income Tax is carried out symmetrically, is considered to represent the final tax payable, and is less significant to be part of tax reporting. Whereas, if often associated with the collection mechanism withholding tax, Income Tax finals can also be collected through self-assessment. In short, it can be concluded that the final Income Tax is the solution chosen in the context of changing philosophies, systems and policies in the area of income tax. These changes are basically in nature aligning the Income Tax system in Indonesia with various challenges. As a solution, Income Tax final was chosen because it has administrative feasibility, if not necessarily reflect first-best policy.

III. PROBLEM ANALYSIS

Based on the explanation in the deep writing of this paper, it can be said that the Final Income Tax provides convenience from the tax administration, supervision and collection by third parties, but also has weaknesses, especially when viewed from the side of justice and ability to pay, so that from a few years back we can see changes to the rules that apply regarding this final Income Tax. Regarding the state acceptance of the Income Tax Final we can also see that the state receives cash flow faster so that it can be used in the management of the state, in addition also from the MSMEs side the Government through the HPP Law provides tax exemptions up to the circulation of Rp. 500,000,000 (Five Ratus Million Rupiah), and if it crosses the threshold it will be subject to a Final Income Tax Tariff of 0.5% and this still applies until the circulation of Rp.4.8 Billion. The aim is to broaden the basis of tax revenue, participation and compliance of business actors who are still outside the radar of the tax authority. In 2022 the Government also opened the Voluntary Disclosure Program where this is also a Final Income Tax scheme, where it is expected to increase state acceptance and also expand the scope of acquisition

of fixed assets which is expected to also be the basis for piracy in the future.

State Receipts from Final Income for 2014-2019 are as follows:



Source: DDTF Fiscal Research processed based on DGT Performance Report, 2014-2019

From the data above we can see Income Tax Final contributing around 13.45% in the past six years to State revenues when viewed from its proportion to tax revenue.

Through data processed by the Central Statistics Agency we can see State Acceptance for 2020-2022, as follows:

Sumber Penerimaan - Keuangan	Realisasi Pendapatan Negara (Milyar Rupiah)		
	2020	2021	2022
I. Penerimaan	1 628 950,53	1 733 042,80	1 845 556,80
Penerimaan Perpajakan	1 285 136,32	1 375 832,70	1 510 001,20
Pajak Dalam Negeri	1 248 415,11	1 324 660,00	1 468 920,00
Pajak Penghasilan	594 033,33	615 210,00	680 876,95
Pajak Pertambahan Nilai dan dan Pajak Penjualan atas Barang Mewah	450 328,06	501 780,00	554 383,14
Pajak Bumi dan Bangunan	20 953,61	14 830,00	18 358,48
Bea Perolehan Hak atas Tanah dan Bangunan	0,00	0,00	0,00
Cukai	176 309,31	182 200,00	203 920,00
Pajak Lainnya	6 790,79	10 640,00	11 381,43
Pajak Perdagangan Internasional	36 721,21	51 172,70	41 081,20
Bea Masuk	32 443,50	33 172,70	35 164,00
Pajak Ekspor	4 277,71	18 000,00	5 917,20
Penerimaan Bukan Pajak	343 814,21	357 210,10	335 555,62

From this data we can see the Income Tax has increased from the last three years, where the income tax includes the final income tax, to get a percentage of the Final income contribution in the paper this has not been able to find the prosentasian number. However, we should appreciate the steps taken by the Government in the deep expansion of the tax revenue base, which in addition to the Income Tax collection mechanism, the Voluntary Disclosure Program, Income Tax Final 0.5% MSMEs, Final VAT for certain businesses. From the Voluntary Disclosure Program sector until the end of May 2022, successful revenues were

collected by Rp. 10.3 Trillion with Assets reported as much as Rp. 103 Trillion. Through the Income Tax Final Mechanism which makes it easy for MSMEs and also tax exemptions up to the Rp turnover. 500,000,000,- are expected to stimulate MSMEs' participation to contribute to state revenues through tax payments, to date in accordance with the HPP Law which came into force in 2022, no acceptance has been found for the MSME Income Tax Final Mechanism, as well as the application of Final VAT for certain businesses.

Tax non-compliance is the biggest challenge for creating an optimal tax system. Many factors are the cause of non-compliance, for example shadow economy, low tax morale, lack of comparative information in order to oversee compliance are the cause, and so on. Many strategies can be done to overcome this, two of which are (i) methods remittance, namely the mechanism of withholding, collecting and / or depositing taxes by third parties which is often associated with the scheme withholding tax, as well as (ii) the often simplification method associated with presumptive tax. Both methods - withholding tax and presumptive tax- is an element that we can meet from the final Income Tax regime in Indonesia. How does this relate to compliance in Indonesia? First, mechanism withholding tax. Mechanism withholding tax considered effective in increasing the level of tax compliance, because taxes are directly collected or deducted by collection agencies or cutters. Martinez-Vazquez et al. states that the mechanism withholding tax automatically closes the possibility of a significant tax non-compliance practice. Besides being effective, this mechanism is also considered efficient because it reduces the cost of Income Tax collection for the government. According to Dušek and Bagchi, there are several studies that confirm that provide empirical evidence that withholding tax can improve government efficiency. On the other hand, mechanism withholding tax mechanism withholding tax. Mechanism withholding tax considered effective in increasing the level of tax compliance, because taxes are directly collected or deducted by collection agencies or cutters. Martinez-Vazquez et al. states that the mechanism withholding tax automatically closes the possibility of a significant tax non-compliance practice. Besides being effective, this mechanism is also considered efficient because it reduces the cost of Income Tax collection for the government. According to Dušek and Bagchi, there are several studies that confirm that provide empirical evidence that withholding tax can improve government efficiency. On the other hand, the withholding tax mechanism is considered complex and burdens the cash flow of the cutting/collecting party. From the side of the tax collector or withholding, this mechanism adds to the costs that must be incurred. Martinez-Vazquez et al. states that the mechanism withholding tax automatically closes the possibility of a significant tax non-compliance practice. Besides being effective, this mechanism is also considered efficient because it reduces the cost of Income Tax collection for the government. According to Dušek and Bagchi, there are several studies that confirm that provide empirical evidence that withholding tax can improve government efficiency. On the other hand, mechanism withholding tax withholding tax atas penghasilan pasif. This is subject to the flow of income imposed presumptive tax is income from business activities. In addition to convenience in tax administration, tax collection carried out by third parties, faster cash flow in state revenues, in addition to the taxpayer's non-compliance factor we can also see the Tax Gap that occurs against state revenue from the Final Income Tax side, we can see a revision of the regulations on MSMEs who have gross circulation up to Rp.4.8 Billion, which the Government currently provides an aspect of justice by providing tax exemptions on turnover up to Rp. 500,000,000.-. Then we can also see this Tax Gap from the shipping sector which was only given a Income Tax Final of 1.2% when compared to other business sectors if a percentage of Income Tax is owed with

an Turnover or Gross Circulation Business can have a Prosperity of more than 1.2%. Likewise from the construction sector, this can be seen from the minimal contribution made when compared to gross domestic product in which the sector contributes by 10.7% however, the contribution to state revenue through taxes is only 7.2%. Then from the land and building sector, the final tax is only obtained in the event of a transition, while the value of the building land assets has increased from year to year, in other words the taxation aspect of the final Income Tax of Land and Buildings does not take into account capital gains or increased profits on capital. From the previous section we see the phenomenon of the final Income Tax expansion in Indonesia. The application of the final Income Tax which is relatively easier and can guarantee acceptance has led to incentives for a government to continue to maintain and even expand objects. In fact, when compared to practice in other countries, the imposition of final Income Tax is not the main option of taxing. Most countries, especially developed countries, the imposition of final Income Tax is more aimed at the SPLN compared to SPDN and is limited to certain types of passive income (passive income), interest, royalties, rent. This is as applied in Singapore and Malaysia.

IV. CONCLUSION

The Final Income Tax has a stable contribution to state revenue, as well as ensuring the smooth flow of state revenue cash, and provide ease with the administration through the mechanism of withholding tax or not recalculating the corporate income tax owed which can lead to tax disputes or restitution that can disrupt the cash flow of state revenues. Reversed profits and excesses from the Final Income Tax can also lead to Tax Gap or Policy Gap, one of which is the solution is application capital gain tax. Enforcement of the Voluntary Disclosure Program, where this is also the application of the final income tax until the time this paper was made, the achievement of acceptance is still very far from expectations, where the potential for this program was initially expected to contribute as much as Rp. 110 – Rp.120 Trillion, but to date the acquisition is still around Rp. 10.3 Trillion, this can be due to the attractiveness of this Program which is not as attractive as Tax Amnesty Jilid I, both from the Tariff side and the circumstances after joining this program, because after the end of this program the Tax Service Office can still check even if it does not issue a tax decree. In the implementation of Income Tax Final MSMEs are also expected to provide assistance and participation in the country's acceptance, this can be seen by the enactment of the Population Parent Number in the transaction process related to taxation activities, from the state acceptance side, of course this expands the taxation base and seeks loopholes or potential taxpayers who have not been included in the taxation information system. Of course, socialization is needed and also reward to taxpayers who have participated in participating in state revenues, for example such as facilitating deep-minded banking access to loans for trying capital, or the Government can provide stimulus for loan disbursement for SMEs that are compliant and orderly in reporting their tax obligations.

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AUTHORS

First Author – Stanly Harimisa BC211120112, Graduated Student Institute STIAMI Jakarta

The Servuction in Transport of People: An Analysis From Gozem Togo Sarlu in the District of Grand Lome in Togo

DANDONUGBO Iléri

Maître de Conférences

LaREESH, Université de Lomé/Département de Géographie
ileridandonougbo@gmail.com

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ABSTRACT

The spread of the Internet and the use of smartphones have changed the daily lifestyle of urban populations by introducing new habits of consumption, training, sales and mobility. Gozem, a private transport company in Togo, has integrated a digital platform that connects drivers and customers. The advent of Gozem allowed the population to get used to this new technology which involves digital in the urban mobility of people. The objective of this research is to analyze the working conditions of drivers by highlighting the dysfunctions linked to this production of services. The methodology is based on documentary research, observation and field investigation. Using a reasoned sampling technique, the survey involved 95 actors. The results show that the machines used in Gozem are made up of 85% motorcycles and 15% 5-seater taxis. According to these same results, 70% of the drivers who come to Gozem do not own their machines and 40% of them earn 4,000 to 5 000 F CFA per day. The long wait, the slowness of the internet connection and its interruption at times are the main problems encountered by Gozem users. For 78% of customers, the slow connection does not allow them to easily access the Gozem platform. Drivers (85%) say they spend an average of 15 minutes getting customers out of their homes. The outward journey is paid in Gozem from the 3rd kilometer at 40 F CFA. On the other hand, the kilometer for Zemidjan is 56 F CFA for the taxi. Drivers (92%) record losses when the outward journey is less than 3 km.

Keywords: District of Grand Lomé (Togo), servuction, urban transport, digital.

RESUME

La diffusion de l'internet et l'usage du Smartphone ont modifié le mode de vie quotidienne des populations urbaines en introduisant de nouvelles habitudes de consommation, de formation, de vente et de mobilité. Gozem, une entreprise privée de transport au Togo, a intégré une plateforme digitale qui met en relation les conducteurs et les clients. L'avènement de Gozem a permis à la population de s'accoutumer à cette nouvelle technologie qui

implique les numériques dans la mobilité urbaine des personnes. L'objectif de cette recherche est d'analyser les conditions de travail des conducteurs en faisant ressortir les dysfonctionnements liés à cette production de services. La méthodologie est basée sur la recherche documentaire, l'observation et l'enquête de terrain. A partir d'une technique d'échantillonnage raisonné, l'enquête a concerné 95 acteurs. Les résultats montrent que des engins utilisés à Gozem sont composés de 85% de motos et 15% de taxis de 5 places. Suivant ces mêmes résultats, 70% des conducteurs qui viennent à Gozem ne sont pas propriétaires de leurs engins et 40% de ceux-ci font une recette de 4 000 à 5 000 F CFA par jour. La longue attente, la lenteur de la connexion internet et sa coupure par moments sont les principaux problèmes rencontrés par les usagers de Gozem. Pour 78% des clients, la lenteur de la connexion ne leur permet pas d'accéder facilement à la plateforme Gozem. Les conducteurs (85%) affirment perdre en moyenne 15 minutes pour que les clients sortent de leur domicile. La course aller est payée à Gozem à partir du 3^{ème} kilomètre à 40 F CFA. Par contre, le kilomètre pour Zemidjan est 56 F CFA pour le taxi. Les conducteurs (92%) enregistrent des pertes quand la course aller est inférieure à 3 Km.

INTRODUCTION

Man is a very mobile living being and the means of travel have experienced an evolution over time. "Thanks to information and communication technologies (ICT), the world having become a planetary village with the ease of transfer of practices and innovations from one continent to another via canvas, urban Africa S ' UBERISE "(Y. Sagna, 2019, p. 42). "Due to the growing importance taken by information in all types of activities, ICT is now asserting themselves, in the world, as tools for helping the formalization of development strategies (A. F. Logou, 2012, p. 51). The forms of transport have undergone the digital revolution in a world in full mutation towards digitalization. This revolution introduced in the United States in the 1970s, was qualified as uberization. The objective sought by uberization is professionalization in transport in order to provide more security in mobility. The professionalization of the transport sector has led

to the creation of companies which offer multiple services in urban areas. In sub-Saharan Africa, the urban environment is characterized by transport by taxi and taxi-motorcycle. The city of Lomé capital of Togo, knows the creation of businesses like Gozem, Olé Togo, Z-Mobile and Cap Vert. Among these companies, Gozem is more open to digitalization. It offers customers several services they choose according to their needs. "The Gozem application allows you to order races with taxi-word taxi and cars in the city of Lomé. It is a transport transport application, therefore the intermediary between the driver and the passenger" (V. Tossou, p. 74). The customer makes his request through the application that works with Internet connection. "The relationship is established through the company Gozem between the applicant who is the customer and the offeror who is the driver" (V. Tossou, p. 75). Customers, physical support, drivers, company administrative staff, internal organizational system and service are the main elements that make up the service and enter the servuction system.

The company's rolling stock park consists of 76 simple taxis, 22 air-conditioned taxis, 679 taxi-word, 87 passenger tricycles and 175 luggage tricycles. The operation of the application is the same for all these vehicles. To make the reservation, passengers must go through the application that geolocates them in real time. No reservation in advance is possible. The racing prices are fixed by Gozem via the application. "These prices are calculated according to the Horokilometric method and depend on the mode of transport chosen" (V. Tossou, p. 76). The service is a contract by which Gozem drivers provide service to customers in return for payment. The amount varies according to the distance traveled, the type of service requested and the duration of the race. This observation brings to the following question: what are the new approaches to the Gozem services in the district of the Grand-Lomé?

The objective of this research is to analyze the new approaches to Gozem services by highlighting the spatial distribution of Gozem's services in the Grand Lomé district. This study revolves around three axes. It first presents the methodological framework. Then, the spatial distribution of Gozem's services is presented in the second bet. Finally, the new approaches to Gozem's activity that contributes to improving the living and working conditions of drivers.

METHODOLOGY OF DATA COLLECTION

This section presents the methodology implemented for achieving the objective of research. It includes pre-investigation, interviews and questionnaire surveys.

1. The pre-investigation

The pre-investigation is the first step in the methodology of this research. It was made from August 15 to August 23, 2021, a period of nine days. It made it possible to observe Gozem drivers in the field and the environments served by the company. It also made it possible to handle the Gozem platform.

2. Interviews

The interviews were carried out with the administrative staff of the Gozem service in order to have the useful information on the process of uberization of transport and the coverage of Gozem left. Gozem from a survey rate of 50%, an interview was Given to 07 managers of the company Gozem and 05 union members of classical taxi-motorcycle transport. The unequal distribution of the

Gozem service, the approach of Gozem in the transport and uberization of its activities is the main information collected at the level of the managers of the said company. The union members of the classic taxi-motorcycle transport provided data related to the price.

3. Questionnaire surveys

The surveys by questionnaire lasted 15 days, from September 03 to 17, 2021. They made it possible to have quantitative data. The information collected relates to the dominance of the transport activity of Gozem by the young men, weakly educated and from the destitute strata. Income from this activity by drivers are overall lean.

The questionnaire was submitted to drivers and customers of the Gozem service (Table 1).

Table 1: Survey sampling

Target groups	Mother population	Sampling rate	Sample
Motorcycle taxi driver	679	10	68
Tricycle drivers	262	30%	79
Taxi drivers	98	50%	49
Customers	975 000	1/10000	98
Total	976039		294

The reasoned sampling was made on the workforce of the mother population of each target group. A total of 294 individuals were submitted to the investigation questionnaire. This sample was subjected to a questionnaire donation requires specific tools in order to have the analysis results.

RESULTS

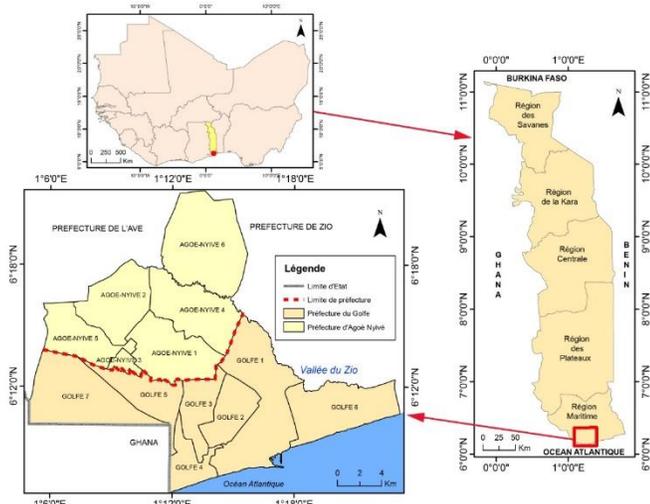
1. An unevenly distributed activity

The city of Lomé lends itself best to the development of transport by Gozem. The coverage of Gozem's services is unevenly distributed in the city of Lomé.

1.1. The city of Lomé, an environment that lends itself to the activity of Gozem

The Grand Lomé district is located in the maritime region, one of the five administrative regions of Togo (Map n °1).

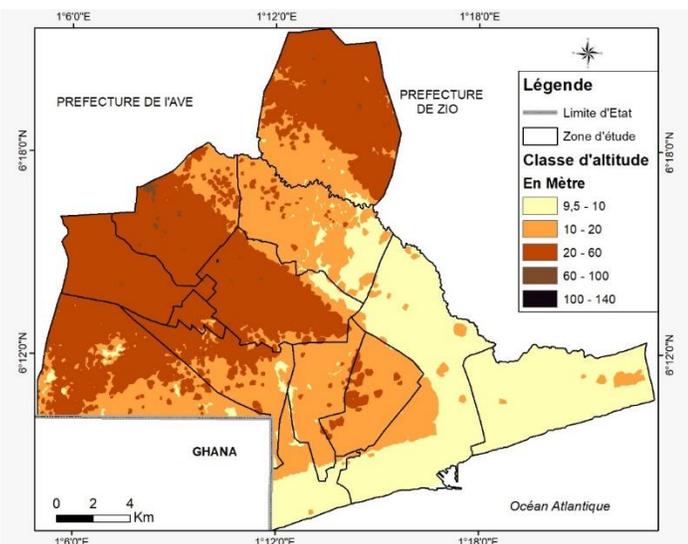
Map n °1: Geographical location of the Grand Lomé District



Source: Directorate General of National Cartography, 2020 and field work, 2021

Map n°1 shows that the Grand Lomé district is located in the far southwest of Togo between $6^{\circ} 7'20''$ and $6^{\circ} 18'00''$ of northern latitude and $1^{\circ} 5'40''$ and $1^{\circ} 21'60''$ longitude is. It presents "a tabular surface whose monotony is broken in a few places by small depressions. The plateau dominates the coastal plain or coastal cord on a slope of about 20 m" (A. Blivi, 1998, p. 178; K. G Fagbedji, 2018, p. 54; K. Am. Amouzoukpo, 2021, p. 51). It extends along the coast of the Gulf of Guinea in West Africa. The Grand Lomé district, according to administrative reforms of 2017, brings together 13 municipalities and extends over an area of 39,000 hectares for a population of 2,090,600 inhabitants in 2019 (INSEED, 2019). The Grand Lomé district is a plain site (map n° 2) bearing closed depressions. It is therefore favorable to human installation and transport infrastructure.

Map n°2 : A plain relief



Source: Directorate General of National Cartography, 2020

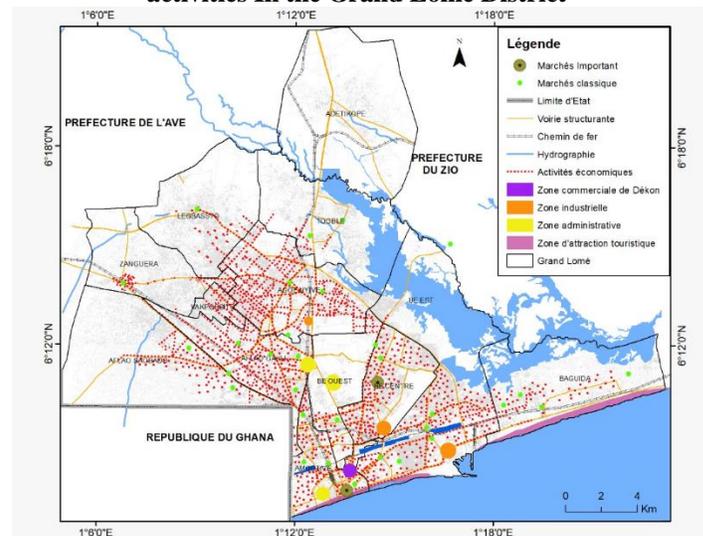
According to card n° 2, the relief is simple, little varied formed by two geological units, the coastal cord and the bar plateau connected by an embankment of a 10% inclination (K. A. Biakouye, 2014, p. 65). This relief does not constitute an obstacle in the mobility of city dwellers because the topographic surface is

uncneced and flat (A. Guézéré, 2012, p. 56). The city of Lomé represents the hub for the economic life of the country, which brings G. K. Nyassogbo, (2010, p. 106) and Y. Sagna (2019, p.43) to qualify it as a macrocephalic city. It concentrates the largest markets in Togo (Adawlato and Hédzranawoé), banking and administrative service, ministries, offices of private companies, universities, schools (G. K. Nyssogbo, 2010, p. 108). The multifunctional nature of the city of Lomé and its center is decisive in the pendulum -type mobility between home and workplace (Y. Sagna, 2019, p. 43). Lomé's physical environment lends itself to the implementation and development of transport by Gozem. The characteristics of the city center make Gozem drivers are more present in this environment.

1.2. A more concentrated activity in downtown Lomé

Gozem vehicles have all the municipalities of Grand Lomé as a cover. It should be noted that the city center is more covered compared to the other municipalities of the outskirts which are Zanguéra, Aflao Sagbado, Adetikopé, Légbassito and Baguida. This is explained by the fact that "the peripheral districts constitute the dormitory environments compared to the city center which represents the job basin" (K. Amouzoukpo, 2021, p. 58). The disparity in the coverage is explained by the distance between the periphery in the city center which is full of the majority of the city's economic and administrative activities as indicated by map n°3.

Map n°3: Distribution of economic and administrative activities In the Grand Lomé District



Source: Directorate General of National Cartography, 2020 and field work, 2021

Map n° 3 shows that the spatial distribution of economic and administrative activities in the Grand Lomé district. These activities are more concentrated in the city center than on the outskirts. The Lomé vile is characterized by the concentration of 75% of services and 80% of economic activities in the city center (K. N'Kéré, 2012, p. 429, A. Guézéré, 2012, p. 58). Mobility is more observed in the city center where demand is stronger. To meet this request, Gozem's service has concentrated its journeys in this environment. Customers are 70% in the city center. In the outskirts, Gozem's activity represents only 30% of the whole.

The city center of Lomé is completely covered by the addressing of streets compared to the outskirts (Y. Sagna, 2019, p. 44). The

Gozem application uses the GPS system to locate customers and locate the driver. It is easier to find your way thanks to the city plan and addressing. The city center therefore responds more to this request. To this is added the fact that among the Gozem service, taxis is the most used by customers. City downs use plot over short distances. The route of the city center on the outskirts is covered by taxis and Sotral buses. Passengers prefer to use these two means because the cost of transport is affordable compared to the Moto taxi. If you have to use a Gozem taxi on such a distance would be more expensive compared to a taxi or the Sotral bus. For example, from Zangura to the large market, the Sotral price is 350 CFA francs. The same route with traditional taxis is 600 CFA francs. On the other hand, for the same route with the Gozem Taxi service as a motorcycle, the price is 1,300 CFA francs for the motorcycle and 3,000 CFA francs for the taxi. The big difference in transport costs on these journeys guides the choice of ordinary bus and taxi.

The districts of Doulassamé, Amouitivé and Hédzranawé record more mobility. The first two districts are the places of concentration of economic services and activities in the agglomeration of Lomé. Strong mobility in Hédzranawé is explained by the presence of a market specializing in the sale of the seconds. The Ibo community of Nigeria, leaders in this business, uses this means of transport more due to the transparency of the cost, speed and security.

2. Gozem, a new approach in transport in the Grand Lomé district

The displacement in the Grand Lomé district is ensured by the taxi and the taxi-motorcycles. Since 2018, a public urban transport company called Gozem has been carrying out the transport of people in the city via an application that allows you to order races with taxi-word and cars in the Lomé agglomeration. This application offers the possibility of calling the driver after launching the order. It gives the way to contact the driver, either by WhatsApp or by GSM, by helping it with necessary indications for it to be easily found. The rest is mainly provided by artisanal transport. This category is dominated by motorcycle taxi. The Gozem company comes to bring a special touch to the transport sector by introducing digital technology.

2.1. Particular service in transport in Lomé

The introduction of digital technology in informal transport, particularly that of motorcycle taxis, highlights both shortcomings on the part of drivers of motorcycle taxis and also the contribution of a particular touch in positive practices corresponding to very specific realities (Y. Sagna, 2019, p. 43). Gozem drivers (board n°1) are ancient zémidjans conquered by the application of this new mobility offer.

Plank n°1 : The drivers of Gozem



Source: I. Dandonougbo, views taken in October 2021

Photo n°1 shows Gozem drivers at the company's headquarters in Kodjoviakopé. Photo n°2 shows a driver with a passenger. "The drivers who are the ancient Zémidjans come mainly for the sake of profitable. They benefit from a supported training of tests to allow them to live up to the requirements of the Highway Code" (Y. Sagna, 2019, p. 47). The goal is to provide safe and secure service to customers. The Gozem transport company has introduced new habits in the displacement of Lomeans by improving the practices that existed, based on the quality, reliability and safety of its services. Like Uber, by establishing itself on the transport market, Gozem did not necessarily need to innovate technologically but has focused on the "improvement" of existing services while taking advantage of new technologies" (V. Tossou, 2020, p. 85). It was based on its beginnings on the taxi-motos, the main mode of movement of the Lomeans by wanting to improve the services of this means of displacement which is constantly being criticized because of its negative externalities in terms of road safety and of incivism.

Ordinary taxis and motorcycle taxis are marauding along the paved streets or the main streets of the neighborhoods. This forces passengers to fall back on the primary tracks on foot to find a driver. Thus playing on feeding efforts, Gozem appears as an alternative through its "almost door to door" service and offering a trip from end to end (Y. Sagna, 2019, p. 48). The price of the races is calculated per kilometer traveled, or 72 CFA francs. The application allows you to display the actual distance traveled after the race and reassures the customer on the service cost (V. Tossou, 2020, p. 88). Payment can be made by T-Money or Flooz (payment system by phone) or by bank card at the end of the journey.

The goal is to avoid expectations due to lack of parts to give money to customers.

2.2. A ubéried activity

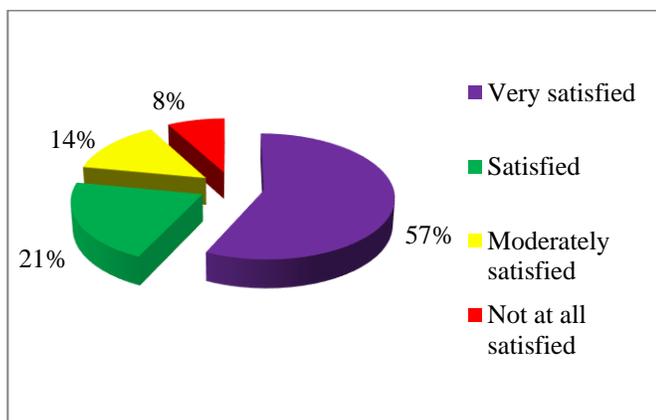
Gozem has been a niche application that has appeared in Lomé since November 2018 (Y. Sagna, 2019, p. 43). It connects the customer and the driver by the reservation or ordering process. It then responds to the form of existing uberization in transport in America and Europe. The uberization process is a rapid and unexpected "creative destruction" in an existing system by bringing a digital touch. It was introduced by the American entrepreneur Travis Kalanick who used a digital innovation (the smartphone and its geolocation) to launch a new offer called Uber, with better value for money than pre-existing offers (C. -A. Schwer and N. Bouzou, 2016, p. 9, cited by V. Tossou, 2020, p. 84). It's about saving time in the service offer in order to be better than what existed. The innovation brought by Gozem is based on a digital platform that connects self-employed workers, drivers and consumers. The specificity of the uberization of domains, according to C-A Schwer and N. Bouzou (2016, p. 9), "is due to the speed of dissemination of digital innovations".

In ordinary practices, to find a means of transport you have to show up at the edge of a road or at a crossroads or wait for a marauding vehicle; And this can cause the interested party to lose between 15 to 45 minutes. With the Gozem mobile application, you can quickly order a race from his room with the possibility that the driver comes to get the customer to the door of his house (V. Tossou, 2020, p. 85). However, to reach the meeting place for

the possible customer, the driver is helped by passing additional threads intended to better guide him. When the client's geographical location is easily identifiable as a result of the oral indication, the driver reaches the location. In other words, most of the races (over 80%) starts 5 meters from the customer's initial position. Indeed, the latter works to put himself in a reference location. It can be a school, a health center, a high-rise building, a service, a display of local shops, a set of informal activities of a Carrefour or even a tree (Y. Sagna, 2019, p. 52).

Drivers happen to make sacrifices to meet customers. This is explained by the fact that the Gozem company supports the driver's move to the customer only over a maximum distance of 10 km from his initial position (V. Tossou, 2020, p. 84). If the customer who asked for the service is more distant, the driver is forced to go at his own cost, which constitutes a break in the usual practice. In Lomé, the ordinary technique for taxi drivers and taximutos to find a customer is to do the maraud, while Gozem drivers calmly wait for a customer to order his race before moving to the latter. This avoids fuel losses by moving in search of customers. Innovation is also observed in the course. In terms of journeys, the application helps the driver Gozem to determine the shortest possible journey to drive the customer to destination, something that an ordinary driver has difficulty doing. The driver wins in time and fuel spent. The security component is also taken into account in Gozem practice. Drivers, apart from their training on manipulation of the application, also receive training on highway code and civility. The company forms its drivers, especially taxi-computer drivers with a view to obtaining category A driving license. Gozem taxi-mutt drivers are distinguished by responsible attitudes in circulation compared to ordinary drivers. Respect for the highway and customer safety code is one of the fundamental rules in the company. The helmet wearing is compulsory at the safe level, thanks to the mobile application, the Gozem customer and driver knowing their identities, insurance covers the driver and the customer during the journey and all the journeys are traced; Everything is sent by email to the customer at the end of the race. The questions on the degree of satisfaction of the drivers to the operation of the company made it possible to have the figure n° 1.

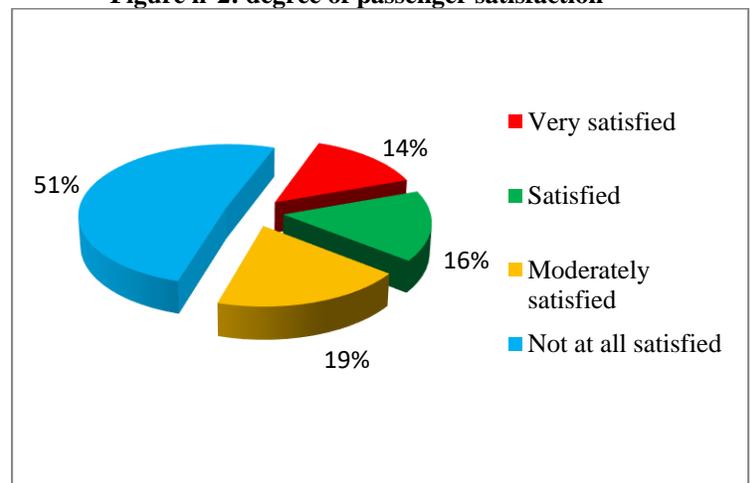
Figure n°1: Degree of driver satisfaction



Source: Field work, 2021

To data in Figure 1, drivers being very satisfied with their belonging to the Gozem service represents 57%, against 21% which is satisfied and 14% which declare that they are moderately satisfied. Those who are not at all satisfied by their service with this service represent only 8%. This analysis emerges that 78% are satisfied with their services and recipes made thanks to Gozem. Satisfaction explains the increase in their daily income taking into account expenses. They do little marauding, which avoids loss of fuel and energy. Uncapped drivers explain this situation by the fact that they do not control the use of the application and the fact of making additional calls in order to find the passenger. The Gozem application is complex for those who do not know how to use smartphones well. For the passages that are located in a neighborhood that the application cannot make the location, the driver makes calls to have a reference on the geographical situation. The degree of customer satisfaction is represented in Figure n°2.

Figure n°2: degree of passenger satisfaction



Source: Field work, 2021

The analysis of data in Figure 2, shows that 51% of passengers say they are very satisfied with drivers and Gozem service, 19% say they are satisfied, 16% moderately satisfied and 14% not at all satisfied. It comes out of this analysis that satisfaction is very high among passengers. All very satisfied and satisfied customers give 70%. They explain their satisfaction by the possibility that they have to order a taxi or a motorcycle from their home thanks to their smartphones. The driver has just sought at home for an additional cost. Those who are not satisfied explain this situation by non-compliance with the highway code by drivers and the difficult location of their home or order place.

3. Soci-demographic characteristics of Gozem drivers

Gozem drivers are exclusively male and low-education young people.

3.1. An exclusively male activity

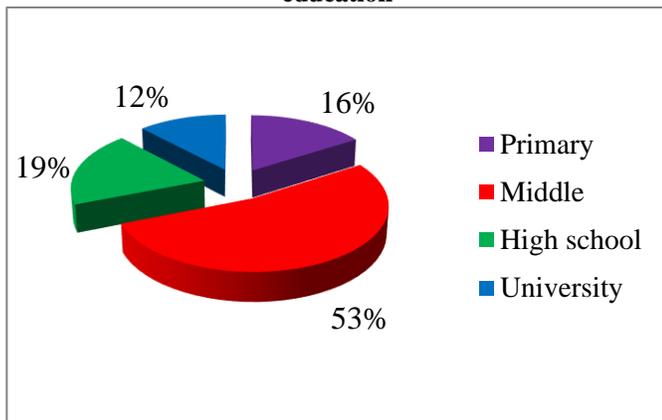
The driver's profession requires considerable energy during the trip. It is physical and appears as an essentially male activity. In taxi-motorcycle transport, women are nonexistent in Togo. Gozem drivers are exclusively male. This situation is explained by the strong presence of men in the driving profession. According to the ministry in charge of transport of Togo (2020), "interurban drivers are made up of 99% of men and those of the urban environment

are formed by 95% of men". According to 95% of customers interviewed, the arduousness of driving work marked by the deployment of physical energy excludes women from this activity. This is also the reason put forward by the Gozem service to retain only male gender drivers. These drivers have a low level of instruction.

3.2. An activity dominated by a population with a low level of education

According to the ministry in charge of transport (2000), driving in Togo was held by a population at 98% little educated until the end of the 1990s. The increase in the unemployment rate led to the discharge of young graduates without jobs in this sector. The Taxi-Moto is the sector that recorded the massive arrival of unemployed graduates. However, according to field work, this sector is still 72% dominated by people with a level below the first cycle study certificate (BEPC). The high proportion of young people in this sector directly impacts people working in Gozem. Gozem drivers have an average level of education as shown in figure n°3.

Figure n°3: Distribution of drivers according to the level of education



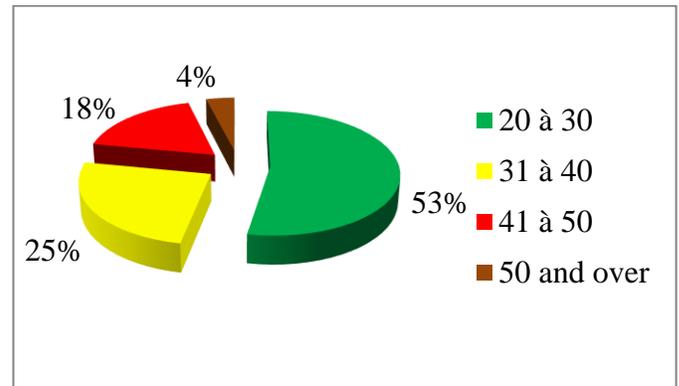
Source: Field work, 2021

According to data in Figure 3, 53% of drivers have a college level, 19% the high school, 16% did primary and 12% have the baccalaureate or a university diploma. Drivers with a diploma less than or equal to the BEPC represent 69%. These results show that the high rate of people with a level of college in the driving sector has directly impacted the Gozem driver sector. This level facilitates the manipulation of SMAR. It is also dominated by young drivers.

3.3. The age structure of Gozem drivers

The population of the city of Lomé is made up of 56% of young people and 64% have an age between 15 and 59 (INSEED, 2020). This age group is more successful for the use of communication information technology (ICT) and suitable for driving. The Gozem company takes younger drivers, that is to say those with an age less than 45 years. The goal is to have young drivers and suitable for the trade. Land works with drivers and the company have made it possible to know that 61% of drivers are age between 20 and 35 years old. Figure 4 shows the age structure of drivers.

Figure n°4: Distribution of Gozem drivers according to their age



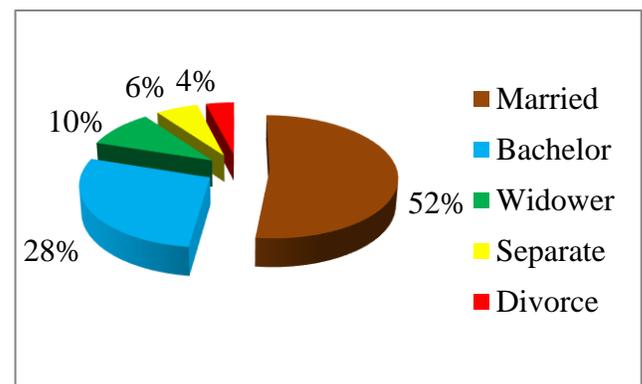
Source: Field work, 2021

The analysis of data in Figure N ° 4 shows that 53% of Gozem drivers have an age between 20 and 30 years. Those with an age between 31 and 40 years represent 25% against only 4% which are an age greater than 50 years. These data show that young people with age between 20 and 40 are more represented with a rate of 78%. This choice of society is oriented towards young people because of their physical strength, their resistance and the desire to optimize profit. Young people have more energy to work on average 10 hours a day and for at least 6 days a week. They better master the highway code and the use of the Gozem application. The desire to increase income is the main reason for the choice of Gozem by drivers.

3.4. An activity dominated by married drivers

The newlyweds flocked massively to Gozem in order to provide family needs (Figure n° 5).

Figure 5: Distribution of Gozem drivers according to the matrimonial situation



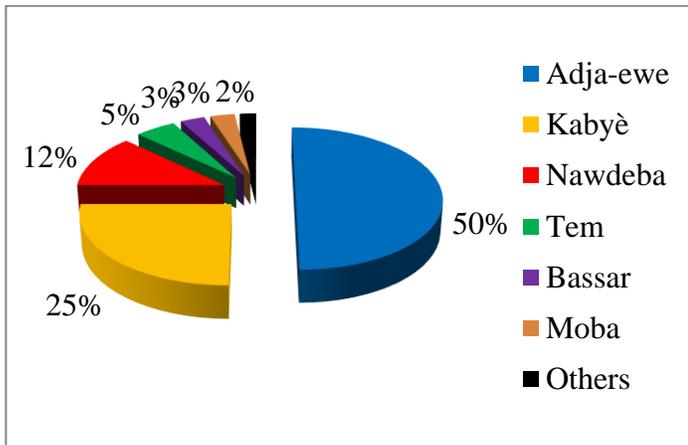
Source: Field work, 2021

According to the analysis of Figure 5, the bride and groom represent 52%, singles 28%, widowers 10% and divorced 4%. The unemployed bride and groom are embarking on the taxi-motorcycle profession in order to meet the quotient needs of their family. Singles are young unemployed graduates or having an end-of-learning diploma but has not yet opened a workshop. The Gozem service provides drivers with daily survival.

3.5. A strong representativeness of adj-e-weighed drivers

Gozem attracted a multitude of ethnic groups as indicated by Figure N ° 6.

Figure 6: Distribution of Gozem drivers according to the ethnic group



Source: Field work, 2021

The analysis of data in Figure N ° 6 shows 50% of drivers are from the Ethnic ADJA-E-WA group, 25% are Kabyè, 12% are Nawdéba and 5% are TEM. The Bassar and Moba respectfully make 3% and 2%. The strong predominance of adj-ewé is explained by the fact that they form the majority ethnicity of the Grand Lomé district. They are the peoples of ancient implantation. Kabyè are the majority group from immigration to the city of Lomé.

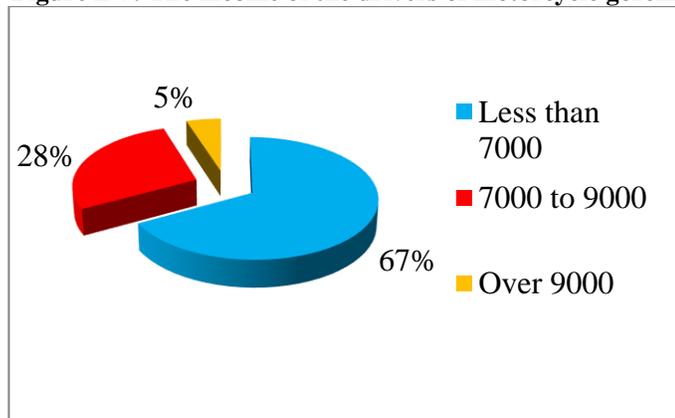
4. An activity that generates income to Gozem drivers

The Gozem service improves the living conditions of drivers thanks to the increase in revenues.

4.1. Gozem drivers income

Gozem drivers improve their income through application. The reduction in unnecessary travel and the high use of the Gozem population allows drivers to have an income higher than that of ordinary drivers. The use of the Gozem application is profitable if the driver applies and works regularly as indicated in Figure n ° 7.

Figure n°7: The income of the drivers of motorcycle gozem



Source: Field work, 2021

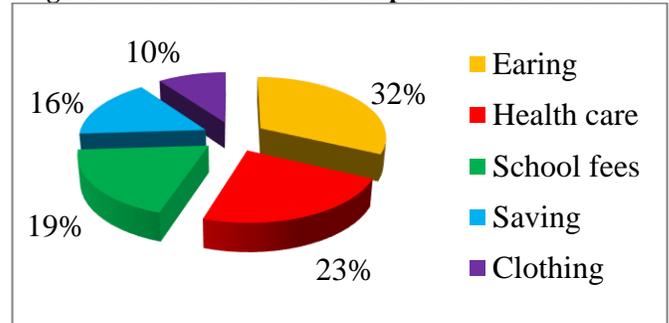
According to Figure n°7, 67% of motorcycle drivers from the Gozem service say they have a daily income below 7,000 CFA francs and only 5% have an income of more than 9,000 CFA francs. A driver says he earned at most 3,000 CFA francs per day, but with Gozem, his gain increased to 6,500 FCFA or 3,500 CFA francs more. The Gozem service has also set up a bonus measure to encourage drivers to work seriously to increase their daily gain. A recipe of 1,000 F CFA gives the right to a bonus of 100 F CFA, or 10% (direction Gosem, 2020). Beyond 7,000 F CFA in won,

the driver is entitled to 2,000 CFA F bonus. A driver who applies can make a recipe up to 60,000 CFA francs per week for vehicles and tricycles, or 50,000 CFA francs for motorcycle taxis (V. Tossou, 2020, p. 104). The daily income is above the poverty line which is 1,113 CFA francs per day (MFPTRAPS, 2018). This allows drivers to ensure basic basic needs and even save.

4.2. Income assignments

Driver's income enters mainly in family expenses (figure n ° 8).

Figure n ° 8: Ristribution of recipes from Gozem drivers



Source: Field work, 2021

The data in Figure N ° 8 shows the distribution of drivers income. Field work shows that 32% of revenue is intended for food, 23% for health care, 19% for the schooling of children and 16% for savings. This analysis then appears that 84% of the revenues fall directly into family needs and 16% are kept in savings. These savings are used for happy events such as marriage, parties and unfortunate events, especially deaths. Revenues from this activity allow these drivers to honor several basic expenses and even build a house. The work of the informal sector helps the survival of players in the field more. In the case of Gozem drivers, 16% of the revenues are spared, which is quite substantial to help actors get out of their social precarious situation.

5. Discussion

The Gozem service unlike other drivers is close to passengers. It offers the passenger the possibility of reducing his displacement from the house to a street in search of a taxi or a motorcycle. This was highlighted by Y. Sagna (2019, p. 53) when he writes that "the Gozem service offers the passenger the possibility of reducing their walking. It brings the motorcycle to the user back by playing on the first and the last segments of the mobility chain. " The Gozem service has become strong competition from ordinary transport methods in the city of Lomé. This competition has negatively impacted the motorcycle taxi drivers who lose customers. This aspect was shown by Mr. Dindji, A. Diabagaté, K. D. Houenenou and E. K. Brou (2016, p. 4) in their studies on motorcycle taxi drivers in Khorogo in Côte d'Ivoire. The advent of motorcycle-taxi transport in this Ivorian city has effect destroyed taxi transport by strong competition. The Gozem breaks with the traditional system in transport which consists in marauding in order to find customers. These are also forced to move from their houses to get out on the streets of the neighborhood in order to find a means of transport. With Gozem, it is the driver who goes to the passenger to his place. This aspect was shown by A. Guézéré (2012, p. 58) when he showed the importance of motorcycle taxis in the coverage of the peripheral districts of Lomé. According to

him, the Taxi-Moto has reduced the route of city dwellers of the periphery in search of a taxi-auto.

The advent of Gozem in Togo has created an innovation in taxi and taxi-motorcycle transport in the Lomé agglomeration. This application although innovative meets limits in its use. Indeed, to easily use the Gozem application, you must have a minimum secondary level of instruction and have average knowledge of the use of smartphones. This was highlighted by Y. Sagna (2019, p. 51) when he writes that the user of the Gozem application should have a minimum level of instruction of the first cycle study patent (BEPC). A driver who does not have proven knowledge in the use of smartphones cannot provide services with this company. It is also difficult for a passenger who does not know how to use these Android phones to make a reservation or to request a Gozem driver.

The use of the Gozem application in the periphery encounters problems due to street addressing. The driver cannot easily identify the passenger's situation in order to join him. The streets do not have a good plan with addresses, the orientation is difficult by the GPS. According to a study by the urban work execution agency (Agetur, 2020) on the addressing of streets in Lomé, "52% of the inhabitants of the city center against 76% on the outskirts do not know the addresses of the streets of their neighborhoods". The driver is forced to make additional calls to better find the passenger. This aspect was shown by V. Toullassi (2020, p. 107) in his study. According to her, the additional costs are caused to the driver and the passenger is forced to move from his house to place a benchmark fixed by the driver. Transport is no longer direct from door to door in the outskirts and districts that do not have an address of streets. Y. Sagna (2019, p. 53) adds by saying that "ultimately, the application only uses approximately the places of departure and destination within a radius that we estimate at fifty meters ».

CONCLUSION

Urban transport by Taxi-Moto is a sector that always escapes control of the public authorities. Efforts are made for the formalization of the sector through the "Zokeke" program initiated by the Delegation to the Organization of the Informal Sector (DOSI) in 2018. Private companies such emerging in order to formalize the sector, to improve the Conditions of movement by motorcycles of city dwellers and to improve the living conditions of drivers. Among these companies are the company Olé Togo and Zmobile which have developed the motorcycle system in Lomé and the Gozem start-up through which we order a driver via its application of the same name. The digitalization of urban transport in the Grand Lomé was done thanks to the Gozem start-up which is part of a movement of emergence of "services on demand" based on digital platforms putting in touch offer and demand in " real time ". The use of taxi-moto in the case of the Grand Lomé by the promoters of this innovation is explained by the fact that it constitutes by far the means of displacement most popular by the Lomeans for their daily trip. However, this application is difficult to handle by individuals weakly educated or who do not master the smartphone.

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Studies on seed germination of blackgram (*Vigna mungo* L. Hepper) under EMS induced mutagenesis

G.Vijay Kumar*¹, Raju Padiya², Bhattu Rajesh Nayak¹, G.Kumara Joshi¹, A. Yugandhar¹

¹.Department of Genetics, Osmania University, Hyderabad-07

².Department of Biochemistry, Osmania University, Hyderabad-07

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Abstract- The present study an attempt was made to determine the effect of the mutagen (EMS) on seed germination in blackgram mutation breeding program. The blackgram accession IC436585 was collected from NBPGR regional centre, Hyderabad was used in the present study. The results showed that the percentage (%) of seed germination in black gram, subjected to treatment with different concentrations of EMS is less than that of their Control. It is clearly indicates that the mutagen (EMS) have clearly exerted an inhibitory effect on seed germination. Percent of seed germination has decreased with an increase in concentration or dose of the mutagens (EMS). The results also revealed that the black gram cultivar was more sensitive to the mutagens EMS. The results also showed that the shoot and root length were decreased with an increase in concentration or dose of the mutagens (EMS). It may concluded that the blackgram genotype **IC 436585** may be germinated up to 0.3% EMS concentration to create variability in blackgram. Further variable lines are useful for crop improvement programme.

and its suitability to various cropping systems and niches, the production potential of blackgram crop should be enhanced by developing high yielding genotypes. However, as the genetic variability is very low in this crop due to cleistogamous nature and narrow genetic base among the released cultivars, the progress of breeding programmes is not in pace with the growing demands. As the genetic variability is essential for any crop improvement programme, induced mutagenesis could be one of the viable options to bridge this gap. In order to induce variable mutations both physical and chemical mutagens are most commonly used in crop plants. In mutation breeding, the success is highly proportionate to the choice of the genotype and the dose of the mutagen which are directly related to the production of desired mutants. The dose that leads to 50% lethality (LD50) has often been chosen for induction of mutations as the lower dose cannot cause mutation in seeds and the higher dose leads to death of the mutated seeds and other deleterious effects. Hence, understanding the sensitivity of genotypes to the mutagens and also determining the LD50 values of mutagens is highly useful for establishment of mutation breeding programme in a cost effective way.

Therefore, the present investigation was undertaken to study the sensitivity of two different blackgram varieties (LBG 752 and TBG 104) to gamma rays, EMS (EthyMethane Sulphonate) and MH (Maleic Hydrazide) treatments in M1 generation by considering the effects of mutagens on traits like germination, shoot length and root length and to determine the LD50 value for different mutagens by probit analysis. Hence, in the present study an attempt was made to determine the LD50 and the GR50 in determining the effect of the mutagens in blackgram mutation breeding program.

I. INTRODUCTION

Pulses are most important crops which provides higher proteins for the populations. Among pulses Blackgram (*Vigna mungo* (L.) Hepper) popularly known as urdbean, belongs to family Fabaceae. It is highly nutritious crop rich in seed protein content (24-28 per cent) and contributes 76 per cent carbohydrate, 3 to 5 per cent fibre, 1.74 per cent fat, vitamins like thiamine (B1), riboflavin (B2) and niacin (B3) and also rich in minerals like phosphorus, calcium, magnesium and potassium etc. (Elangaimannan *et al.*, 2008). This crop has an important role in meeting the dietary protein requirement, in particular, in South India where its products are daily used in different forms like idli, dosa and vada etc. The perusal of the statistics of blackgram showed that India is the largest producer in the world with an area of 5.28 million hectares with a production potential of 3.49 million tonnes and a productivity of 662 kg ha⁻¹ (Indiastat, 2017 - 18). Among the pulses, blackgram ranks fourth in area and production after chickpea, pigeonpea and mungbean and is one of the most highly prized pulses of India. However, the average yield of blackgram is very low in comparison to major grain legumes like chickpea and pigeonpea. Hence, in view of its growing importance

II. EXPERIMENTAL METHODOLOGY

The research work entitled with 'Studies on seed germination in blackgram (*Vigna mungo* L. Hepper) under EMS induced mutagenesis' was carried out at Department of genetics, Osmania University, Hyderabad during in the month of February, 2021. The blackgram accession IC436585 was collected from NBPGR regional centre, Hyderabad was used in the present study. Healthy and uniform size of blackgram (IC 436585) seeds (75) were surface sterilized with 0.1% mercuric

chloride solution for about one minute, washed thoroughly and soaked for 5 hrs in distilled water and treated with EMS in five different concentrations viz., 0.1, 0.2, 0.3, 0.4 and 0.5% and keep above five sets in incubator shaker (25 ± 1 °C) for 2 hrs. After two hrs, the seeds were thoroughly washed in running tap water to remove the residual mutagen from seed surface. Fifteen treated seeds of each concentration were placed in Petri plate in three replication along with untreated seeds for germination test. The germination was observed on the 6th day after treatment while shoot and root length of seedling was recorded on the 12 day.

III. RESULTS AND DISCUSSION

Effect of different concentration of EMS on biological parameters such as seed germination, shoot and root length (cm)

were studied. The results obtained are as follows. The percent seed germination in black gram, subjected to treatment with different concentrations of EMS is less than that of their Control. It is clearly indicates that the mutagen (EMS) have clearly exerted an inhibitory effect on seed germination. Percent of seed germination has decreased with an increase in concentration or dose of the mutagens (EMS). The percent of seed germination was 93.33% in Control of black gram. Maximum decrease in percent seed germination was observed with EMS (0.4 and 0.5%) (Fig.1). Thus 0.4 and 0.5% dose of EMS seemed very effective in reducing percent seed germination in black gram. The results also revealed that the black gram cultivar was more sensitive to the mutagens EMS.

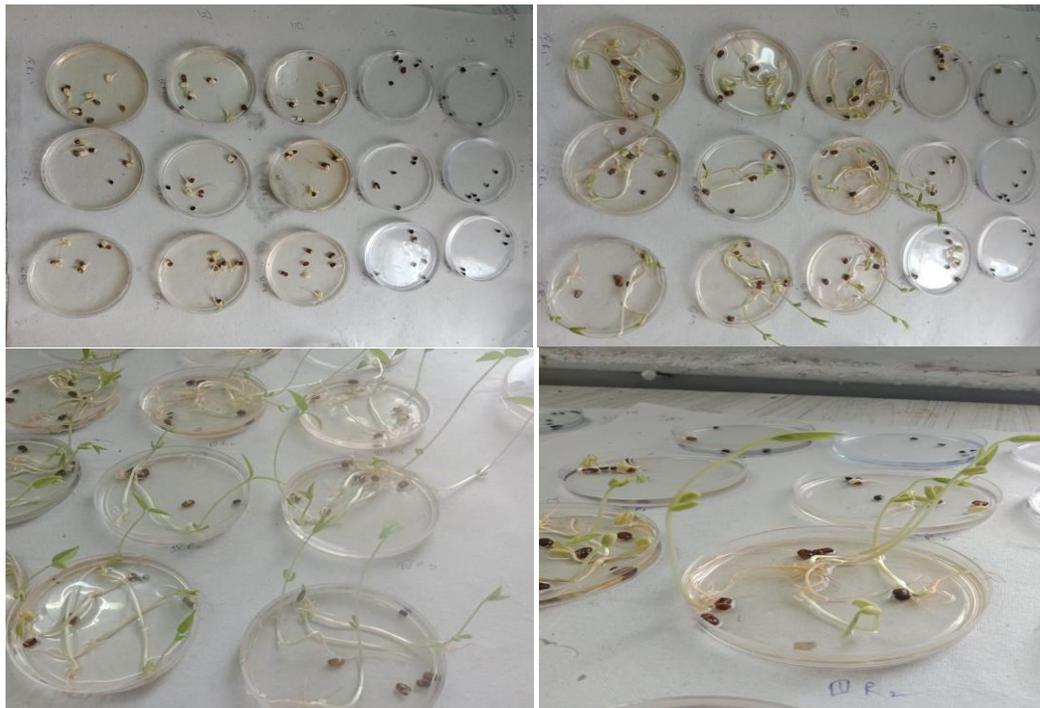


Fig.1. Germination of blackgram seeds induced by EMS mutagen

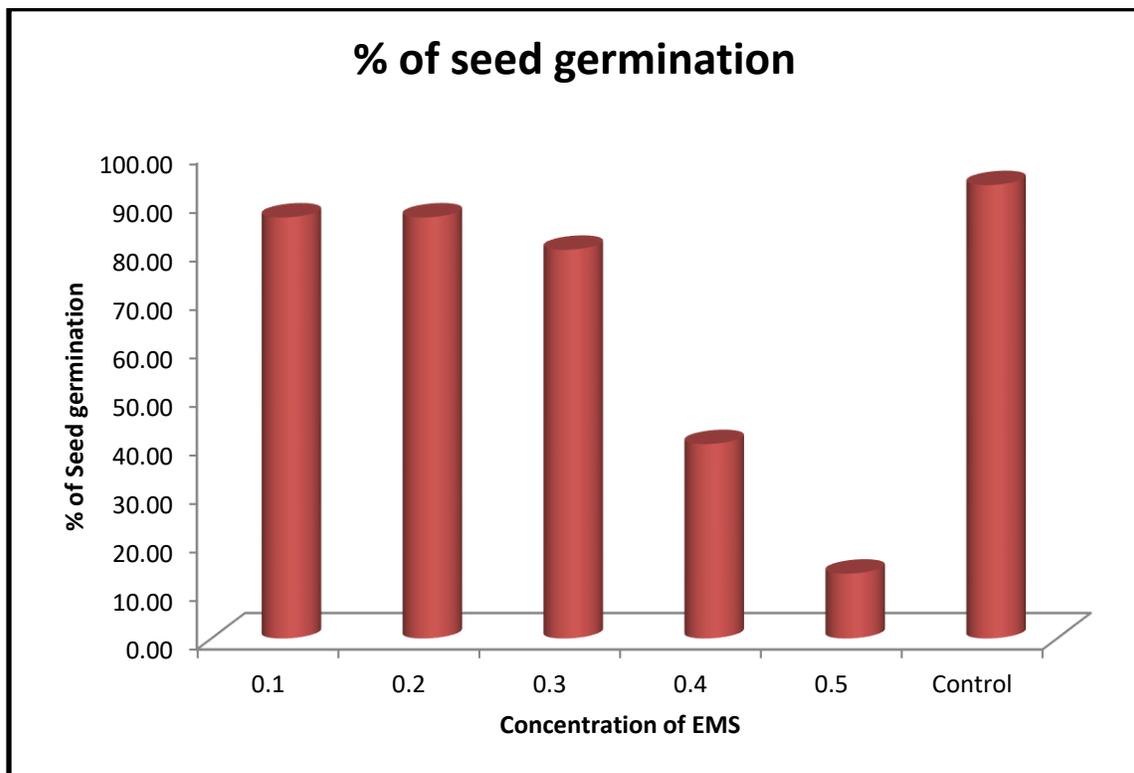


Fig.2. Graphical presentation germination percentage of blackgram seeds induced by EMS mutagen

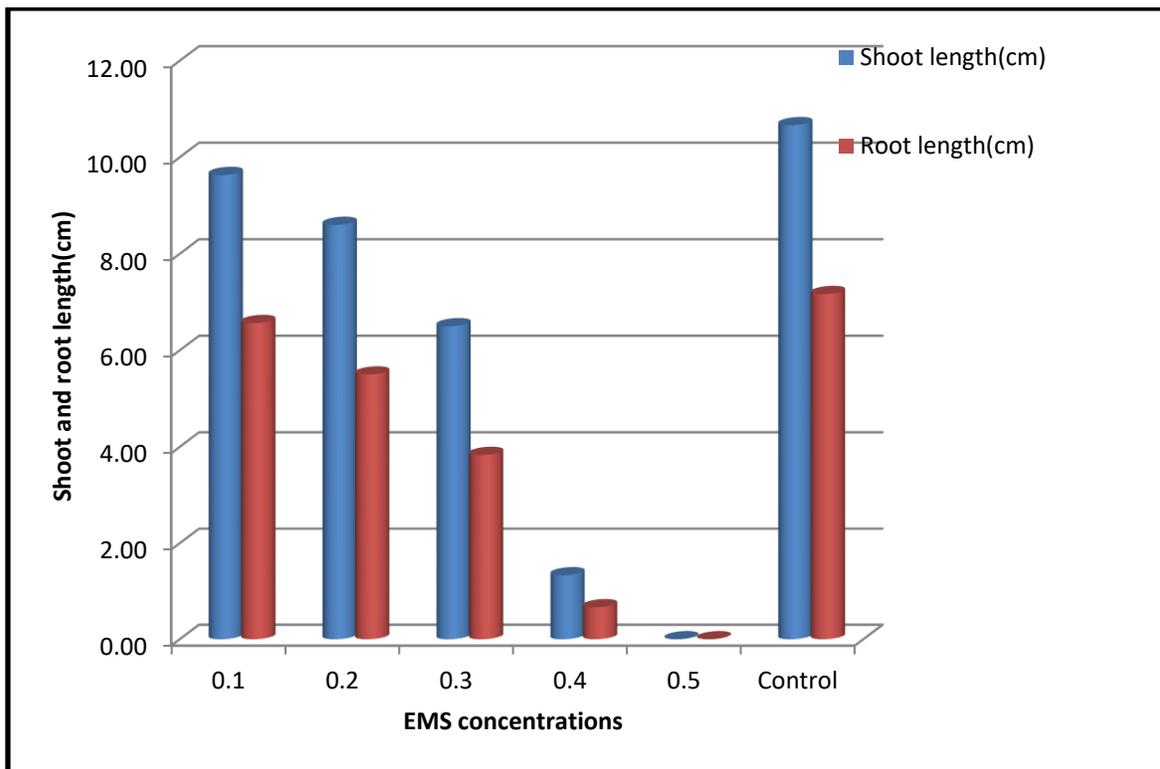


Fig.3. Graphical presentation of shoot and root length (cm) of blackgram induced by EMS mutagen

The results also showed that the shoot and root length were decreased with an increase in concentration or dose of the mutagens (EMS). The maximum shoot (9.63cm) and root length(6.57cm) were observed at 0.1% of EMS (Fig.2). Maximum decrease shoot and root length was observed with EMS (0.4 and

0.5%). The perusal of the results suggested that as the dose of mutagen was increased, the germination percent was reduced with impact more conspicuous at higher doses as compared to lower doses of gamma rays and EMS. The impact of germination could be attributed to damage in the seeds at the time of cell division in

the meristemic activity during the process of germination. The similar results have reported by Singh and Chaturvedi, 1980; Khan and Goyal, 2009 and Thanga, 2015 in *Vigna radiata*; Solanki and Sharma, 1994 in lentil; Sagade and Apparao, 2011, Dhasarathan *et al.*, 2014 and Ramya *et al.*, 2014 in *Vigna mungo*; Ariraman *et al.*, 2014 in *Cajanus cajan*; Umavathi and Mullainathan, 2014 in *Cicer arietinum*; Dhulgande *et al.*, 2015 in *Pisum sativum*; and Aparna *et al.*, 2013 in *Arachis hypogaea*. The reduction in radical length recorded in laboratory study has been attributed to change in levels of auxin and absorbic acid and to physiological and biochemical disturbance or chromosomal aberrations, changes in enzymatic activity, and impaired mitosis in the meristemic zone of growing seedlings. It might be due to decrease in respiratory quotient in the seedlings obtained from treated seeds. The similar results for radical length are also reported earlier by Sujay and Singh, 2001 and Thanga, 2015 in *Vigna radiata*; Rajiv Kumar *et al.*, 2008 in *Cyamopsis tetragonoloba*; Patel, 2008 in *Macrotyloma uniflorum*. Speed of germination decreased with increased dose of the mutagenic concentration this type of result obtained because of decrease in germination per cent with increased dose of mutagenic concentration. The impact of germination could be attributed to damage in the seeds at the time of cell division in the meristemic activity during the process of germination. The results are in accordance with the results of Aparna *et al.*, 2013 in *Arachis hypogaea*.

IV. CONCLUSION

The results indicated that the blackgram genotype IC 436585 may be germinated up to 0.3% EMS concentration to create variability in blackgram. Further variable lines are useful for crop improvement programs.

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AUTHORS

- First Author** – G.Vijay Kumar, Department of Genetics, Osmania University, Hyderabad-07
Second Author – Raju Padiya, Department of Biochemistry, Osmania University, Hyderabad-07
Third Author – Bhattu Rajesh Nayak, Department of Genetics, Osmania University, Hyderabad-07
Fourth Author – G.Kumara Joshi, Department of Genetics, Osmania University, Hyderabad-07
Fifth Author – A. Yugandhar, Department of Genetics, Osmania University, Hyderabad-07

Corresponding author: vijay.genetics@gmail.com

Subclinical Bovine Cryptosporidiosis and its Potential Risks in Cattle within Yangon Region

Babi Kyi Soe^{a*}, Khin Su Hlaing^b, Toe Win Naing^c, Khin Khin Pyae^d

^{a*}Livestock Upgrading Section, Livestock Breeding and Veterinary Department, Yangon, Myanmar

^bLivestock Upgrading Section, Livestock Breeding and Veterinary Department, Yangon, Myanmar

^cUniversity of Veterinary Science, Yangon, Myanmar

^dLivestock Breeding and Veterinary Department, Magway, Myanmar

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Abstract- A cross-sectional study was conducted to find out the prevalence and potential risk factors for shedding of *Cryptosporidium* spp. oocysts in cattle within Yangon Region. For this purpose, 350 fecal samples of cattle were collected from five quarters within Yangon region. The microscopic examination was performed with modified Ziehl-Neelsen (Z-N) staining. Pearson Chi-square test was used to determine potential risk factors. Among the fecal samples examined, 53.1% (186/350) were positive for *Cryptosporidium* spp. oocyst. Less than 6mth old calves had 2 times higher probability than the age group of 6mth-2yrs (CI: 1.04-3.7, p: 0.000, OR: 1.96) and had 13 times more likelihood than age group of >2yrs (CI: 1.02-4.1, p: 0.03, OR: 12.8). High risk of exposure to *Cryptosporidium* spp. infection was occurred in cattle of using river water supply (CI: 1.03-3.6, p: 0.05, OR: 2.97). Since *Cryptosporidium* spp. infection is zoonotic which can also cause major loss of productivity, routine fecal examination and control measures should be provided.

Index Terms- cattle, *Cryptosporidium* spp., microscopy, Ziehl-Neelsen

I. INTRODUCTION

Cryptosporidium spp., an intracellular coccidian parasite, become an interesting emerging infection for its opportunistic behavior in immunodeficiency patients (Petersen, 1992). *Cryptosporidium* spp. were recognized worldwide that can cause chronic and severe diarrhea (Fayer and Ungar, 1986). Regarding the impact on socioeconomic development, *Cryptosporidium* spp. has been included in the “Neglected Disease Initiative” of the World Health Organization (Geurden and O’Handley, 2011). Growth impairment, physical fitness and cognitive function in early childhood have been associated with *Cryptosporidium* spp. infections (Guerrant *et al.*, 1999). Transmission mode could be either direct contact or consumption of contaminated food and water indirectly (Dixon, 2009). In Myanmar, 3.4% of cryptosporidiosis was occurred previously in infants between 2-11 months of age with acute diarrhea (Aye *et al.*, 1994).

On the aspect of conventional microscopic techniques, modified Ziehl-Neelsen (ZN) staining has been used to determine

Cryptosporidium spp. oocyst in fecal samples even the sensitivity was low (Omoruyi *et al.*, 2014). Apart from microscopic examination, sandwich antigen detection enzyme linked immunosorbent assay (sad-ELISA) and molecular base technology have been evaluated. However, their cost, technician involvement and time-consuming made conventional microscopic still preferable one.

Cattle have been investigated as potential source for human cryptosporidiosis (Inpankaew *et al.*, 2010). Globally, *Cryptosporidium* spp. has been recognized as major causal organism of neonatal enteritis in calves (Mosier and Oberst, 2000). In Myanmar, 57.3% of calves within Mandalay Region has been tested as positive to *Cryptosporidium* spp. infection. In 2009, the overall prevalence of 56% has been reported in cattle from Yamethin and Pyawbwe Townships, Mandalay Region (data not published). Apart from central part of Myanmar, 100% in cattle, 52.5% in buffalo and 24.6% in mithun have been reported in Matupi Township, Chin State (data not published). However, the information on prevalence of *Cryptosporidium* spp. infection in cattle within Yangon Region has not been identified yet whereas Yangon is the second largest cattle industry in Myanmar (LBVD, 2019). Therefore, this study aimed to determine the prevalence of *Cryptosporidium* spp. infection in cattle within Yangon Region and to access the associated risk factors. This information may provide knowledge of infection within region and support for control measures.

II. MATERIALS AND METHODS

2.1 Sample size calculation and sample collection

A cross sectional study was carried out within five villages in Yangon region (16.8409° N, 96.1735° E) in June – September 2017 (Figure. 1). The sample size was calculated using the formula described by Daniel, 1995 with estimated prevalence of 50%. The demographic data of sample animals was shown in (Table. 1). Amount of 25g fecal sample was collected per rectum directly. Separate disposable gloves and zip-locked plastic bags were used for sample collection. Then, the bags were labeled with cattle individual identity and were carried to Parasitology Laboratory of

Livestock Breeding and Veterinary Department, Mingaladon Township, Yangon using ice boxes. The samples were kept at 4°C refrigerator and examined within 12 hr after collection.



Figure 1. Geography map of study area; Yangon Region

Table 1. Demographic data of study animals

Demographic data	% (n)
Gender	
Male	57.1 (200/350)
Female	42.9 (150/350)
Age	
>6months	44.9(157/350)
6 mth – 2 yrs	29.7 (104/350)
>2yrs	25.4 (89/350)
Breed	
Local	53.7 (188/350)
Crossbred	46.3 (162/350)
Water source	
River water	57.7 (202/350)
Private wells	42.3 (148/350)

2.2 Identification of *Cryptosporidium* spp. oocysts by modified Z-N stain

Identification of *Cryptosporidium* spp. oocyst was conducted using modified Ziehl–Neelsen (Z-N) staining method (Clarke and McIntyre, 2001). Briefly, thin fecal smear was done, left air dried and fixed in the absolute methanol for 2-3 minutes. The smear was stained with cold carbol-fuchsin for 5-10 minutes and differentiated in 1% hydrochloric acid-ethanol until color disappeared. Thereafter, the slides were rinsed in tap water and counterstained with 0.25% malachite green for 30 seconds. Then, it was rinsed in tap water again, blotted or drained dry. Finally, the

stained smear was examined for oocyst morphology using high power objective 40×. Regarding of oocyst scoring system of Dagnall Teaching Laboratory, Liverpool School of Tropical Medicine, oocyst density of each sample was determined as follows: rare (+) for less than 5 oocysts per slide; few to moderate (++) for 5-10 oocysts per field of view; and numerous (+++) for up to 11 oocysts per field of view. For each smear, 20 viewing fields covered at 1,000× magnification.

2.3 Statistical analysis

Data files of questionnaires and laboratory results were entered into Microsoft Excel Sheet. Pearson Chi-square test was used to identify hypothesized risk factors of *Cryptosporidium* spp. infected animal by using SPSS version 17 at 95% Confidence Interval (CI).

III. RESULTS AND DISCUSSION

Out of 350 fecal samples, 186 samples (53.1%) showed *Cryptosporidium* spp. infection positive. The overall prevalence of *Cryptosporidium* spp. infection was found 53.1% in current study, which was similar to the previous findings of 57.3% in Mandalay city (Lay *et al.*, 2008), 56% in Pyawbwe and Yamethin Townships (Bawm *et al.*, 2014). Interestingly, all of the infected animals did not show any clinical symptoms.

In current study, prevalence of above 50% shown to be relatively higher than compared to neighboring countries, 0.6%, 12.5% and 11.9% in Thailand (Inpankaew *et al.*, 2010, India (Baht *et al.*, 2012) and China (Gong *et al.*, 2017), respectively. Since molecular characterization of *Cryptosporidium* on species level in cattle haven't done yet in Myanmar and thus, the zoonotic potential of bovine cryptosporidiosis becomes critical for further detail.

Oocyst density of *Cryptosporidium* spp. in the study area was observed as 45.7% (160/350) for + and 7.4% (26/350) for +

+. There was no samples showed + + +. In present study, most of all positive animals were asymptomatic and therefore, it could be noted that those animals were subclinically infected. As single oocyst is sufficient to produce infection and disease in susceptible hosts, the infected animal could serve as reservoir (Pereira *et al.*, 2002).

According to statistical analysis, factors of age and water supply were associated with the presence of *Cryptosporidium* spp. infection (Table. 2). In detail, less than 6mth old age had the highest prevalence rate 78.3% (123/157) followed by 6mth – 2yrs of 35.6% (37/104) and >2yrs of 29.2% (26/89). The calves less than 6mth had 2 times more likely to be infected than 6mth-2yrs and 13 times more likely to be infected than >2yrs. In calves, there was more chance on occurrence of oocyst because of viability of oocyst in soil have been reported up to 60 days (Lim *et al.*, 1999). Therefore, sanitation management of calves and their manure could be critical to prevent infection. Apart from that, high prevalence rate in calves could be due to their low immune response and thus susceptible to infection (Thompson *et al.*, 2017). This information corroborates with previous reports of Quilez *et al.*, 1996, Lefay *et al.*, 2000 and Castro-Hermida *et al.*, 2002 in which the prevalence was significantly higher in newborn and suckling calves as oocyst shedding was negatively correlated with age Nasir *et al.* (2009).

Table 2. Association between *Cryptosporidium* spp. infection and potential risk factors

No.	Risk factors	Positive		p- value	OR (95%CI)
		Number of animals	Prevalence (%)		
1.	Gender			0.98	1.79 (0.98-3.2)
	Male	84	42.0		
	Female	102	68.0		
2.	Age			0.03	12.8 (1.02-4.1)
	<6 mth	123	78.3		
	6 mth-2 yrs	37	35.6		
3.	Breed			0.57	1.78 (0.12-0.63)
	Indigenous	97	51.6		
4.	Water source			0.05	2.97 (1.03-3.6)
	River water	133	65.8		
	Private wells	53	35.8		

On behalf of breed, there was no difference between indigenous and crossbred. Thus, breed factor had been shown without any association with the presence of infection as previously described (Ayele *et al.*, 2018). Moreover, sample size of our study reflects gender equality thus, it couldn't favor to show significant difference between male and female.

Regarding to our findings, the farm with river water supply had more chances to get infection compared to private wells. Since the grazing pastures were supplied by river water, it could probably be infected to the farming site as different way of infection (Bawm *et al.*, 2014). In current study, all of the sample animals were kept intensive farming and feed with cut and curry system. Apart from that, the source of water for both human and animal come from the river nearby Yangon. Therefore, it could be

possible that water troughs might serve as reservoir because drinking of contaminated river water have been reported as waterborne route of *Cryptosporidium* spp. infection (Shirley *et al.*, 2012). Sanitation practice and proper handling of cattle manure could be improved since excreted feces from infected animal found to be infected others (Vermeulen *et al.*, 2019).

The present finding was the first investigation on the prevalence of *Cryptosporidium* spp. infection in cattle within Yangon region. Our study pointed out that calves were being at high risk of infection than older ones. As public concern of this parasite, awareness on prevalence and associated factors for shedding of *Cryptosporidium* spp. oocyst might be helpful in designing prevention strategies. To address their impact, molecular characterization should be performed in order to

identify species level. Moreover, assessment of potential risk relevant with human infection are also necessary to find out.

IV. CONCLUSION

According to present study, the overall prevalence of bovine *Cryptosporidium* spp. infection within Yangon region was 53.1% in which *Cryptosporidium* spp. infection was more well encountered in calves younger than 6 months. Out of positive cattle, 45.7% were shed *Cryptosporidium* spp. oocyst with rare rate (+) while 7.4% of cattle shed moderately (+ +). Contaminated river water supply could be investigated further for public health concerns as the cattle used river water supply found to be infected significantly. Although we haven't done for molecular characterization, this study could benefit in designing control measures.

Declaration of Competing Interests

The authors declare that there are no competing interests.

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AUTHORS

First Author – Babi Kyi Soe, Livestock Upgrading Section, Livestock Breeding and Veterinary Department, Yangon, Myanmar

Second Author – Khin Su Hlaing, Livestock Upgrading Section, Livestock Breeding and Veterinary Department, Yangon, Myanmar

Third Author – Toe Win Naing, University of Veterinary Science, Yangon, Myanmar

Fourth Author – Khin Khin Pyae, Livestock Breeding and Veterinary Department, Magway, Myanmar

Corresponding author: babikisoe.vet@gmail.com

Abattoir Waste Management Strategies In Nigeria: A Case of Ota, Ogun State Nigeria

Thomas A. JOACHIM¹, Ifeoluwa AKANDE² and Teminijesu OKE³

^{1,2,3} Department of Architecture, Bells University of Technology, Ota, Ogun State.

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Abstract- High production of meat and meat products for human consumption has led to high waste generation from abattoirs. Nigeria as a developing nation has been characterised by inadequate waste disposal, treatment, and management technologies leading to pollution. Therefore, the study aims at evaluating abattoir waste management strategies in the Ota abattoir. A structured questionnaire, personal observation, and one-on-one interviews were used to gather data for the study. Waste generated includes blood, dungs, rumen fluid, carcasses, blood, hoofs, and blood. Findings from the study revealed there is no proper strategy put in place for the management and treatment of abattoir waste within the study area and the recycling potential of the waste product is not explored. The current disposal method utilised in the abattoir were unsatisfactory, not hygienic, contributes to global warming, and does not meet up to global standard. The study, therefore, recommends that Stakeholders, individuals, and government agencies need to explore the recycling potentials of animal waste for the production of valuable products, job creation, sustainable environment, wealth creation, a reduced waste product, and economic growth. Built professionals should also be employed in planning, designing, and setting up an abattoir facility to ensure all checklists are met.

Index Terms- Abattoir, environment waste, waste management, and recycling.

I. INTRODUCTION

In an attempt to continuously increase livestock production, animal protein, and human per capita consumption, a key pivot in the achievement of the SDG (Sustainable Development Goal) 2, there are related environmental and health issues associated with livestock waste generation (Koul, Yakoob, & Shah, 2022). Failure to adhere to strict Good Manufacturing Practices (GMP) and Good Hygiene Practice (GHP) within the abattoir facility gives rise to pollution. In Nigeria, slaughterhouses are usually littered with non-meat products and waste which needs to be explored for recycling into valuable by-products for domestic, agricultural, and industrial use (Daniel, John, Yusuf, & Onyedikachukwu, 2021). Some of which include biogas production from dung and rumen fluid, biodiesel from animal fat, biomethane filtration from bones, and blood processing (Adebowale, Oziegbe, Obafemi, Ahuekwe, & Oranusi, 2022).

Abattoir operations generate different types of highly organic waste at different levels involved in the process right from animal arrival to meat packaging (fig.1). The Abattoir facility has various waste and waste generation points and handling options. But in many countries, the abattoirs are not just crude but the wastes generated are not treated before disposal. Also, the regulatory bodies are never up to their duties to monitor the processing activities and the disposal of the waste (Hantoko, et al., 2021).

Abattoir wastes consist of several pollutants such as faeces, blood, bone, hone, fat, animal trimmings, paunch content and urine from operations, stunning or bleeding, carcass processing, and by-product processing (Vinayak, et al., 2021). These abattoir wastes can be classified as solid, liquid, and gas. Solid wastes include manure, intestinal contents, hairs, horns, hooves, gallbladders, trimmings, internal organs, bones, condemned carcasses or body parts, paper, cartons, and plastics. The liquid waste slaughterhouse consists of urine, blood, and wastewater from the slaughter processes. Odors and emissions on the other hand are the forms of slaughterhouse gaseous nutrient input for agricultural production including waste (Pandit, et al., 2021).

Abattoir waste can be detrimental to public health, animal health, and the economy of the country if they are not properly and effectively managed and controlled (Odjadjare & Ebowemen, 2020). Abattoirs often have difficulties in

disposing of, treating, and processing these wastes in an environmentally acceptable mode (Obigiegwu, Chineke, Ubajaka, & Adogu, 2019). Due to these reasons, there is a high risk of environmental pollution like underground water pollution, air pollution, nuisance, odour, soil pollution, and public health risks through the transmission of zoonotic diseases to humans (Alayu & Yirgu, 2018).

Abattoir wastes are considered potential polluters of the surface, underground waters as well as air quality, which pose health challenges to the residents living in the abattoir’s vicinity (Dada, Odufuwa, Badiora, Agbabiaka, Ogunseye, & Samuel, 2021). Such a health problem can be spread to the general populace if care is not taken. There is little or no attention paid to SH waste management by the operators, policymakers, and the government. Ogun state is not even close to exploring the recycling of abattoir wastes despite the existing potential. There seem not to be any strategy in place for waste management and recycling. Therefore, the authors explored the healthiest possible slaughterhouse waste management practices and strategies and see it can be **implemented in Ogun state and Nigeria at large.**

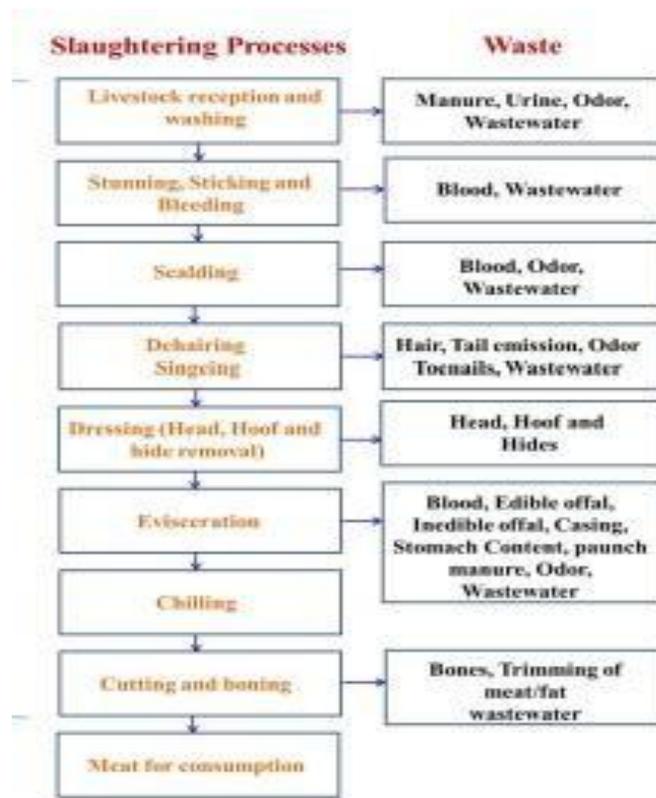


Figure 1: Animal Slaughter Process and Waste Generated (Guardian, 2018)

II. METHODOLOGY

The study was undertaken to establish waste generation and strategies utilised for disposal and management of abattoir waste in Ota, Ogun State, Nigeria. The methods involved in achieving the study aim are explained below;

2.1 Research Design

This study was designed to take opinions and draw inferences on the need to take into account the various types of waste generation, disposal, and management methods in designing a sustainable abattoir. The cross-sectional study approach was used in this study. The stud utilized both quantitative and qualitative study approaches and the theoretical study was based on what was found in existing pieces of literature. The cross-sectional study was used to find out the prevalence of the situation in the abattoir by taking representative samples (Meshi, Cotten, & Bender, 2020).

2.2 Study Area

Ota town is located within Ado-odo/Ota Local Government Area of Ogun State, South-West Nigeria. Ota is located on the latitude 6°40'29.57"N and longitude 3°11'52.99"E. It is bounded in the south by Agege and Alimoso in Lagos state, in the North by Ifo and Agbado of Ifo local government of Ogun state, Owode Idi-Iroko, a border town to the Benin Republic forms the boundary in the west (See fig. 2).

Ota has the third-largest concentration of industries in Nigeria. It also possesses a large market and an important road junction, found just north of the tollgate on the Lagos - Abeokuta Expressway. Ota. Historically, Ota is the capital of the Awori Yoruba tribe.

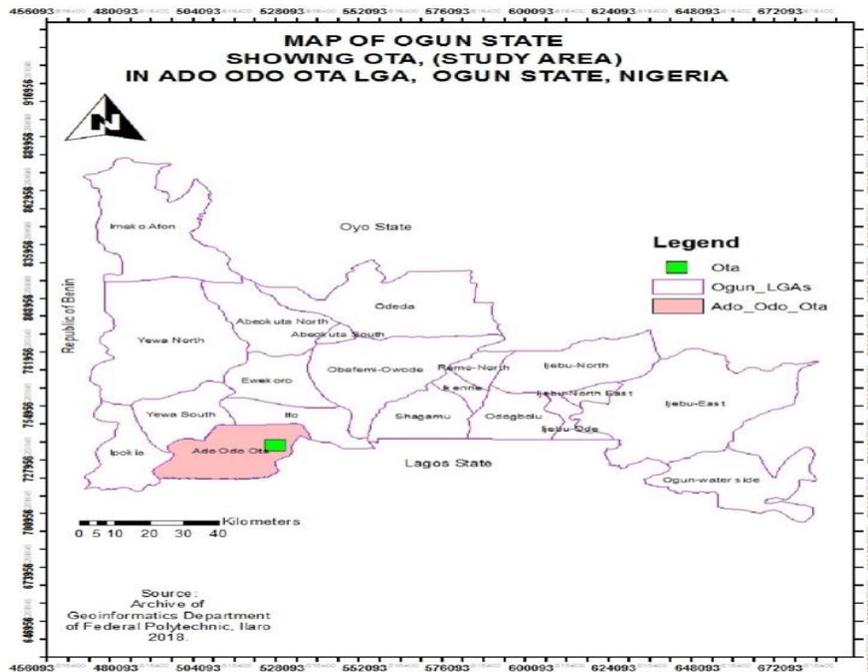


Figure 2: Map of Ota, Ogun State, Nigeria (Ajala, 2019)

2.3 Study Population

The target population for this study was abattoir operators, that is business owners and workers within the abattoir. The study sampling aimed at gathering deep information about the research. Two abattoirs were considered in the study area.

2.4 Instrumentation

The instruments used for data collection were; observations, interviews, and questionnaires. The non-participant observation type was used. The questionnaire was made up of questions that responded to the study goals which included both closed-ended and open-ended questions (Krosnick & Presser, 2009), the close-ended question form is used for specificity and to make a comparison of results possible (Krosnick & Presser, 2009), the open-ended questions add richness to issues that appear difficult if not impossible to approach with close-ended questions (LaDonna, Taylor, & Lingard, 2018). A structured interview was conducted to gather additional information related to the types and management of wastes in the selected abattoirs.

2.5 Data Analysis

Data from this research work was analysed using descriptive and narrative analysis following the research objectives and questions. The descriptive analysis made use of position measures like percentage and frequency.

III. RESULT AND DISCUSSION

3.1 Respondents Profile

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A total of 48 responses were received out of 60 questionnaires shared within 2 abattoirs in Ota, Ogun State (Arobieke abattoir, Idiroko and Iyesi Abattoir, Iyan Iyesi). Table 1 shows the distribution of respondents according to their gender and age group. 46 respondents were male and just 2 were female. The result tallies with existing works of literature on the male gender being the predominant in the abattoir operation process (Ogunseye, et al., 2021). The highest number of respondents were between 31-40 years of age (29.17%). The table shows that the youth are greatly involved in abattoir operations which is similar to findings from Adeolu et al., (2019) and Obidiegwu et al., (2019).

Table 1: Distribution of Respondents According to Gender and Age Group

	Category	Frequency	Percentage (%)
Gender	Male	46	95.83
	Female	2	4.17
	Total	48	100
Age Group (years)	Below 20	2	4.17
	21-30	13	27.08
	31-40	14	29.17
	41-50	10	20.83
	Above 50	9	18.75
	Total	48	100

Table 2: Distribution of Respondents According to Education Level, Marital Status, and Tribe

	Category	Frequency	%
Education	No education	12	25
	Primary	26	54.17
	Secondary	9	18.75
	Tertiary	1	2.08
	Total	48	100
Marital Status	Single	9	18.75
	Married	38	79.17
	Divorced	1	2.08
	Widowed	0	0
	Total	48	100
Tribe	Yoruba	37	77.08
	Igbo	1	2.8
	Hausa	7	14.60
	Others	3	6.35
	Total	48	100

Table 2 shows the respondents' educational level, marital status, and tribe. The majority of the abattoir operators were married (79.1%) and most of them belong to the Yoruba tribe, this could be linked to the study area. Ota is a southwestern state in Nigeria dominated by the Yoruba. Other tribes include; Hausa, Igbo, and Fulani.

Over half of the respondents (54.71%) had primary education and 25% had no education. This indicates that the majority of the abattoir workers are not well read and the work carried out with the abattoir doesn't require education. For example, respondents sampled were engaged as cow owners/sellers, labourers, butchers, and cleaners (fig. 3). Fig. 4 shows that most of them receive a monthly income of between #30,001 to #90,000. This indicates that the majority of the abattoir operators receive more than the Nigerian Government allocated minimum wage of #30,000.

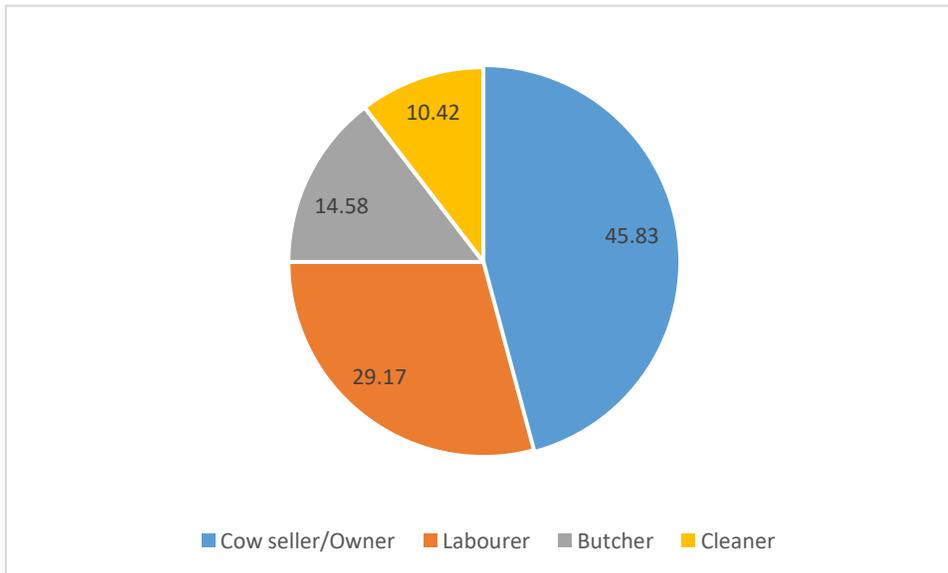


Figure 3: Operators' Nature of Work Involvement (%)

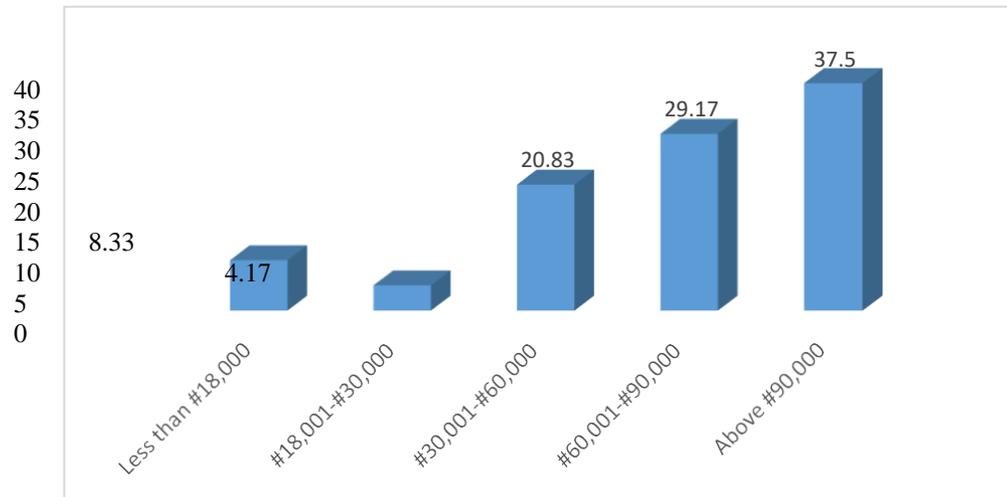


Figure 4: Operators' Monthly Income (%)

A very good percentage of the abattoir operators have more than 5 years of experience (figure 5) indicating that they are well aware of the abattoir operational practices. This implies that the operators stand in good stead to provide information regarding waste management practices within the abattoir facility.

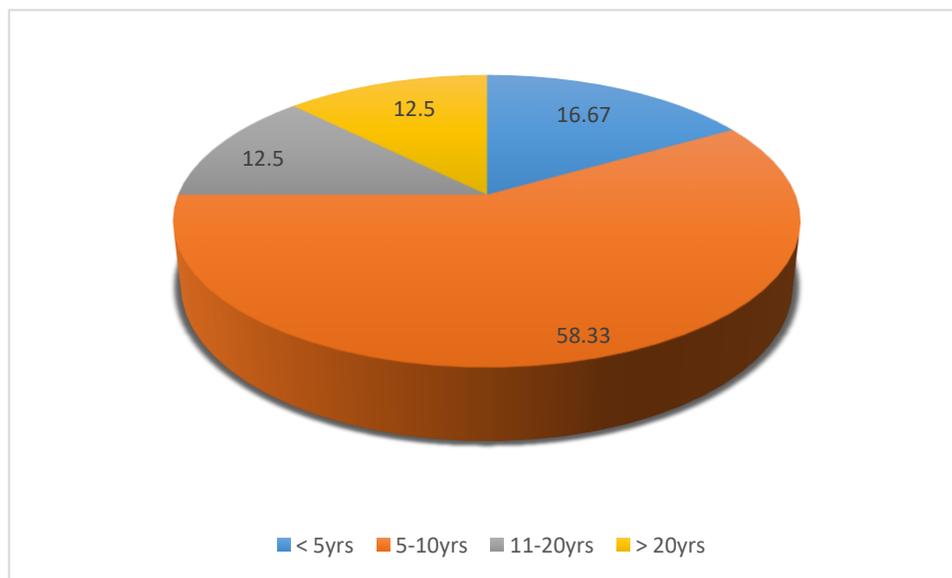


Figure 5: Operators' Years of Experience (%)

3.2 Abattoir Operations and Facilities

Abattoirs visited within Ota are managed by individuals with a production rate of between 7 to 12 cows slaughtered per day serving the locality since their inception. Activities carried out within the abattoirs include cow slaughtering, inspection, processing (stunning, deboning, meat washing, meat cutting), and meat marketing (buying and selling to residents for house consumption and food sellers). Fig. 6

For smooth operations at an abattoir, some basic facilities are not to be compromised such as water supply, electricity, and cold room for preservation. Water used within the facility is gotten from a borehole and well (fig.7). The abattoir visited within the study area does not have a cold room facility for storage, so leftover meat is stored outside the facility using generating sets.

The major source of electricity within the abattoir facility is via generators this is due to the lack of adequate power supply and high electricity tariff. The use of generating sets has an effect on the environment and people due to air pollution through the emission of carbon.



Figure 6: Slaughtering process



Figure 7: View of Slaughter slab. Water is Supplied into Water Tank Storage directly from the borehole.

3.3 Waste Generation and Management

Waste generated for the abattoir includes cow dungs, rumen fluids, bones, hair, blood, horns, and hooves. Observation also showed that there is no proper waste storage mechanism for the waste generated within the facility although some of the waste are been sold to intending buyers (farmers, horticulturists, and industries). Table 3 shows some waste generated and intended use by the buyers as documented by an interview conducted within the facility. Literature has also documented some potential use of different abattoir waste. Adebowale et al., (2022) utilised rumen fluid and corn stover for biogas production analysing that the rumen fluid from cows serves as the inoculum for the production of methanogenic bacteria that produces methane which is a major component of biogas. Biogas can be used at home as a source of cooking gas or electricity. Research from the biotechnology department SIR M VISVESVARAYA INSTITUTE OF TECHNOLOGY, BANGALORE produced biodiesel from slaughterhouse waste using animal fat.

Table 3: Abattoir Waste Products, Intending Use, and Frequency of Collection

S/N	Waste Products	Intending Use	Frequency of Collection
1.	Cow dungs	Mostly used as fertilizers by farmers and horticulturists.	At least twice a month
2.	Bones	Mostly sold to plastic manufacturers.	At least twice a month
3.	Cow horns and hooves	Used as animal feed, ceramics, buttons, etc.	Once a month
4.	Blood	Used as animal protein feed	Everyday
5.	Pancreas (oronro eran)	Serve as medicine for sickle cell patients.	Not sure

IV. CONCLUSION AND RECOMMENDATION

In conclusion, resolving issues attaining to waste management, disposal, and treatment in Ogun State, Nigeria should be collaborative involving the Government, individuals, abattoir operators, and management of abattoirs. This is important to attain specific needs involved in the planning and implementation of chosen alternative strategies. In addition, modernisation of abattoir structures, installations of basic facilities, treatment of waste, and best practices are required. The study validated the recycling characteristics of abattoir waste through the visit by farmers and industries to source waste products, process and convert them into valuable products (such as fertilizers, ceramics, and animal feeds). Therefore, the study recommends that Abattoir waste recycling methods should be explored towards creating a hygienic facility, increasing job opportunities, waste to wealth creation, and improved economic growth. There is a need for implementation of proper guidelines on setting up an abattoir, the guidelines should address issues about meat handling, hygiene, waste management, treatment, and recycling. Built professionals must be involved in the setting up process right from the design process to the full facility delivery this will ensure all checklists are met.

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AUTHORS

First Author – Thomas A. JOACHIM, Department of Architecture, Bells University of Technology, Ota, Ogun State.

Second Author – Ifeoluwa AKANDE, Department of Architecture, Bells University of Technology, Ota, Ogun State.

Third Author – Teminijesu OKE, Department of Architecture, Bells University of Technology, Ota, Ogun State.

Corresponding author's email: thomasayorinde.j@gmail.com

The social act, the social action and the social interactions: a secure basis for social bonding

Francesco Paolo Pinello

University of Enna "Kore", Italy
Sciences of Man and Society

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Abstract: I consider it useful to compare George H. Mead's conception of social act, Talcott Parsons' conception of social action and Florian Znaniecki's biographical method, from the perspective not only of sociology but, more generally, of cognitive sciences and John Bowlby's attachment theory. Parsons, who took up some of the theoretical ideas of Vilfredo Pareto, Émile Durkheim and Max Weber, is certainly one of the most important classical authors for the sociological study of the structure of social action. Mead's theoretical positions are compatible with current approaches to cognition (4E programme of empirical-pragmatic implementation) and the "pragmatic turn" in the cognitive sciences. As Charles W. Morris writes, Mead and Lev S. Vygotskij are the classic authors to refer to for the study of consciousness and the self, starting from the processes of interpersonal and social networks and communicative instruments (gestures and acts). Also starting from interpersonal and social networks and communicative tools (gestures and acts), with particular reference to the mother and child, Bowlby theorised an ethological behavioural psychology of attachment and the secure base. Florian Znaniecki, together with William Isaac Thomas, is considered the originator of the biographical method.

Index Terms – social act, social action, social interaction, biographical method, secure attachment basis, cognitive sciences.

1. INTRODUCTION

In the book «Mente, sé e società» («Mind, Self and Society», see Mead, 2018), drawn up and published posthumously in 1934 (by his pupil Charles W. Morris, the originator of semiotics), Mead, with a "more extensive and more appropriate behaviorism" and pragmatic-ethological manner, addresses the questions of mind, self-awareness/consciousness (the self) and society. The results of some of the research he cites are now outdated, yet the general framework of his work is still valid and rich in insights for making, as we shall see, connections with other very important works by influential authors. However, it must be pointed out that, as Baggio (2018) writes, many of the theses of the classical pragmatists (James, Dewey, Mead) are compatible with current approaches to cognition (4E program of empirical-pragmatic implementation). Consider, for example, what Menary (2016) writes or Baggio's theoretical proposal that problematises the Deweyan notion of "experience" and replaces it with the Meadian notion of "act". The act is «a "unit of existence" that expresses the reciprocal conditioning relationship between the various phases of the organism-environment transaction, it is at the origin of the organic cognitive process» (Baggio, 2018, p. 55); in it, perception and action are inextricably linked.

For Baggio (2018) the theory of perception in action of Mead (act theory, percept, habitual responses to familiar objects, first-person perspective and third-person perspective, *imagery* and patterns of action) is easily approachable to the cognitive theory enacted (one of the 4E of the empirical-pragmatic implementation program: the *enactivism* and its relations to Mead's theories are rooted in Merleau-Ponty's phenomenology of perception, see Rosenthal & Bourgeois, 1991; Merleau-Ponty, 1942), even though Noë (2004) denies any kind of representation (internal advance representation, pattern of action: problem of *imagery* and the dispute between representationalists and anti-representationalists; on the *Vision*, see Marr, 1982; Tabossi, 1998). For Mead as for Merleau-Ponty perceptual activity plays a central role in the development of human consciousness. In organic interaction, primarily for sense-motor stimulation, the mind comes to be constituted as a property of a particular field of interacting events (see Baggio, 2018, p. 48).

For a basic minimum starting update of the issues related to the researches results used by Mead, see in De Palma & Pareti (2015): John J. C. Smart, «Sensazioni e processi cerebrali» (Sensations and Brain Processes); David M. Armstrong, «La natura della mente» (The nature of mind); Hilary Putnam, «La natura degli stati mentali» (The nature of mental states); Donald H. Davidson, «Eventi mentali» (Mental events); Jaegwon Kim, «La sopravvenienza come concetto filosofico» (Supervenience as a philosophical concept); David H. Hubel, «Neurobiologia: una scienza bisognosa di un Copernico» (Neurobiology: a science in need of a Copernicus); Margaret S. Livingstone & David H. Hubel, «Separazione di forma, colore, movimento e profondità: anatomia, fisiologia e percezione» (Separation of form, motion, and depth: anatomy, physiology, and perception); Francis H. C. Crick & Christof Koch, «Verso una teoria neurobiologica della coscienza» (Toward a neurobiological theory of consciousness);

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Horace B. Barlow, «Singoli neuroni, scopi comunitari e coscienza» (Single neurons, community purpose and consciousness). See also Michael Tomasello, «Le origini culturali della cognizione umana» (The cultural origins of human cognition) (2005).

The Pragmatism (pragmatic-ethological manner of Mead) brought a new interpretation of mind and intelligence in line, biologically, psychologically and sociologically, with post-Darwinian currents of thought. This also made it possible to reconsider the problems and task of philosophy (see Morris, 2018, p. 8). The philosophy of mind, which is one of the cognitive sciences, has in fact begun to reflect on a type of naturalism whereby thinking man is embedded, immersed, in nature (environment). It thus avoided the traditional dualism between mind and matter, experience/act and nature, theory and practice (see Morris, 2018, p. 8). As Shaun Gallagher (2016) writes, the environment is both physical and social, it is “situation” in the sense that the human mind is always and in any case problematic interaction organism-environment, solvable with reorganizations realized through social behaviors (natural-artificial, physical-social tension). With words of Luigi Pareyson, the human being is an initiative initiated (*continuum*) in conditioned and problematic biological, social, biographical and historical situations (see Modica, 1980; see also Mills, 2014). Rather than of action and of interaction, as Baggio (see 2018, p. 50) suggests, one should speak of patterns of action resulting from *transactions* with the physical and social environment. The individual is not aware of the coordinated process (automatic processes). He becomes aware (conscious processes) of it when the agreement between the anticipatory performance and the act present in the process is inhibited by conflicting impulses, triggering a readjustment (see Baggio, 2018, p. 50; see also Kahneman, 2015). The Ethology (pragmatic-ethological manner of Mead) is one of the disciplines on which both behaviourist psychology of Mead (social psychology) both behaviourist sociology (sociological interactionism) are based, as well as attachment and secure-base theory.

Mead act theory (it is only by acting that we perceive and represent: *imagery*) can be regarded as a contribution to the “pragmatist turn” in the cognitive sciences (new approaches of cognitive science), that is as the increasing use of pragmatist theories and concepts for the study of cognition and human experience (experience understood as an act: act theory), for the following reasons (4E of the programme empirical implementation of pragmatism: *embodied, embedded, enactive, extended*): *embodied* approach (see Varela et al., 1991); *embedded* approach (see McClamrock, 1995); *enactive* approach (see Noë, 2004); *extended* approach (see Clark & Chalmers, 1998). This multiplicity of approaches to human cognition, which has provided an empirically reliable account of the nature and functioning of the experience/act, the cognition and the human mind (act theory, inextricably linked to sense-motor processes), has made it possible to overcome the initial cognitivist and computational paradigm of classical cognitive science (see the three-level model for explaining complex information processing systems proposed by Marr, 1982; see Tabossi, 1998) according to which the human mind is like an abstract brain programme guided by logical rules and cognition is disembodied, formal and cerebral. For all these approaches, it is the body that plays a central role, because it is the body and the environment that determine cognitive processes. Indeed, the mind is rooted in an organism in action, which is immersed in its environment (see Baggio, 2018, p. 42). The individual belongs to a social structure, to a social order. Mead’s starting point is human social experience, understood as an act (act theory) and observed from the perspective of communication, which is essential for the social order (see Mead, 2018, p. 39). The social order is structured essentially by communication in an environment (interaction/transaction), in which human beings are immersed (for the concept of a human being, see Pinello, 2021).

According to the positivist paradigm of biological evolution, already at the end of the 19th century the life of the mind as a whole were interpreted as evolutionary development, as change and interactivity between organism and environment. The mind resided in the sphere of conduct and human societies were as complex biological entities, to be studied using evolutionary categories (see Morris, 2018, p. 7-8). But then the orientation of those who wanted to establish sociology as a scientific discipline prevailed, cutting the bridges and links with biology and heredity (see Parsons, 1987). This approach is now largely overcome, despite the resistance of many nostalgics especially in Italy. In this changing context, it is increasingly difficult to draw a clear line between sociology, psychology, biology and cognitive sciences in general and between social and individual psychology (see Mead, 2018, p. 39), because the development of the individual self and self-awareness occurs in the context of social experience (understood as acts: act theory) and as a function of the social group to which one belongs. Mind (which can also become, I would add, a “well-made mind” or a “mind of quality”, see Morin, 2000, and Mills, 2014) and self are social products, they are social phenomena of human experience and underlying automatic physiological mechanisms (see Mead, 2018, p. 40).

Mead’s conception of the mind/brain relationship is not dualist but monist (on dualism and mind/brain monism, see Bechtel, 1992) and involves the question of private experiences, which belong to the individual self, and introspection (see Mead, 2018, p. 41). With respect to the enigma of subjective experience and the crisis of functionalism, it is appropriate to acquire a basic understanding of the issue. To this end, it is useful to read, in De Palma & Pareti (2015): Thomas Nagel, «La bisezione del cervello e l’unità della coscienza» (The bisection of the brain and the unity of consciousness); Thomas Nagel, «Com’è essere un pipistrello?» (What is it like to be a bat?); Frank Jackson, «Ciò che Mary non sapeva» (What Mary didn’t know); Daniel C. Dennet, «Quainare I qualia» (Quaining the qualia); David J. Chalmers, «Come affrontare il problema della coscienza» (How to deal with the problem of consciousness).

Mead’s problem is how the mind of the individual is constituted in its essential components, the consciousness and the self, the human mind not being an abstract entity that functions in the same way in all individuals. The starting point, integrating Mead’s theses with Bowlby’s, is the capacity of the individual mind to interact/transact (come to a transaction through physical and social interactions) in a healthy way and with secure attachment (secure base), through a gestural and symbolic communication system, in a physical and social environment (see Mead, 2018, p. IX-X). The central theme of my paper is residuals, *i.e.* the different conception of residuals in Parsons, in Mead, in Znaniecki and in Bowlby. This is because Mead, unlike Parsons, argues that mind and self are social emergences without residues and that the mechanism for their emergence is language, in the form of the gesture and of speech (see Morris, 2018, p. 12-13). In my opinion, however, it is appropriate to consider not only language and communication, but more social and cognitive constraints. After all, the purpose of Merleau-Ponty’s phenomenology of perception, to which, according to Baggio, Mead’s theory of the act can be juxtaposed, is precisely to

criticise reductionism of experimental physiology and psychology and to propose a non-reductionist, holistic naturalism (*see* Baggio, 2018, p. 48). Great and relevant is the distance between the theoretical position of Mead (closer to the new approaches of cognitive science) and those Parsons (closer, on the other hand, to the classic approach of cognitive science). Understanding why is sociologically very important.

The translations from Italian of the citations of the authors taken into consideration were made by me.

II. PARSONS: THE STRUCTURE OF SOCIAL ACTION & ZNANIECKI: THE STRUCTURE AND THE BIOGRAPHICAL METHOD

Parsons approaches the study of social action with the aim of moving from the analysis of the structure of social action to the structural-functional analysis of social systems, which in his view are ultimately systems of social action (*see* Parsons, 1987, p. 34). His critical targets are heredity and the environment and his aim is to establish sociology as an autonomous scientific discipline capable of standing on its own two feet. Parsonsian sociology severely criticises behaviourism, social Darwinism and biologism, as well as idealism. In his view, behaviourism takes to extremes the tendency to reduce the factors of human behaviour to biological terms, eliminating the analytical need for a subjective and voluntarist approach. Everything must be translated into general terms that apply indiscriminately to all biological organisms. This «makes the subjective factor “epiphenomenal”». Behaviourism draws the extreme consequences of this in its methodology; the subjective approach is not only superfluous, it is illegitimate, it is contrary to the canons of “objective” science [In the particular behaviourist sense that limits the data of science in general to facts expressible in the terms of the conceptual schemes of chemistry and physics. All other data are eliminated simply by denying their character as facts]» (Parsons, 1987, p. 158). Parson’s problem is «the identification of the minimal set of structural reference points» (normative and non-normative conditional factors: it is the tension between normative and non-normative conditional elements, in particular “Inheritance” and “Environment”, which he discards from his structural theoretical system of reference) «and to which basic relations between these a scientific theory of social action should refer» (Poggi, 1987, p. 13).

The American sociologist writes that his general theory of social action does not consist of a group of general concepts/notions and in their logical-deductive interrelationships (Euclidean system: «A scientific theory is not the result of idle “speculation”, it is not constructed by deriving its logical implications from initial hypotheses», Parsons, 1986, p. 37), but rather in the formulation of general statements (which constitute the “body of the theory” and which Parsons extracts from certain theses of Pareto, Durkheim and Weber), in the logical development of these general statements and in their empirical process of transformation, an empirical process that transforms the general theory itself. The development and transformation process are related to the discovery of new empirical facts. Parsons’ interest in the empirical fact is oriented by the logical structure of the general theoretical system used (the general structure of social action) and the importance of factual problems is inherent in the structure of the general system itself. Essential in fact is the concept of the “meaning” of the fact, which Parsons draws from Pareto: what counts is not the fact, but its meaning within the general theory. What counts is not the “sensible impressions” as such and in any concrete sense, but the “meaning” of the symbols (Parsons, 1986, p. 226). The general frame of reference (general theory of social action), therefore, not only states what we already know, but also says what we need to know, i.e. the factual and problematic questions we need to answer. It is in this sense that the general theory of social action refers to empirical data, to facts. It is always in this sense that it is a dependent and, at the same time, independent variable (in the development of science) and that it is an integrated “logical-empirical system”. If, due to new facts, due new empirical data (the empirical part of the logico-empirical: the concepts/notions refer to a reality external to the concepts themselves), the formulation of an important (or general) proposition of the system changes substantially, this entails logical consequences (the logical/integrated part of the logico-empirical fundamental/general propositions must stand together according to logical relations) for the formulation of the other important propositions of the same system (body of theory) and, consequently, for the general system itself (Parsons, 1987, p. 46-47).

As we shall see, the same problem of symbolic meaning and gesture without symbolic meaning is approached differently by both Mead and Bowlby. Parsons, in his understanding of the meaning of social action, depends heavily on Pareto and of Max Weber’s hermeneutics. Not so Mead and Bowlby. Well aware of the problems implied by abstraction and analysis, Parsons in fact believes he can start in the theorisation of the general structure of social action from Vilfredo Pareto, who, in turn, starts from the methodological scheme of logical-experimental science, *i.e.* from the logical elements by distinguishing them from the non-logical ones. This scheme can be described as follows: 1) examine the logical, or logico-empirical, structure of the theories; 2) check whether non-logical elements emerge from this examination, with respect to the structure of the theories; 3) check whether, because of these non-logical elements, the theories cannot fit into the standards of logical-experimental science (these standards then constitute the basic model for proceeding to the examination of the theories); 4) if the theories cannot be brought back to the standards, separate the constant elements of them from the relatively more variable ones; 5) following this procedural sequence, locate, identify and distinguish the residuals and derivations; 6) after distinguishing and classifying the residuals and derivations, identify the reciprocal relations between them. This is the methodological part that Parsons takes from Pareto. Considering it insufficient, however, he, also drawing on Durkheim, adds to this outline: 7) the distinction between normative and non-normative elements; 8) the distinction between “conditioning” elements susceptible to non-subjective formulation and “value” elements’ (*see* Parsons, 1987, p. 502). Taking these additional elements (classes) into account also means focusing attention on feelings, which manifest themselves in the residues. Thus: logical and non-logical elements, methodology of logical-experimental science, relatively constant and relatively variable elements, residuals and derivations, normative and non-normative elements, non-subjectively formulated “conditioning” elements and value elements. Parsons derives from Pareto’s writings a theorem that

he calls the “sociological theorem” on the basis of which society can only be considered a reality *sui generis*, insofar as it has properties that cannot be derived from those of the units that constitute it and that cannot be enunciated through processes of direct generalisation, *i.e.* generalising abstraction. It is for this reason that, according to Parsons, in the wake of Durkheim, individual social actions (of “concrete individuals”) cannot be considered in isolation, which Pareto does in part. According to Parsons, Durkheim arrives at essentially the same theorem. This theorem expresses a non-scientific derivation, at least in Durkheim’s and partly Pareto’s application of it (Parsons’ aim is to verify whether and under what conditions what is non-scientific can be brought back into science, in this case sociology), of a residue, a non-scientific derivation that in Durkheim is idealistic and metaphysical.

It should be emphasised that, according to Parsons, Pareto, due to certain peculiarities of the means-end logical scheme he theorised, *i.e.* due to his general logical theory (initially a positivistic means-end scheme, later transformed into a voluntaristic scheme of action), could not adequately distinguish between heredity and environment and between value elements in non-logical action (*see* Parsons, 1987, p. 510). Pareto’s voluntarist scheme of action implies an individual more or less integrated with other individuals, within a system characterised by common values (social element). The transformation of the positivistic scheme into the voluntaristic scheme, again according to Parsons, allowed Pareto, unlike Durkheim, to avoid a positivistic or idealistic configuration of the social element (*see* Parsons, 1987, p. 506). It is for this reason that Pareto’s work represents, for Parsons, the starting point for the elaboration of his general theory of social action. Durkheim was very clear about the distinction between hereditary and environmental elements in drawing the line between non-utilitarian “individual” and non-utilitarian “social” elements. Unlike Pareto, the distinction between hereditary and environmental elements for Durkheim was clear from the outset. His problem was rather to define the nature of the social element. The dividing line between the non-utilitarian “individual” and “social” elements was eventually identified with that between heredity and the environment on the one hand and the value elements on the other’ (*see* Parsons, 1987, pp. 510-511 Durkheim, for Parsons, in the last phase of his theoretical production, moved away from the voluntarist theory of action (positivistic voluntarism: “sociological positivism”) to place himself within an “idealistic sociology”.

Parsons’ starting point (formulation of general statements, which constitute the general “body of theory” of social action), through Pareto, is the scientific standards that must be taken into account in order to apply to the theories (of Pareto, Durkheim, Weber, utilitarianism, hereditary and environmental determinism, methodological empiricism) the scheme I have outlined above in points, in order to verify and establish whether they are scientific or not, and if they are not, why they are not and how and under what conditions they could become so. There are basically two reasons why a theory, relevant to the analysis of social action (not all of them are), may deviate from scientific standards: 1) because it is ascientific; 2) because it is non-scientific. Ascientific means that it implies ignorance and errors; non-scientific means that it implies «considerations that are completely outside the domain of science» (Parsons, 1987, p. 502). It can also be the case that a theory is non-scientific and ascientific at the same time. Refining this latter distinction further, Parsons specifies that within the category “non-scientific” two types of elements can be identified: 1) «the ultimate ends of the action and the non-experimental entities that are used to justify the pursuit of these ends» (along with the ultimate ends, from a teleological point of view, one must consider the intermediate ends); 2) «certain elements that serve as selective criteria in the choice of the still non-scientific means (those generally involved in ritual actions)» (Parsons, 1987, p. 502-503). Thus, with respect to the standards of logical-experimental science, consideration must also be given to ultimate ends (residuals), the entities used to justify the pursuit of these ends (derivations), and certain elements that serve as selective criteria in the choice of means that are not yet scientific. For Parsons, utilitarianism, as a theory of social action to be scrutinised as to its scientificity (standard and scheme), is more important than biological, hereditary and environmental determinism, another theory of social action to be scrutinised, because it contains within itself and uses the conceptual scheme, fundamental to its theorisation, of logical “means-end” action, a conceptual scheme proper to positivist methodologies (first and foremost the economic one) which the American sociologist compares to the “cause-effect” scheme of classical physics. Besides utilitarianism, he writes, the other theory to be examined, closely related to utilitarianism, «is methodological empiricism. Although a clear awareness is rare in this field, there is a widespread tendency to regard the analytical concepts of science as directly corresponding to concrete observable entities and to refer the classification of the social sciences to various concrete spheres of social life» (Parsons, 1987, p. 498). The distinction between causal relations (cause-effect) and sense-provided relations (means-end) constitutes a very precise methodology of the “cultural sciences” that has taken the name *Verstehen*, which is distinct from the analytical methodologies of the “natural sciences”. Weber’s merit, for Parsons, was to fill the concept of *Verstehen* with further content useful, in terms of critical reflection on the meaning of social actions, for the foundation, elaboration and development of his general theory of social action. *Verstehen*, *i.e.* to consider symbols and try to understand their meaning, because if ideas change, societies change too (*see* Weber, 1991).

It should be pointed out that sociological theorising, for Parsons, must deal not only with the means-end relationship, but also with «the incidence of criteria of self-determination of the actor other than maximising rationality - criteria such as the symbolic, non-instrumental adequacy, of certain means in relation to certain ends; or the absolute, self-justifying adequacy of expressive action, which is an end in itself» (Poggi, 1987, p. 13).

I now discuss the relationship between what I have argued so far, language and reality. We have seen that:

- Verifiable empirical knowledge of any kind - even common sense knowledge, in everyday life - implicitly (with implicit postulates: implicit general fundamental propositions) or explicitly (with explicit postulates: explicit general fundamental propositions) implies a systematic theory (general frame of reference), which may be ascientific, non-scientific or scientific.

- Parsons’ intention is to methodologically identify the general fundamental theoretical (epistemologically scientific) propositions of the general framework of social action.

- These are general fundamental propositions that do not require demonstration. However, they should not be regarded as merely intuitive and self-evident, «for their validity must be judged not by the arguments adduced in support of them [...], but by considering how [they] fit into the general structure and results» (Parsons, 1987, p. 46).

- General fundamental propositions are obtained by means of “logical processes of representation”.

- Such “logical processes of representation” use conceptual (mental) schemes to produce logical-rational representations (linguistic propositions).

- Applying such logical conceptual schemes, logical representations (propositions) are derived from the “representational processes”.

- The focus is therefore on the general structure (the general fundamental propositions), the “logical process of representation” (using the conceptual schemes of the general structure), the logical representations and the results of the empirical verification.

- The general fundamental propositions (logical representations), the logical conceptual schemes and the “logical processes of representation” serve to state empirical “facts”, which are (as statements) also logical representations.

- Underlying this are the problem of signs/symbols, the problem of the mind (the thought), the problem of the real referents of language (to gain a critical perspective on the topic, *see* Ogden & Richards, 1966), and the problem of the social construction of reality (to gain a critical perspective on the topic, *see* Berger & Luckmann, 2019). For Parsons, “conceptual schemata” are inherent in the structure of language and differ from one language to another. Being in language, they are not in the mind a priori, but are introduced into the mind through the different spoken and written languages, *i.e.* through socialisation.

It is useful, at this point, to clarify the Parsonian concept of order, because the author distinguishes two radically different levels of order. A first level is the “natural order”, that of the physical and mathematical sciences, which is nothing more than «a series of phenomena involving uniformity of behaviour, formulated in terms of “laws”. This does not imply any necessary relation to human ends. The struggle for existence or the war of all against all [Hobbes] can certainly constitute an order in this sense», because it is entirely determined by biological, hereditary, automatic environmental categories that are non-subjective, non-voluntaristic in contractual terms of the cognitive means-end scheme. «Its antithesis is a state in which events happen at random, *i.e.* are not subject to scientific analysis». A second level, on the other hand, as in Pareto, Durkheim and Max Weber, «implies not only uniformity in events» scientifically observed and observable, «but a control of human action» (logical actions, in terms of the means-end cognitive scheme, conscious, aware and voluntary) «with reference to certain norms of behaviour and ideal relations, *e.g.* “the establishment of the contract”, of a legal order» (1987, footnote 4 at p. 390). Thus: uniformity in the behaviour of physical, chemical and biological objects, represented through the cause-effect principle of classical physics, on the one hand, uniformity in the events and control of human action (logical actions), on the basis of the means-end “mechanism” (*Verstehen*), with reference to certain norms of behaviour and ideal relations (the institution of contract and other institutions and relations), on the other hand.

Parsons, in his book on the structure of social action (1987), analysing Pareto’s methodology, also distinguishes two abstract types of society: a society in which “sentiments” prevail (instincts, biology, the neural circuits of survival, the irrationality of human nature) and where choices are essentially irrational, automatic, even if thought is not lacking (but is conditioned by irrationality), and a society in which, instead, only logical-experimental reasoning operates (*see* Pinello, 2022). It is clear that human society «lies between the two types now noted» (Parsons, 1987, p. 265). The total realisation of the first type would be the Hobbesian “war of all against all”. The total realisation of the second type today would no longer be the purely neocortical society of the positivists (mere “pure” neocortical brain with total elimination of the reptilian brain and limbic brain), but would be the totally artificial, artificially intelligent and unsupervised society. Parsons links «“a society determined solely by reason” [...] to the ideals of the positivists» (Parsons, 1987, p. 268), human society nevertheless comes close to the second abstract type outlined and therefore the social sciences have to deal with it, leaving aside the studies and research on social Darwinism (and behaviourism and biology), *i.e.* leaving aside the tension towards the first abstract type of society, with the certainty, however, that «“a society determined solely by ‘reason’ does not and cannot exist” [...]. This is the fundamental non-logical aspect of Pareto’s action» (Parsons, 1987, p. 267). It is from this last postulate that Parsons derives the question of residuals and “residual categories” (one must be careful of the “empirical” – “categorical” dualism present in Parsons: logical-empirical method). Furthermore, it is worth noting that he, in addition to the oppositions “logical action” and “non-logical action”, “subjective category” and “non-subjective category”, makes extensive use of oppositions such as “logical social actions” and “non-social actions”, “subjective sociological categories” and “non-sociological categories”, etc. The need is to return to reflecting on the logicity or otherwise of social action and the subjectivity or otherwise of the sociological category. This is the operation undertaken by Pareto and, through him, by Parsons. One must not simply discuss “social action” or “sociological category”, but one must distinguish, within “social actions”, those that are “logical” from those that are “non-logical” and, within “sociological categories”, those that are “subjective” from those that are “non-subjective”.

The American sociologist explicitly addresses this question because the ultimate ends/values of action (the salvation of the soul, the kingdom of heaven, nirvana, collective happiness, general harmony, universal brotherhood, etc.), which are relatively latent, are for Durkheim responsible for solidarity and social cohesion, *i.e.* a moral community that makes use of social rituals and rites. It is the question of “collective consciousness” that costs Durkheim the accusation of metaphysical idealism.

Florian Znaniecki, like Parsons, rejects biopsychic methods and excludes the possibility of considering antagonism sociologically as a reactive automatic, physical or psychic state, behaviourally consequent to a stimulus. In delimiting the disciplinary fields, the Polish sociologist specifies epistemologically that, with reference to the bio-psychic individual, this is an issue typical of the natural sciences, which is also dominant in psychology (especially in behaviourism) and which in the sociological field is found in social psychology. With regard to purely sociological epistemological questions, he states that he wants to start from a critical re-reading of the sociological heritage produced up to the 1930s, from a particular perspective: the

criteria of scientific induction. Parsons, as we have seen, starts instead from Pareto, Durkheim and Weber, as well as from the most important 19th century theories. Znaniecki's critique does not only concern induction, but also focuses on deduction and the mixed method, inductive and deductive at the same time, mixed method of those who have based their sociological statements, as far as possible, on assumptions deduced from other disciplines (or, like Parsons, from well-established sociological theories) and then inductively traced a huge mass of facts to these theoretical assumptions, by way of demonstration, and generalised with them. Since not all induced facts can be accorded by generalisation to the assumed theoretical assumptions, the problem of contradictory facts arose, a problem that the most trite sociologists solved by omitting them altogether and the most scrupulous instead by treating them as exceptions to the assumed assumptions, i.e. not as fictitious but as real (ascientific, non-scientific, ascribable or not within a general scientific theory). This theme is present in Parsons, who uses Pareto's concepts of "non-logical", "residual" and "derivation", as well as the concept of "concreteness", for this reason.

Znaniecki's aim is to replace the biopsychic approach to the problem (also criticised by Parsons and which, as we shall see, is Mead's), the deductive approach (merely logical and also criticised by Parsons), the inductive approach (merely empirical and also criticised by Parsons) and the mixed approach, inductive and deductive at the same time (this is Parsons' method), «with another» (biographical experiential) «one in order to arrive at important conclusions in the whole area of its applicability» and to question «what is obvious for the biopsychic problem, namely the very existence of any property definable by the scholar as objective» (Znaniecki, 2008, p. 33). The point is that, given the impossibility, in modern societies, of establishing the highest degree of antagonism, the opposition between "our own" ("familiar") and "strangers" is no longer to be sought at the bio-psychic level, nor at the level of the group tout court (archaic defensive group antagonism) but, sociologically, with «reference to the experiences of those individuals (or collectivities) whose attitudes towards strangers we intend to study» (Znaniecki, 2008, p. 38). With regard to social contacts, in order to state «what role lack of contact plays in the distinction between our own and strangers, it is not enough to know the facts, conscious or unconscious (automatic), of the contact or lack of contact between certain persons; it is necessary to refer to the current experiences and activities of these persons [the concept of experience/act is fundamental, as we shall see, in Mead and in Bowlby], in order to establish who, when and why he considers certain individuals among those with whom he has had contact and among those with whom he has had no contact to be strangers» (Znaniecki, 2008, p. 43). «This means that the foreignness of an individual (or of a collectivity) is not a trait that can be attributed by an observer on the basis of this or that property considered objective (of a psycho-somatic or social kind such as belonging [to a group] and diversity) because it depends, yes, on contextual factors but above all on subjective [subjective non-objective and environment] factors. It is the same persons who notice in the same persons sometimes certain characteristics and sometimes others, depending on the circumstances, and judge the given individuals or groups as foreign or their own» (Znaniecki, 2008, p. 10). Hence, in contrast to Parsons' structural-functionalist approach, the biographical method (forerunner of symbolic interactionism and sociological constructionism) of Znaniecki and William Isaac Thomas.

And here Kaczyński (*see* Znaniecki, 2008), highlights an epistemological assumption, which is also present in Mead and in Bowlby: social research cannot consist of the direct observation of facts and in the observer's experience alone, but must also take into account the experience of social actors ("outsiders" are only those who, at a given time, in a given conditioned situation, in a given environment, are perceived as "outsiders" by the individual or group being analysed). Znaniecki, on the contrary (in some respects, for others, as we shall see, there is convergence) to Mead and Bowlby, argues that this does not mean that the internal point of view of the observed subject should be taken into account (Mead expresses himself in terms of private experience), because applying the "humanistic coefficient" (it is a coefficient of abstraction and generalisation, Mead expresses himself in terms of "universals") «it is obvious that individuals or groups who treat certain persons as strangers do not think they are doing so for subjective reasons but, consciously or unconsciously, rely on aspects that in their eyes have objective significance» (Znaniecki, 2008, p. 53). «From a sociological point of view, it is not what happens to the psyche of the persons studied that is important, but rather how they act in relation to other persons» (Znaniecki, 2008, p. 73).

A concept that allows me to relate Znaniecki and Parsons is that of structure, with the clarification however that, as I said before, the Polish sociologist criticises and does not accept the mixed method (inductive-deductive, logical-empirical) of the American sociologist. For Znaniecki, as for Parsons, «a scientist's discovery is an element of some structure of scientific truths», i.e. of a theory, of a general theoretical structure. «The same truth can be used in different philosophical or scientific systems and can also be linked to religious dogmas [...] In attempting to analyse a particular issue, the sociologist encounters several questions that force him to formulate a postulate of revision of fundamentals» (Znaniecki, p. 59-60 and footnote no. 34 on p. 61). However, the way in which the Polish sociologist and the American sociologist deal with the question of residuals is different. Znaniecki, as I have already mentioned, together with Thomas, devised the biographical method.

In the face of every empirical generalisation we should comparatively analyse facts converging and facts diverging with it, to replace statements such as 'the majority of S is P' not with the statement 'n% S is P', but with two or more statements such as: 'all S that are A, are P', 'all S that are B, are Q', 'all S that are C, are R' (or: if S is A, S is P, if S is B, S is Q, if S is C, it is R) and so on until all S variants are exhausted. Measurement and counting have their place only where the characteristic traits A, B, C...P, Q, R... are quantitatively changeable and measurable; thus they must serve the numerical identification not of the scope, but of the content of sociological concepts. This obviously requires a more specific approach than in the past, but it facilitates the testing of hypotheses (2008, p. 26-27).

Parsons distinguishes enunciated facts and residues from impulses and "feelings" understood in a merely biological, automatic and deterministic, non-subjective way. The latter can neither correspond nor not correspond to enunciable facts, because they are not propositions but phenomena or elements of phenomena, since they are automatic and do not pass through the human mind and meaning is given symbolically by ideal systems within the mind itself, through interpretations. It follows that for the problems posed by residues to make sense, the residue must also be a logical proposition endowed with meaning (*see* Parsons, 1987, p.

269), *i.e.* it must pass through the human mind. Residues that cannot be formulated by means of logical propositions (*i.e.* by means of logical derivations) must not be taken into account because they are meaningless, relative to the applied theory.

The concept of residual must be framed within the question of general categories, empirically identifiable variables and negative categories. Indeed, at whatever level one considers a theoretical system, it implies the positive definition of general categories and empirically identifiable variables. Positive definition means that «the very fact that they are defined implies that they are distinct from the others, and that the facts that constitute their empirical field of reference are consequently, at least in some respects, specifically differentiated from the others» (Parsons, 1987, p. 58). It happens, however, that «not all facts that are actually observable in a given field, or not all those that have been observed, can be made to fit into clearly and positively defined categories» (Parsons, 1987, p. 58). This implies the need to also use negative, or negatively defined, categories for «facts of which the existence is known, which are also more or less adequately described, but [which] are characterised theoretically by the impossibility of fitting them into the positively delimited categories of the system» (Parsons, 1987, p. 58). From a theoretical point of view, in these cases, Parsons writes, it is only possible to formulate and express negative statements, such as “they are not so and so”, and not also positive statements, such as “they are so and so”. From this, the American sociologist continues, it should not be inferred that negative categories and negative statements are unimportant. Only the most talented researchers and scholars, however, strive to make them as explicit as possible, to express and expound them with rational and logical rigour. This is because a form of progress in theoretical work consists precisely in deriving positively defined concepts from the residual categories in order to seek their verification in empirical research. The obviously unattainable goal, which one approaches asymptotically, is the elimination of all residual categories in favour of positively defined and empirically verifiable and verified concepts, *i.e.* the closed system. «The derivation of positive concepts from residual categories constitutes a process of reconstruction of theoretical systems» (Parsons, 1987, p. 59).

III. MEAD & BOWLBI:

SOCIAL INTERACTIONS, THE MIND, THE SELF, THE SECURE BASE AND ATTACHMENT

Mead, like Znaniecki, starts with the individual human being, the functioning of his mind, his biography, his social interactions, but unlike Znaniecki he also deals with the problem of his consciousness and self (social philosophy: pragmatism; social psychology). Like Parsons, he studies the behaviour of the human being, but not as a general theory of social action, as logical-empirical structure and functions, but as experience, gesture, symbolic act, ethology, biology, environment (organism - physical and social environment interaction), as a human mind (not as mind in general and in the abstract), as data, together and at the same time, biological, psychological, social and linguistic. Everything in the “world of science” begins with experience, with the act, experience and act having a genetic, hereditary, biological, physiological, anatomical basis (Parsons and Znaniecki, as we have seen, start instead directly from the analysis and critique of sociological theories and methodologies that precede their studies and research, discarding a priori the biological basis of human behaviour). The “physical thing”, although predating science, is an experiential social derivative. «The world of experience is conceived by Mead as a realm of natural events emerging through the sensibility of organisms, events that are no longer properties of the organism, but of the things observed». (Morris, 2018, p. 18). With Mead, mind and self are generated without residue in a social process, just as, with the biographical method of Znaniecki & Thomas, all individuals must be considered without residue. However, unlike Parsons and Znaniecki, for Mead sociology and psychology are united by a common biological basis. As his student Morris writes:

Mead’s attempt is to demonstrate that the mind and the self are social emergences without residue; and that language, in the form of speech gesture, provides the mechanism for their emergence. It is my belief that Mead has succeeded in this task, especially in isolating the mechanism of language by which the mind is socially constituted and through which the self-conscious self appears as object [...] Be that as it may, it seems to me that Mead has shown that the mind and the self, in the sense of these terms he introduced, are generated without residue in a social process, and that he has for the first time isolated the mechanism of this genesis [...] Mead gives an answer in biosocial terms. He does not disregard, like the traditional psychologist, the social process in which human development takes place; he does not disregard, like the traditional social scientist, the biological level of the social process by referring to a mentalistic and subjective conception of society [...] psychology and sociology are united on a common biological basis; social psychology is founded on a social behaviourism (Morris, 2018, p. 12-14).

Mead demonstrated that mind and self are generated without residue in a social process. There is a genetic, biological, anatomical, physiological basis, and it is from that basis that mind emerges, through social interactions (better said transactions), within an environment. This means that

we must be mindful of the human animal [...] as human animals we in fact observe in our attitudes, in our images, in our thoughts, in our emotions aspects of ourselves that we cannot observe as fully in others; and the fact is communicable [...] he mind was not to be reduced to non-mental behaviour, but was to be seen as a type of behaviour emerging genetically from non-mental types. Behaviourism [...] meant for Mead neither rejecting the private [the experience is private insofar as it is distinct from social experience] nor neglecting consciousness, but interpreting all experience in terms of conduct. [...] The transformation of the biological individual into the organism endowed with mind or the self is, according to Mead, effected through the work of language, which in turn presupposes the existence of a certain type of society and certain physiological capacities in the organisms of individuals [...] Mead, perhaps, did not make full use of his behaviourism as he did not arrive at a precise definition of the role of the private individual (Morris, 2018, p. 15-16 and p. 19).

It must be made clear that Mead distinguishes gesture (including mere vocal gesture) from act and communication from language (*see* Tabossi, 2002), because animals also communicate and gesture (gesture conversation), but only human beings in a conscious, logical-rational and creative way, do so by, using historical-natural languages and moving from impulse to rationality (meaningful symbol of language that has implicit in itself the social “mechanism” of role-taking, one’s own and of others, from

which consciousness and self are derived, self understood as a biological being who has become conscious of itself, in physical and social interactions, in an environment, as 'me' and 'I'; the 'I' in front of the 'me' is the recognition of the biological individual). This is because human beings are endowed with the necessary neurological apparatus for the meaningful linguistic symbol, a neurological apparatus that all other animals do not have (see the concept of the *cognitive revolution* in Harari, 2019, and the concept of the *cognitive Big Bang* in Pinello, 2020).

As I said before, in Znaniecki, along with the biographical method, which aims at zero residue, we have the "humanistic coefficient", in Mead we have the concept of the "generalised other" ("universality" and "impersonality"). The concept of the "generalised other" can be regarded as the equivalent of the concept of the "humanistic coefficient".

The universality or impersonality of thought and reason are, from the behaviourist point of view, the result of the process whereby the individual takes on the attitudes of others towards him and finally crystallises these particular attitudes into a single attitude or point of view that can be defined as that of the "generalised other" (Mead, 2018, p. 138). [Mead is interested not only in meanings (hermeneutics, comprehension theory, *Verstehen*), but also in "mechanisms"]. Through a social process, then, the biological individual attains a mind and a self. Through society, the impulsive animal becomes a rational animal [...] By virtue of the internalisation or import of the social process of communication, the individual acquires the mechanism of reflective thought [...] he acquires the capacity to live in a common moral and scientific world; he finally becomes a moral individual in whom impulsive ends are transformed into the conscious pursuit of definite ends. Following the appearance of this kind of individual, society is in turn transformed. It receives through the social function self the characteristic organisation of human society; instead of performing its social function through physiological differentiation (as in the case of the insect) or through the simple influence of gestures on others, the human individual regulates its part in the social act by means of the acquisition, within itself, of the roles of others involved in the common activity [...] The mind-body and soul-body problem is naturally explained in terms of the contrast between the biological individual and the self. Just as the previous levels of the social process remain even when higher levels have been reached, so the biological individual continues to exist even when it has organised itself into a self. Animal psychology reveals much about the failure to properly integrate these fundamental stages of personality (Morris, 2018, p. 26-27).

Mead writes that, in order to explain the psycho-social behaviour of a social group (a social group is also a group consisting of a mother and a child), one must not start from the behaviour of the individual member of the group (this is a theme we have also encountered in Durkheim and Parsons and which cost Durkheim the accusation of idealistic and metaphysical sociology), but from the complex interactions between the individuals of the group itself, in an environment (not from the mother or the child, in the case of a group consisting of a mother and a child, but from their complex interactions, made up first of gestures and then of meaningful symbols). As far as the mother and child are concerned, the interaction and internalisation of the "significant other" takes place through reciprocal gestures that elicit reciprocal responses, responses that become stimuli for a reciprocal readjustment of the interaction and for the performance of the social act. In the parent/child-form, for example, we can have: «the stimulating cry, the inquisitive tone on the part of the parent-form and the consequent change in the cry of the child-form. We have here, on one side of the two forms, a series of adaptations that produce a common act involved in the care of the child. We are therefore confronted [...] with a social process in which it is possible to isolate the gesture whose function lies in the social process itself and which can become an expression of emotion, or, later, an expression of meaning, *i.e.* of an idea» (Mead, 2018, p. 87), *i.e.* still of the mind and the self. The logical structure of meaning «is to be traced in the threefold relation» (relational triangle of the logical structure of meaning: this triangle can be related to that of Ogden & Richards, 1966, p. 37; see Marradi, 2007, p. 27-41) «of the gesture with the response and with the resultant of a given social act. The response, on the part of the second organism, represents the interpretation and reveals the meaning of that gesture insofar as it is indicative of the resultant of the social act initiated by it and in which both organisms are thus implicated. The threefold or triadic relationship between the gesture, the adaptive response, and the outcome of the social act initiated by the gesture is the basis of meaning» (Mead, 2018, p. 127). The Ogden and Richards triangle, on the other hand, is about the meaning of meaning (Ogden & Richards, 1966).

There is a passage in Mead's book that, in my view, makes the connection with attachment and secure base theory: «We see ourselves, more or less consciously, in the same way that others see us. Unconsciously we address ourselves as others address us [...] Of course these particular responses must already be present in our mechanism. We evoke in others something that we simultaneously evoke in ourselves, so that we unconsciously assume these attitudes. Without being aware of it we substitute ourselves for others and behave like them. [...] We continually evoke in ourselves, especially through the use of vocal gestures, the same responses that we evoke in other persons and thus assume their attitudes in our personal conduct» (Mead, 2018, p. 114).

As Jeremy Holmes writes, Bowlby, basing his behavioural psychoanalysis on ethology (an ethological approach and not simply a biographical one, as also in Mead) and taking Charles Darwin (1982) as a point of reference, argues that children who have a secure attachment and a secure base are able to tell their biography coherently and fluently, whereas children who do not have a secure attachment and a secure base have obvious difficulties (see Holmes, 2012, p. 9). There are many social and psychological conditioning situations that influence, positively or negatively, the development of the child's mind and self (see Bowlby, 2012, p. 1). Those who interact with and care for the child must in turn receive a great deal of assistance, from the individuals and institutions with which they interact (see Bowlby, 2012, p. 2).

According to Bowlby, the traditionally used term "dependency" (for the child's bond to its mother: the child is generally dependent on its mother for its survival) must be replaced by the terms "attachment" and "secure base". The child-mother bond, in fact, is «the result of a precise and partly pre-programmed system of behavioural patterns that in the normal environment develops during the first months of life and has the effect of keeping the child in more or less close proximity to the mother figure [attachment] [...] At the end of the first year of life, behaviour becomes organised in a cybernetic sense» (secure base in relation to attachment type), *i.e.* the child begins to explore its environment, but does so up to a certain point, until it feels the need to return to its secure base, *i.e.* its attachment figure, or to be able to rely on it. As time passes, explorations of the environment become longer and more autonomous, but the need for a secure base of attachment remains throughout the human being's life.

It is postulated that the biological function of this behaviour is protection, in particular protection from predators [...] attachment behaviour is not only limited to children [...] we can also observe it in adolescents and adults [...] whenever they are under stress or distressed [...] The activation of attachment behaviour [to a reference figure] in these circumstances is probably universal and should be considered the norm [...] One characteristic of attachment behaviour [...] is the intensity of the accompanying emotion, the kind of emotions depend [...] on the state of the relationship between the persons involved. If the relationship is good, there is joy and a sense of security. If it is threatened, there is jealousy, anguish and anger. If it has been disrupted [loss], there is grief and anguish [...] the pattern of attachment behaviour that an individual has structured depends on the kind of experiences they have had in their family of origin, or, if they are unlucky, outside of it. [...] This involves observing and describing the system of behavioural patterns characteristic of the parent's activity, the conditions that activate and terminate each behaviour, how the patterns change as the child grows, the various ways in which parental behaviour is organised in different individuals, and the myriad of experiences that influence how it develops in each person. Implicit in this approach is the assumption that parenting behaviour, like attachment behaviour, is partly predetermined and therefore ready to develop along certain lines when conditions allow. [...] This assumption, of course, does not imply that the appropriate behavioural pattern is fully manifested in every detail from the outset. Clearly this is not the case, neither for humans nor for other mammals [...] Human offspring [...], like the offspring of other species, are preprogrammed to develop in a socially cooperative manner, whether they do or not depends largely on how they are treated (Bowlby, 2012, p. 3-4 and 8).

Interactions, in fact, are not always secure, *i.e.* a parent, or anyone else who is significant as a parent, is not always able to provide a secure base for the growing child. This implies problems in attachment and reference to a secure base. Prolonged deprivation of care (deprivation: absence of something that is needed; privation: loss of something that used to be there, leak), especially maternal care, suffered by a child, can in fact cause prolonged and severe effects on his or her character, mind and self, in terms of vulnerability.

To conclude, I would add that it is on the “attachment behaviour system” that that of behaviour of attachment and attachment are based: «a photocopy or model of the world in which the self, significant others, and their interrelationships are represented and which encodes the particular attachment pattern exhibited by an individual» (Holmes, 2012, p. 72). The “operating models” of others and oneself, in fact, depend on the attachment relationship.

As Holmes (*see* 2012, p. 72-76) writes, an attachment relationship can be defined on the basis of the presence of three key characteristics: 1) the search for closeness to a preferred figure; 2) the “secure base” effect; and 3) protest at separation. The development of the attachment system can also be divided into three phases (*see* Holmes, 2012, p. 77-82): 1) 0-6 months: orientation and recognition pattern; 2) 6 months - 3 years: “set-goal” attachment; 3) from 3 years onwards (completion of the connectome): formation of a reciprocal relationship. One must also take into account the “internal operating models”:

“Thought shapes reality or runs parallel to it [...] the organism carries within its head a ‘small-scale model’ of external reality and its possible actions that enables it to react more fully, more confidently and more competently to the emergency situations it encounters” [...] The idea of an ‘operational model’ implies that of a practical mechanism [...] a structure that lends itself more readily to the planning and execution of empirical research (Holmes, 2012, p. 83).

Attachments can be distinguished into: secure attachments and insecure attachments and, within insecure attachments, it is possible to distinguish between insecure-avoidant attachments, insecure-ambivalent attachments and insecure-disorganised attachments (*see* Holmes, 2012, p. 84-85).

V. CONCLUSION

I agree with the historian of mathematics Morris Kline (1985) that mathematics has played and continues to play, like physics, a fundamental and foundational mediating function between human beings and nature and, consequently, between the world “inside” human beings (the internal environments) and the world “outside” (the external environments). Mathematics and physics, in fact, form an exceptionally strong bridge (as Kline writes) between us and the outside world. This bridge, however, although exceptionally strong, is as if it were without a foundation on dry land, because it is «not yet firmly anchored either to reality or to the human mind» (Kline, 1985, p. 362). Hence the need to address the question of “rooted on dry land” and anchored to both the human mind and physical reality.

The theses of the classical pragmatists (James, Dewey, Mead) are compatible with current approaches to cognition (4 E programme of empirical implementation of pragmatism). Mead's act theory can be seen as a contribution to the “pragmatist turn” in the cognitive sciences. For those who pursue a sociological approach aligned with the cognitive sciences, the Meadian notion of “act”, the notion of the *imagery* (it is only by acting that we perceive and represent: this is a useful addition to Harari's theory of imagination, 2019; *see* Pinello, 2021), the notions of *transactions* (patterns of action resulting from *transactions* with the physical and social environment instead of the notions of action and interaction) and environment, the Bowlbyan notions of attachment and secure base, become fundamental to the development of a new way of doing sociology and for the consequent, negative and positive, critique of the notions of social action, rest, derivation, hermeneutics, social interaction (not understood in Mead's manner) and the biographical method, notions proper to classical sociology.

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Corporate Management and its Principles in Financial

Salahedeem Azwali

phd.candidate

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Abstract- Corporations are clear forms of association of people in order to achieve certain roles, goals and tasks. The corporation encompasses different actions and different knowledge and skills, as well as combining them into one meaningful, targeted, purposeful process. Managing such a process requires such coherence both in time and space, and in the part related to quality and quantity. That is why it is necessary for the management of the corporation to put as much emphasis as possible on the control of corporate governance. The function of control is a modern business philosophy, which represents professional support to management, and which contributes to transparency, coordination and integration of business. In order for corporate governance to be implemented effectively, it is necessary that certain factors be met. First, these are factors that are conditioned by the environment in which the organization operates. Second, international business is characterized by market instability and increasing competition.

Key words: financial management, corporate governance, human resources, enterprise management,

I. INTRODUCTION

There are many definitions of corporate governance in the world. In the text that follows, we will present and analyze the definitions that are most often cited and that present the concept of corporate governance in a comprehensive way.

The International Finance Corporation has defined corporate governance as structures and processes for the management and control of companies. Corporate management deals with the process of leading, administering and directing the company towards defined goals. The success of any business is closely related to the success of the corporate management of the organization. This is because corporate managers are in charge of strategic planning, managing resources and deploying them to meet the company's goals.

If we observe the concept of corporate governance from an etymological aspect, then we come to the conclusion that the concept originates from the English language, most likely from the

term corporate governance. Namely, the word "governance", i.e. management, has its root from the Latin words *gubernare* and *gubernator*, which mean the ship's manager, respectively. the captain of the ship and from the Old French word *gouvernance*, which meant control and the state of government."¹

In 1999, the Organization for Economic Cooperation and Development (OECD) defined corporate governance as: "the internal means by which joint-stock companies are managed and controlled, and which include a group of relationships between the company's management, its board, its shareholders and other stakeholders." Corporate governance also provides a structure through which the company's goals are set and the means to achieve those goals are determined and performance is monitored. Good corporate governance should provide appropriate incentives to executives and board members in a company to pursue goals that are in the interest of the company and shareholders and enable effective oversight, thereby encouraging companies to use resources more efficiently."² These are 10 rules that should be followed for successful corporate management are presented:

1. Resources - One of the main goals of corporate management is the efficient and effective use of resources within the organization. This may include designated staff and technology used in the organization. To do this, corporate management needs to figure out a way to minimize production time and improve productivity to increase profits.
2. Policy Formulation - Corporate management is tasked with formulating company policy. The policy should follow the various rules and guidelines that are specific to the industry in which the company operates. This means that the policy should be able to bring together the different departments or branches of the company and ensure that they are working towards one unified goal.
3. Finance and Budgets - One of the many functions of corporate management is to define the budget for the company (or the department they head) and spend it accordingly. Each manager should spend the budget according to the amount of money the company is able to spend. Failure to do so may adversely affect the company.

¹ John Farrar, Susan Watson (2011), *Contemporary Issues in Corporate Governance*, University of Auckland.

² Zakon o privrednim društva, ZPD, čl. 398. i 441.

4. **Coordination** - To achieve company goals, it is important that there is coordination between different departments. Coordination can be achieved through various communications, meetings and an organized line of transmission of information results. For example, this can help coordinate the level of sales with the level of production so that demand for a product is met by the company's supply.
5. **Control** - Control of progress in achieving the company's goals can be done through adequate reviews, reports and feedback from employees. Having a reporting structure provides insight into an organization's strengths and weaknesses. Control also helps to ensure that employees are doing their part in meeting business goals and are working in accordance with the business plan.
6. **Communication** - Good communication is a key feature of any company's success. One of the manager's tasks is to ensure that there is a well-established communication system in which employees can freely express their suggestions for improving the organization and are not afraid to admit that they have made a mistake.
7. **Employees** - Selecting candidates who fit the job, academically and intellectually, is very important to the company. Managers must ensure that the appointed employees can work towards the company's goals. They have to make sure that the staff is competent enough to handle any kind of situation, good or bad.
8. **Training and development of personnel** - Training of new employees is very important in helping them understand the way the company works, as well as in introducing the rules and regulations of the organization. Equally important is the training and development of existing employees.
9. **Performance appraisal** - Rewarding employees for a job well done, whether it's a public appraisal or a bonus, is very important. This not only helps employees stay motivated, but also shows managers the level of enthusiasm employees have and how well they are working towards the company's goals.
10. **Technological development** - Technology is always changing. Therefore, it is important for the manager to ensure that the company uses the latest technology whenever possible. Using outdated technology will not only contribute to inefficient work, but can also threaten the success of the company and management. That's why it's crucial for any organization to update their technology and keep their stuff up to date on the technology being used.

Corporate management works as a team that guides and directs the work of the company towards the goals at the executive level. Managers are expected to understand the company's strategic goals and then work to allocate the company's resources to achieve those goals. Managers at the same level are expected to work together, putting their teams in a position to complete the tasks and projects assigned to their department. Managers at different levels also communicate, sending reports and data back and forth and ensuring that all ongoing work is moving in the right direction.

Corporate management represents the aspect of management that deals with all types of projects and the production function of business, as well as employee productivity. Corporate business management refers to the managers and executives who are the primary leaders of the company. The scope of managerial roles can be found in different areas of the organization such as HR department, IT department, legal department and executive department, etc. The success of any business organization mainly depends on the success of the corporate management of the organization. As a corporation usually refers to a large business organization with various departments and divisions that are kept to produce goods and services for the end consumer.

Guiding main principles of corporate governance

- The Board approves corporate strategies aimed at building sustainable long-term value; elects the Chief Executive Officer (CEO); supervises the CEO and senior management in the conduct of the Company's operations, including capital allocation for long-term growth and risk assessment and management; and sets the "tone at the top" for ethical behavior.
- Management develops and implements corporate strategy and manages the company's operations under the supervision of the board, with the aim of creating sustainable long-term value creation.
- Management, under the supervision of the board and its audit committee, prepares financial statements that fairly represent the company's financial condition and operating results and timely discloses the information investors need to assess the company's financial and business stability and risks.
- The Board Audit Committee maintains and manages the relationship with the external auditor, oversees the annual audit of the company's financial statements and internal control over financial reporting, and oversees the company's risk management and compliance programs.
- The Board's Nominating/Corporate Governance Committee plays a leading role in shaping the company's corporate governance, seeks to build an engaged and diverse board whose composition is appropriate in light of the company's needs and strategy, and actively conducts succession planning for the board, the board.
- The Board's Compensation Committee develops an executive compensation philosophy, adopts and oversees the implementation of a compensation policy that aligns with its philosophy, designs compensation packages for the CEO and senior management to drive long-term value creation, and develops meaningful performance-based compensation goals that support the company's long-term value creation strategy.
- The board and management should engage with long-term shareholders on issues and concerns that are of broad interest to them and that affect the company's long-term value creation. Shareholders who engage with the board and management in a manner that may influence corporate decision-making or strategy are encouraged to disclose appropriate identifying information and to assume some responsibility for the long-term interests of the company and its shareholders as a whole. As part of

this responsibility, shareholders should understand that the board must constantly weigh both the short- and long-term uses of capital when deciding how to deploy it in a way that is most beneficial to shareholders and to building long-term value.

- In making decisions, the board can take into account the interests of all members of the company, including stakeholders such as employees, customers, suppliers and the community in which the company operates, when it directly and meaningfully contributes to building a long-term business. creating term value.

II. CONCLUSION

Corporate governance provides rules and appropriate control mechanisms through which, on the one hand, shareholders can monitor the decisions of managers and, on the other hand, of allocating partners. Such a system, in a modern business environment, should initiate and support research and development activities, to contribute to the social stability of human and cultural capital through construction. It is easy to come to the conclusion that the modeling of corporate governance should be integrated into strategies concerning sustainable development, through continuous involvement in the restructuring of the main economic branches or the reform of the social sector. If in the traditional management model the company was led by the owner's family, economic, managerial and technological factors determined the need for leadership realized by professional managers. In this way, new relationships and economic processes between business owners and managers were created. Their modeling and practice forms the subject of corporate governance, but its basic goals remain unchanged.

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AUTHORS

First Author – Salahdeen Azwali phd.candidate

A review of African spirituality and food sovereignty and the gender aspects along the staple food value chain among smallholder farmers in western Kenya

¹Owino Harriet Nyakecho; ¹Tsawe-Munga Chidongo; ²Mugalavai Violet Kadenyeka & ¹Joshua Stephen Muoki

¹Pwani University
²University of Eldoret

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Abstract- There is vast literature on African spirituality under African traditional religion, but not much on African spirituality as a concept within the context of Kenya, whereas in the area of food sovereignty, most of the literature is on global food sovereignty and not much on food sovereignty in Kenya. On the other hand, there are studies done on food security in Kenya but with little mention of its relationship with food sovereignty.

The spirituality practiced by small holder farmers is not outside of their culture which in turn governs its application to the community's food systems and their practices towards their own food sovereignty. A smallholders farmers spirituality is also not separate from their ethnic identity and how their ethnic identity influences their farming practices which are able to sustain the community.

Both women and men are integral in the embodiment and practice of African spirituality in the continent, as well as in Kenya. Together, they make up the smallholder system and play an important role in developing their families and consequently their community by involving themselves in socio-economic activities alongside the spiritual ones in a quest for liberation from hunger and oppression. This paper highlights some of the studies that have been done in Africa in these aspects and tries to fit it in the smallholder farm household along the staple food crop value chain in western Kenya.

Index Terms- African spirituality, food sovereignty, gender, western Kenya

I. AFRICAN SPIRITUALITY AND FOOD SOVEREIGNTY

African spirituality is the spirituality of African people independent of the naming systems given to the culture of those spiritual beliefs. The spirituality of African people cannot be separated from their ethnic identity and culture, and the smallholder farmers practice a spirituality that is historically part of their identity. African spirituality is organized based on the ceremonies, libations, holidays, rituals, taboos, totems, spiritual

leaders and observance of sacred practices that is demonstrates through the food value chain.

According to Opok et al. (2016), African spirituality is defined as the spirituality of African people independent of the naming systems given to the culture/rituals of those spiritual beliefs and that it is not a denomination. They further expound on their definition by mentioning that African spirituality lives inside Islam, Judaism, Christianity as much as it does inside *Vodun* or *Odinani* which are indigenous spiritual systems. Moreover, the study of Opok et al (2016) states that outside of Abrahamic faiths, and faiths found in the African diaspora, many African religions are inseparable from the ethnic identity and culture. In lieu of the definition of Opok et al. (2016), this would mean that the spirituality of the smallholder farmer in western Kenya is historically part of their identity and that their African spirituality illustrates itself in their way of living which includes how they plant their food crops to the point of harvesting and consumption. Irrespective of the religion smallholder farmer practices, there is African spirituality within it qualified by the rituals, taboos and practices that are observed through the staple food crop value chain.

Opok et al. (2016) further state that all spiritual systems practiced traditionally by Africans whether native or mainstream are organized along religions. They include the rituals of *voodoo*, *orisha*, and *serer* which according to them are all highly organized and without exception, function in a communal setting. The organization comes in the form of degrees of a priest class, ceremony, libation, religious holidays, creation stories, saints, and divine systems of punishment and rewards (Opok et al. 2016). This further exemplifies that nowhere in Africa is there 'spirituality' outside of a culture to contain and govern its application to a community, because they have vehicles which are cultural, symbolic and cognitive in nature for institutionalizing beliefs for posterity. Minnema (2014) also identifies culture as a pre-given constant which is seen as characterized by custom and habitual behaviour that is typical of traditional cultures of small and non-complex societies. In consonance with Opok et al. (2016) study, the spirituality of the smallholder farmer can be organized in a way

that it can function in a communal setting. Their spirituality would include a priest/priestess class, ceremony, libation, and most importantly, a spiritual dimension in how they plant, harvest, prepare and consume food. A smallholder farmers spirituality would not be separate from their ethnic identity and how their tribal identity influences their right to farming practices that are most sacred and suitable for the sustenance of the community.

Rudolf & McElchlan (2013), attempt to define food sovereignty by showing how it differs from food security which is vastly studied. They argue that food sovereignty considers the cultural, political and environmental aspects of food systems which is a major missing link to food security globally. They further illustrate that while the two terms of food sovereignty and food security are related, they differ in their approaches and results. Furthermore, they contend that food security focuses on the supply of food to communities, which ends up ignoring the power inherent in food systems, power that is expressed through food sovereignty, and not ordinarily practiced by rural communities. Desmaris (2008) and Wittman et al. (2010) elaborate how food sovereignty aims to link production to consumption by recognizing both the people and the power inherent in food systems thus affirming that food sovereignty is a grassroots movement which requires the ideas and practices of those on the ground rather than policies from the top.

According to Awolalu (1976), when discussing African traditional religion in order to distinguish it from African spirituality, the meaning changes slightly from that of African spirituality. Awolalu asserts that while Africa spirituality is found within Abrahamic religions such as Christianity and Islam and combines aspects of African traditional religion which exists as the indigenous religious beliefs and practices of Africans. African spirituality is a religion which resulted from the sustained faith held by the forebearers of the present Africans, and which is being practiced today in various forms and various shades and intensities by a very large number of Africans including individuals who claim to be Muslims or Christians (ibid). Traditional here means indigenous, that which is aboriginal or foundational, handed down from generation to generation, upheld and practiced by Africans today (ibid). Awolalu (1976), continues to emphasize that African traditional religion is a heritage from the past, but treated not as a thing of the past but as that which connects the past with the present and the present with eternity, African traditional religion is not a fossil religion, a thing of the past of a dead religion. It is a religion practiced by living men and women (ibid). In lieu of the definition and extrapolation of African traditional religion by Awolalu (1976), there is a difference between the concepts of African spirituality and African traditional religion. In essence by the definition by Awolalu (1976) highlights African traditional religion as being a component of African spirituality. Therefore when one explores the African spiritual beliefs and practices of smallholder farmers, one would discover many elements of African traditional religion as well as elements from Christianity and Islam which were heralded by the colonial era in many parts of Africa. Sometimes these religions are practiced side by side in specific geographical locations and other times there is syncretism where a community combines various elements of different religions on demand. Awolalu (1976) definition would therefore help explain or understand the aspects of African traditional

religion discovered in the study and mentioned as African spirituality.

A review of Shiva (2016) on the process by which a disconnect arose between indigenous spiritual systems of the world and reflected in Africa as a continent and its particular spiritual systems and nature as highlighted in food sovereignty, shows that colonialism and industrialism destroyed the earth and indigenous cultures through four false assumptions. The first assumption is that humans are separate from nature and not a part of nature. In this case therefore, the smallholder farmer is assumed not to be spiritually connected in any way to the land on which they dwell, farm and sustain themselves on. The second assumption is that nature is dead matter, mere raw material for industrial exploitation and thus a tool to be used in a detached manner to get the most out of it by applying the least amount of effort. The third assumptions is that indigenous cultures are inferior and primitive, need to be "civilized" through civilizing missions of permanent colonization thus one would discover smallholder farmer who exhibit shame when utilizing African spirituality through their food systems and castigating those who apply ancestral knowledge while working on their land. The fourth assumption is that nature and cultures need improvement through manipulation and external inputs and that Green Revolution, genetically modified foods and gene editing are rooted in this false assumption (Shiva, 2016). All these assumptions when applied in the setup of western Kenya, contribute to the disconnect between African spirituality and food sovereignty among smallholder farmers and can be used to bring about their integration.

Shiva (2016) continues to affirm that many nations of the world were divided by colonialism and Africa was hugely divided by colonialism and more so, Africans were divided by gender, race, religion, class as they were colonized. However, before colonialism, humans were part of the Earth and food is the currency of life on Earth. (ibid). A review of Shiva's work shows that a food system that is at war with the Earth is also at war with our bodies. Furthermore, Shiva (2021) asserts that across the world, especially in times of the pandemic, there is a growing consciousness that the multiple energies humans are living through have their roots in an unjust, non-sustainable industrial-globalized food system and solutions to all the crises lie in creating local biodiverse, poison-free, chemical-free food systems that increase nourishment for all beings while reducing our ecological footprint and connecting it to the spirituality of the people (ibid). Shiva (2016) continues to show the spiritual dimension of food and that the food we eat can be a big contributor to the problems or solutions. She states that eating consciously and spiritually can be a big contributor to the solutions and that what humans need to keep in mind is that food is the currency of life. Shiva (2016) also states that when one is participating in destructive industrial food systems, they are participating in breaking the cycles of life. This means that through the staple food crop value chain, one needs to avoid processes that are not ecologically, environmentally and process friendly as they may also be harmful to body. . To eat in a spiritual way means to eat food that has been prepared with love. One should avoid eating anonymous foods cropped from anonymous seeds where one does not know what went into the manufacture (ibid). All beings are living, all beings are sentient. Eating is a conversation with other living beings. Anonymous foods disrupt that communication and our health and

seeds should remain sacred (ibid). Shiva's (2016) study contributes to giving the ecological dimension to food sovereignty which in essence is the nexus that is missing when it comes to utilizing African spirituality alongside food sovereignty.

1.2 Gender and African spirituality along the staple food crop value chain

Oduyoye (2001), Mwaura (2016) and Phiri (2002) have done extensive research on the spirituality of African women. Oduyoye (2001) illustrates how African women use story as a source of theology and so tell their own stories as well as study the experiences of other women including those outside of their own continent but especially those in Africa whose stories remain unwritten. The writer also elaborates that these stories are weaved together into what forms beliefs related to spiritual and cultural life within an African set up (ibid). She affirms that story telling is important to spirituality because it is a medium of communication and that stories are educational and lend meaning to events in people's lives (ibid). Phiri (2002), on the other hand observes that storytelling can be used to delve into the past to enable one to use the past to understand and affect the present differently. On the other hand, Mwaura (2016) highlights that African woman play a crucial role in the development of their communities and thus her study shows how African women bring a very special input into the spirituality of their communities in general, especially in smallholder farm households. Oduyoye, Phiri and Mwaura's studies (2001, 2002, 2016) respectively, on women and their spirituality, lends relevant information in the aspect of gender. However, it is inadequate and limited as it relates to the disaggregating and understanding gender within a community.

A review of Orbis (1975) work sets African women in their role and contexts as pertains to spirituality. He affirms that in traditional African life, women play a significant role in the spiritual activities of the society. One of the areas their role is prominent, he asserts, is in the offering of prayers for their families in particular and their communities in general. He continues to assert that in many areas in Africa, there were (and still are) women priests (priestesses) and almost everywhere in Africa the mediums (who are so important in traditional spiritual practice) are nearly always women and that those who also experience spirit possession are in most cases also women (ibid). Orbis (1975) continues to illustrate the deep significance of African women in the Spiritual heritage of their communities. He adds that traditional healing using medicinal herbs and nutritious food cultivated within the community is a spiritual profession of both men and women and it is more often under women practitioners who handle children and women in special rituals (ibid). An example of a spiritual ritual performed by women as exemplified by Ohaja (2021) and Orbis (1975) is shown in menstruation which was intimately linked with the passing on of life. He also shows that many Africans perform spiritual ceremonies during rites of passage and many of these rituals are performed by women (ibid). Orbis (1975), gives an example of how in Ghana, the Ashanti mother of a concerned child prays that she may grow to full maturity and bear children on the onset of menstruation which is a rite of passage. This, he continues, is the wish and spiritual responsibility of every mother for her children during every stage of rites of passage (ibid). A prayer offered by a mother would be

accompanied by libation of wine and drink from cultivated crop from the families farm and with an invocation that said, *"God upon whom men lean and do not fall, receive this wine and drink. Earth Goddess, whose day of worship is a Thursday, receive this wine and drink. Spirit of our ancestors, receive this wine and drink. This girl child whom God has given me today, the Bara state has come upon her, Do not come and take her away and do not permit her to menstruate only to die."* (Gyekye, 1987)

A review of Mbiti (2016) illustrates that in many parts of Africa, it does not always rain enough and lack of rain is seen as a spiritual sign of great significance requiring petitions, prayers, libations and rituals. Rainmaking is a revered calling with a great significance for smallholder farmers. Rainmakers are therefore important members of the community and many of these rain makers are women (ibid). According to Mbiti (2016), rainmaking ceremonies are performed, a role fulfilled by women, at which sacrifices, offerings and prayers are made to God, beseeching him to give more rain or to let it rain. Women's role was to pray to God to beseech him for rain and their prayers would be for the welfare of the people and animals at large since all depended on water along the staple food crop value chain (ibid). Mbiti (2016) also highlights the spiritual role of African women in enhancing food sovereignty in their communities through their spiritual beliefs and practices which includes mediation for their land and the community through prayers and performing rituals as rainmakers. It is therefore clear that women participate in the spiritual rites of passage of their societies and made their own contributions for the welfare of their lives, their families and of society at large through the offerings of prayers and libations. According to Mbiti (2016), the prayers are small windows that open into the spirituality of women which indeed is the spirituality of all human beings. As women share with God in the great mysteries of passion on life, so they share in giving human life a spiritual orientation (ibid). Most importantly, role of women in integrating African spirituality in food sovereignty is enhanced by combining leadership in the spiritual arena with leadership in community governance especially when it comes to food sovereignty.

Mwaura (2016) also integrates women's spirituality with their socio-economic activities of which food sovereignty is an aspect. She says that women's involvement in the socio-economic activities alongside the spiritual ones is a quest for liberation from all that dehumanizes them and quotes the scripture as a mandate that is derived from the Gospel (Luke 4:16-20). She continues to say that even though gender in African spirituality is a quest for liberation, some scholars observe that approaches to liberation which resonate with earlier development models in the 1960s and 1970s remain welfare-oriented meeting practical gender needs but not strategically addressing the root causes of women's vulnerability and marginalization in present day context (ibid). Mwaura (2016) further explains that women's experiences of injustices arise from a web of interconnected factors such as that addressing one area. For example, gaining education does not overcome the fundamental and inherent vulnerability faced by women because of their gender. Mwaura's study gives a glimpse on contexts of vulnerabilities for women that might affect how they apply African spirituality in food sovereignty. A woman might be educated but still be vulnerable as she explores farming, even though she has a right to sustainable farming systems as a

woman. She may not be able to acquire land by virtue of being female despite her education or lack thereof. Mwaura (2016) lends a lens for comparison on the factors that causes the lack of integration between food sovereignty and African spirituality by women despite having a rich spiritual heritage from the past.

A review of gender and spirituality would not be complete without addressing the issue of ownership and acquisition of land by gender. There would be no staple food crop value chain without ownership of land, neither would there be any spirituality without a context which is earth. The staple food crop value chain begins at the preparation of land and there would be no land preparation without the ownership or acquisition of land. Kireu (2016) renders that in African spirituality, land is sacred and is God given and there is no separation between the earth, the rites and rituals performed on it as well as the living and the ancestral spirits. All were held in continuity, flowing and being interdependent. A review of Kireu (2016) suggests that when it comes to women and land, the issue of vulnerability is apparent in post-colonial times. Kireu therefore shows that the discrimination as concerns land trickles down to food sovereignty in how and if women are able to determine their food sovereignty. According to Kireu (2016) discrimination and powerlessness as concerns food sovereignty begun with changes during the post-colonial period and she gives an example of the Maasai of Kenya. Kireu (2016) also emphasizes that in precolonial era, the Maasai never owned land as it was considered as a gift from God. She continues to highlight that the Maasai people thus lived on and used the land without ownership (ibid). Furthermore, men were the heads of the household (in the sense that they led, although women were the ones who dealt with 'real' issues) (ibid). The studies of Agarwal (2003), and Platue and Baland, (2001) also illustrate that the biasness in land inheritance rights favour male relatives, leaving both widows and daughters at a disadvantage. Kireu (2016) further extrapolates that when the Government of Kenya embarked on land distribution programs, it was the men who were given land and most of the land distributed was not fertile. Initially as the barren land was divided, women were not permitted to participate in any discussions on land issues (ibid). Miller et al. (2011) illustrates that inheritance was about making sure that the male heir maintains the family name and secures ownership and thus further passing the land to his own sons. Because of further sub-divisions of infertile land, women became more vulnerable and had to walk far to fetch water to take care of their families and their animals (ibid). The women thus continued to become more marginalized, disconnected from the land and more vulnerable as society members but despite this, it was the women who kept in touch with their culture through informal educations that involved story-telling and being taught about their culture because formal education was not esteemed for the girl child (ibid). Kireu (2016) highlights that after informal school, young girls would become integrated to their societies and most would get married and the disconnection with the land despite the oral tradition that they would receive, would continue from one generation to another. Kireu (2016), shows that the disconnect between gender, spirituality and food sovereignty became prominent on the onset of colonization and lends valuable information in understanding how land distribution affects food sovereignty and a possible lack of integration of African spirituality in utilization of land as expressed by the women in the community further divides the community from attaining food

sovereignty. African spirituality and food sovereignty therefore heavily requires the participation of women through the staple food value chain for greater success .

Howard (2003), on the other hand goes back to show that the link between women, spirituality and the seed is an ancient one. She further illustrates how women's link to seed is through food, health, culture, ecology, spirituality and social relationships. She highlights that in their roles as seed custodians, plant breeders, farmers, herbalists and mothers, African women's daily work involves an intimate involvement and knowledge of plants and further states that women are the unacknowledged and unseen experts on seed and on both domesticated and wild biodiversity (ibid). Howard (2003) lends an integrated perspective of African women's spirituality and their food sovereignty because women from ancient times are connected to their seeds. Her study is integral to the aspect of Gender in food sovereignty and African spirituality.

Pionetti (2012) affirms the role of women in African spirituality and food sovereignty by stating that in Africa, as in other regions of the world, women are responsible for most of the harvesting and post-harvesting activities and therefore save, select and breed seed. For them, farming and breeding are one and the same activity as the many challenges they face require not only knowledge but also the ability to innovate and apply their spirituality (ibid). The study of Kergna et al. (2010) among smallholder livestock farmers in Mali, West Africa and the study by Njuki & Mburu in ILRI (2013) among the East African countries also illustrate that women were more likely to be considered the owners of small livestock and to have a say in the disposal and sale of these and their products, and in the use of income accrued from the sales as compared to larger livestock. The life-giving function of women is thus embedded in a sophisticated knowledge system. Pionetti (2012) also states that as seed custodians, women are often responsible for rituals around key moments in the crop cycle and act of celebrating these life cycles gives meaning and importance. Pionetti (2012) study lends a deeper understanding on the spiritual role those African women play in food sovereignty.

Furthermore, Pionetti (2012) realized that for the four decades of research and action she had engaged in, most farmers of the world are women who grow food as nourishment, not for commodities and that they grow food for health, not disease. Through wars and famines, through floods and droughts, she asserts that women keep alive the spiritual memory of their seeds and foods and that women have the potential to lead the transition to regenerate the earth, her biodiversity, health and nutrition (ibid). Pionetti (2012) also highlighted the role of women in bringing about food sovereignty while utilizing African spirituality because of their important role as custodians of nourishment among farming households.

1.3 African spirituality along the staple food crop value chain

Gumo et al. (2012) shows how African spirituality is practiced along the staple food value chain by emphasizing that African spirituality has been enhanced through the environment where humanity worshiped and venerated everything under the earth, on earth, between the earth and heavens and in the heavens above. Bayers (2017) also states that traditional African and

religious belief systems were practiced concurrently during planting whereas Fisher et al. (2009) elaborated that African spirituality is linked to traditional agriculture which highlights old practices through which humans have been interacting with nature and managing ecosystem services. Consequently, various methods to restrict the utilization of certain natural resources are employed as a way of conserving the environment and continuing the relationship between the African person and their environment which is an ecological perspective and thus lends an ecological angle to this study. The smallholder farmers households are part and parcel of their environment even as they practice African spirituality.

Most importantly, Mbiti (1969) supports the ecological view by stating that Africans exercise their spirituality in all of their daily activities as he notes that Africans are notoriously religious. Wherever the African is, there is spirituality and he carries it to the fields where he is sowing seeds or harvesting a new crop; he takes it with him to the beer party, or to attend a funeral ceremony; and if he is educated, he takes religion with him to the examination room at school or in the university (ibid). Spirituality deeply permeates society that it is further carried into the political realm where if an African is a politician, he takes it to the House of Parliament where policies are made (ibid). Mbiti (1969) is relevant in bringing the ecological angle to the study as well as illuminating how spirituality is present when policies are made concerning the governing and utilization of land as an aspect that brings about the nexus between African spirituality and food sovereignty.

Gumo et al. (2012) continues to set the ecological dimension by saying that humankind, according to African thought and belief, is not an isolated creature. Humanity is only part of the universe which is full of animals, plants and inanimate objects, and is not isolated and all these components are relayed to each other in various ways since they are dependent on the supreme God for their appearance and continued existence (ibid). Gumo et al. (2012) further highlights that African philosophy on resource utilization and environment protection is spiritually based and thus major conservation efforts and control of resources are influenced by spirituality. The African spiritual worldviews create respect to nature, reverence of hills, forests, animals and rivers and this practice is still held by some African communities, especially among the Luhya of Kenya who use their spirituality for example to conserve nature and especially forests (ibid). The author contributes to the perspective of ecology as an aspect of food sovereignty and how a smallholder farmer integrates African spirituality in their farming systems.

Galli (1973) asserts that among most of our African people, there exist strong beliefs, fears and respect for the spirits of the ancestors. Animals are used for ritual sacrifices to appease the ancestors and deceased spirits who guard the destiny of the living (ibid). The use of animals for spiritual rituals and sacrifices is part of the nexus between African spirituality and food sovereignty. Galli (1973) gives the example of the Nguni of South Africa who sacrifice a goat and consume it on the arrival of a new baby (ibid), part of an illustration of integrating African spirituality and food sovereignty. He highlights that if the ritual goat sacrifice was omitted, the anger and punishment of the ancestors would be apparent by their 'burning' the child and the consequent failure of the child to grow and thrive (ibid). To restore equilibrium would then call for elaborate rituals, animal sacrifices and services of

traditional practitioners and spiritual elders (ibid). Galli (1973) further shows how African spiritual beliefs concerning food are handed down through the ages and are passed from one generation to another and these beliefs transcend education or social status. Moreover, Shazali et al. (2013) illustrates that the beliefs concerning food can occur and be transferred spontaneously without intent thus with little encouragement and motivation from the surrounding, from the known to the unknown as community members get engulfed in the festivities and spiritual practices that accompany the practices. Galli (1973) also offers practical examples of how African spirituality and food sovereignty are intertwined in indigenous societies in Africa and therefore contribute towards a worldview of practical examples.

Mwale and Chita (2015) also reiterate concerning the practice of African spirituality along the staple food crop value chain that harvest festivals in which the gods and ancestors are thanked for the harvest are an essential aspect of African tradition. Therefore, the sacrament of the first fruits is an essential rite in a complex series of other rites such as birth, childhood, puberty, adulthood, death, and rebirth (ibid). The crops undergo the same process of regeneration, the fruits of the field ripen each year and each year the people protect themselves against danger (ibid). Therefore, whatever threatens this process is given a religious interpretation and needs a spiritual response (ibid).

According to Mbiti (1987), African people have so many spiritual associations with food, some of which are linked with the concepts of God, such as the belief that he has absolute power over the universe and the production of food. Studies by Riang'a et al. (2017), Chakona et al. (2019) and Mbogoh et al. (2019) also assert that food beliefs and practices are practiced among other ethnic groups in sub-saharan Africa. According to Castagnetti et al. (2021), the offering of crops completes a harvest cycle by recognizing and returning the energy of life (in the form of food) to its spiritual source. African spirituality along the staple food crop value chain is thus seen where animals and plants which constitute human food are used in rituals and sacrifices Mbiti (1987). Sibanda (1997) also notes that Africans have spiritual bodies and objects which are used for various contextual practices. The spiritual significance of a particular animal or plant may differ from one community to another as shown by Gumo (1993) who illustrates the example of communities who undertake spiritual practices often binding oaths or purification rites, which involves the use of certain animals. Hens and cocks may be used as sacrifices to God or mediators between God and humanity, including ancestors while burnt offerings are widely considered to be essential too (ibid). This is something similar to what [Kimmerer \(2013\)](#) calls "ceremonies of practical reverence," powerfully pragmatic "acts of reverence," in which manifest and material action has seemingly unmanifest and immaterial effects. Gumo (1993) highlights that there are also myths which tell how domestic animals originated at the same time or in the same way as man himself. Cattle, sheep and goats sourced for sacrificial and other spiritual purposes are examples found in most Kenyan communities (ibid). On the other hand, Mbiti (1987) describes how many people have sacred attitude toward their animals and example of the Nandi, Pokot, Samburu and Maasai who pray everyday to God for the safety and prosperity of their cattle (ibid). Based on this review of Mbiti (1987) and Gumo (1993), it is evident that there is a sacred relationship between the

environment, animals and food. Christianity is also interconnected with the farming beliefs and practices in (2 Corinthians 9:6-8; Hebrews 13:16) where brethren are reminded to sow generously in order to reap generously in time of need.

According to Bordet (2015), when someone is unwillingly hungry or malnourished, there is not much room for spirituality because it essentially means that the human and the environment are disconnected. There is no oneness or reverence with the environment if food is scarce and it means that spirituality is absent (ibid). Martinez & Pascuel (2013) also state that rural household members adhere to different food beliefs, with some of the rejected foods being nutritious foods but for a limited time. Bordet (2015) also continues to highlight that lack of food makes the body to hurt and the mind to be obsessed with the lack of food and thus the soul thus has no room to thrive. She highlights that since the body and soul are one, only heroes or extraordinary characters can develop a beautiful spiritual life when lacking adequate food, or not having access to food (ibid). Furthermore, she explains that hunger is a burden imposed on the poorest of poor which in turn defeats the purpose of spiritual enhancement (Bordet 2015). Bordet's article augments the premise that without African spirituality practiced within the context of food sovereignty, there would be no food security for smallholder farming nations. Bordet (2015) illustrates that the four dimensions of food security which are availability, access, stability and utilization have in themselves a spiritual dimension. She further emphasizes that food must be available, in sufficient quality and quantity for all in the area one lives and that food production and marketing must be practiced in a spiritual manner; and that smallholder farmers and traders have a responsibility in this. (ibid). In addition to this, Bordet (2015) points out that food must be accessible; that is affordable at a reasonable price, as a spiritual practice. Food that is grown by smallholder farmers and cooked with attention and love can contribute to the wellness of the body and soul and moreover, sharing a meal with the family and community is a righteous act and affirms the sacred nature of food (ibid). Bordet (2015) highlights that the spiritual dimension of food security derives from the commitment of those who are healthy and food secure to help the hungry in becoming food secure, and more generally to change the course of strongly unequal social organizations, political systems and ill-conceived policies that tolerate abject forms of poverty. To achieve this entails the application of spiritual values and forms of action aimed at changing the state of things (ibid). The review of Bordet (2015) enhances the premise that to realize food security among smallholder farm households, there needs to be a nexus between African spirituality and food sovereignty.

1.4 The relationship between African spiritual beliefs and food sovereignty practices of smallholder farmers

A review of Nkosi (2016), shows that the nexus between African spirituality and food sovereignty is an ecological one that begins at land ownership. Food sovereignty begins with land ownership or acquisition and the consequent utility of the land in ways that are culturally, spiritually and ecologically sound. He expands his thesis on Spirituality, Land and Land Reforms in South Africa by discussing that while land is a birthright of every African indigenous person, it has a communal dimension whereby all members of the community are expected to share its resources,

especially in the rural areas, under some form of traditional authority. According to Nkosi (2016), it is the general belief of African people that land is a gift from God and from the ancestors and that communities are given land by God through their lineage to be good stewards of Gods resources. Being a good custodian thus includes conserving the land and utilizing it to feed the community in sustainable ways (ibid). This is in line with studies by Howes & Chambers (1980) as well as Pulido & Bocco (2003) who illustrate that various activities were practiced towards protecting natural resources among them animals, water, plants, trees and human health. Nkosi (2016) continues to give examples of the importance of land in the African spirituality context, one which includes how in many African families, the umbilical cord of a new born baby is buried, and in other communities how when a boy is circumcised, the foreskin and blood is also buried. The sacredness of land in Africa is linked further to the fact that the ancestors are buried in it and without land there would not be a home for a dead body while in some communities, when someone died, one would not be allowed to touch the soil with a hoe, to plough or till the land until that person is buried (ibid). Nkosi (2016), further emphasizes that in African spirituality, land is valued as a resource of livelihood since the land produces food and water which gives life to all living things. During the hunting and gathering times, when people went looking for herbs, he illustrates how African people would perform rituals using incense to request their ancestors to give blessings in their foray and pray before the land was dug (ibid). Nkosi (2016) furthermore describes that the custom of making or asking for rain through the help of the ancestors and God still features strongly in some communities and that a number of communities also continue to make sacrifices before they eat from the year's harvest to thank God and their ancestors. Nkosi (2016) is integral to this present study because it shows how land is a physical resource with a spiritual significance and thus everything that is done on the land has an effect on a smallholder farmers livelihoods.

According to Karyongi (2016) and Mbunda (2017), one of the greatest challenges to utilizing African spirituality in the context of food sovereignty is the dissociation with the land which is the genesis of every community and is where the story of every family member ends. He gives the example of the Maasai of Tanzania who display that the connection with the land is integral because land is the basis for livelihood given that the earth provides grass, other plants and water for their livestock and this is part of the food system where food sovereignty is practiced. He asserts also that the earth is also where crops are grown, and wood fuel for food preparation is derived from and that the earth also provides sacred plants like *oreteti* which are used for meetings, rituals and medicine (ibid). Karyongi (2016) and Mbunda (2017) is integral to the study in showing how linking the spiritual significance of the land and smallholder farm households brings about food sovereignty.

On the other hand Hambira (2016) illustrates that food is one of the most basic human needs and the state of food security has to be ensured before one turns to any activity in life because this was the case in the ancient world and remains so in contemporary times. He further emphasizes that concern with food and the protection of its sources permeates all human thought and activity (ibid). He gives an example of Christianity where food was very central to the spiritual formation and direction of the spiritual

community. (ibid). The Passover meal (Exodus Chapter 12:1-11- NIV Bible) is given as an example and the Christian celebration of the Eucharist (Luke Chapter 22:7-8- NIV Bible) too which are at the very heart of anyone who practices Judeo-Christian faiths (ibid). Whatever therefore threatens the people's source of livelihood, whatever threatens their source of food threatens their very existence threatens them not only socially, economically and morally, but also spiritually and in other words, it shapes either indirectly or directly their view of God (ibid).(rephrase) Hambira (2016) contributes to this study in enhancing the thesis that the nexus of African spirituality and food sovereignty brings about food security.

Shiva (2021) concludes the review on the relationship between African spirituality and food sovereignty by expanding on the relationship that humans have with food where she highlights that beyond the connection that humans have with food they are generally connected to nature. She asserts that the forests are sources of water and the storehouses of a biodiversity that can teach us the lessons of democracy, pointing towards leaving space for others while drawing sustenance from the common web of life (ibid). She illustrates how the poet Tagore saw unity with nature as the highest stage of human evolution. In his essay "Tapovan" (Forest of Purity), Tagore writes:

"Indian civilization has been distinctive in locating its source of regeneration, and material in the forest, not the city. India's best ideas have come where man was in communion with trees and rivers and lakes, away from the crowds. The peace of the forest has helped the intellectual evolution of man. The culture of the forest has fueled the culture of Indian society. The culture that has arisen from the forest has been influenced by the diverse processes of renewal of life, which are always at play in the forest, varying from species to species, from season to season, in sight and sound and smell. The unifying principle of life in diversity, of democratic pluralism, thus became the principle of Indian civilization." (ibid).

Through much of Shiva (2021), we see that it is this unity in diversity that is the basis of both ecological sustainability and democracy and that diversity without unity becomes the source of conflict and contest. She highlights that unity without diversity becomes the ground for external control and this is true of both nature and culture and gives the example of the forest which is a unity in its diversity, and that we are united with nature through our relationship with the forest (ibid). Shiva (2021) sheds light into the relationship between the smallholder farmers, the land and their spirituality as one that has several aspects and yet united as one, also borrowing from the systems theory that has been used to conceptualize this present study.

Shiva (2016) augments the interrelation between the smallholder farm household,, the food they grow and the environment therein by showing that a reverence for food and the way food is eaten, and the food that one eats is important and matters greatly because food makes us who we are, physically, culturally and spiritually. By championing greater food sovereignty, sustainability and seed rights for local farmers around the world, Shiva (2016) asserts that food and culture are the currency of life and that you cannot have one without spiritualization.

According to Shiva (2021), food sovereignty is defined as not only sovereignty over food but also sovereignty over one's

life, livelihood and health and that human beings are interconnected; therefore, food sovereignty is an ecological process of co-creation with other lifeforms that begins with seed sovereignty: saving and using living seeds as well as involving care for the land and soil. She asserts that we cannot have food sovereignty if we do not feed the soil organisms and that food sovereignty is based on organic farming and avoiding chemicals and poisons while also including knowledge sovereignty, economic sovereignty and political sovereignty in one's food sovereignty(ibid). Shiva (2021) shows that the seed is the source of life, the source of food and that to protect food freedom, one must protect seed freedom.

In Shiva (2021), she explains how she not only emphasizes advocacy that enabled the masses to reconnect with the sacredness of seeds and consequent food, but she also enforces advocacy that enables the community to reclaim seeds that were owned by the community and to resist seeds that patented and driven by capitalist enterprise at the expense of ecologically sound seed banks. The advocacy and creation of seed banks snowballed into creating opportunities for farmers to grow more nutritious crops and also have climate-resistant seeds to deal with the environment where they are prone to climate change and climate disasters(ibid). Shiva (2021) continues to highlight how she helped write laws that recognize that plants, animals and seeds are not human inventions as well as doing advocacy work which involves fighting cases on biopiracy, the patenting of biodiversity and indigenous knowledge. In addition, Shiva (2021) through participatory research, showed that when one intensifies biodiversity instead of chemicals, and measure nutrition per acre instead of yield per acre, they can grow enough nutrition for two times the world population. From Shiva's study, it is pertinent that there is need for all stakeholders along the staple food crop value chain (farmers, buyers, sellers, processors, government agencies, religious organizations and NGOs) and all aspects of agency ought to collaborate and ensure that the nexus between African spirituality and food sovereignty can be used to achieve food security among smallholder farm households .

1.5 Discussion and conclusion

A smallholder farmers spirituality and culture can be evaluated based on how their lives and community in general is impacted and they should be venerated because of their role as the preservers of spiritual wisdom and knowledge. For a community to be sovereign in its food systems, it has to consider contextual aspects that include traditional, religious, cultural, symbolic, political and environmental aspects. The way to achieve food security is through food sovereignty which highlights smallholder farmers deciding and producing their own food through organizing themselves and making decisions towards the kind of activities to engage including what and how to conserve seeds, plant, harvest and consume. This gives them an integrated right to food approach to achieving community food sovereignty.

Gender and food are linked when one understands the power and control in the food system Ghale et. al (2018). Hunger is disempowering and men and women's rights put food sovereignty on the agenda. The major challenges that women face in achieving food sovereignty include denied land allocation rights, high input and food prices, contamination of food during planting, post-harvest handling and agroprocessing, and changes in the landscape through deforestation and demarcation. Linking food production

to consumption and presenting food as sacred establishes a means of handling these challenges.

For African people, spirituality focuses on preservation of the well being of the human and the promotion of what enhances life while on earth. This requires a healthy and natural environment. Animals, forests, tree species, sacred forests, lakes and mountains all served to remind indigenous communities of their need to respect their environment for sustainability. Good weather meant that a community was in harmony with nature while drought, famine or floods showed that there was disharmony. Spirituality permeates and is integrated in the daily life of an African including how he plants, harvests, processes, cooks and eats his food. Since spirituality permeates all aspects of an African life, the practices to protect special areas, species and to ensure the sustainable use of land and water finds expression in African spiritual rituals and practices. These practices are pertinent for integrating African spirituality and food sovereignty for a possible continual improvement of the food security situation of smallholder farmers in sub Saharan Africa.

In Kenya, agriculture is the backbone of the economy. 61.1% of Kenyans live in rural areas engaging in agriculture (World Bank 2013). Kenya is dependent on agriculture with peasant men and women being active advocates of food sovereignty. Peasant farmers have actively been pulling down cash crops like coffee trees and instead planting organic food crops (Brownhill, 2008). By actively working towards restoring the countries soils and agrosystems, agroecology is becoming a reliable way to achieving food sovereignty. Further efforts should also be made by the agricultural sector to accelerate the economic growth through strategic programs like crop production management, providing quality seeds, and effective fertilizers to boost productivity. Mainstreaming outreach programs while targeting age and gender equitably, and highlighting the role of African spirituality and food sovereignty should also be undertaken at the community grassroots level. In Kenya, this can be undertaken by County agriculture departments at the ward level in order to attain better community food and nutrition security and can be a model that can be implemented at the National level for a wholesome food and nutrition security for all.

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AUTHORS

First Author – Owino Harriet Nyakecho, Pwani University
Second Author – Tsawe-Munga Chidongo, Pwani University
Third Author – Mugalavai Violet Kadenyeka, University of Eldoret
Fourth Author – Joshua Stephen Muoki, Pwani University

Corresponding author: hariet.scott@gmail.com

Reduction Of Convergence Error In Adaptive Beam Forming Antenna

Ifeoma B. Asianuba¹ and O. Oghenekaro²

^{1,2} Electrical / Electronic Engineering Department, University of Port Harcourt, Rivers State, Nigeria.

ifeoma.asianuba@uniport.edu.ng

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ABSTRACT

Wireless communication network with much higher coverage capacity has triggered more research interest especially in beam forming techniques using smart antennas. The smart antenna adopts smart signal processing algorithms to track the location of mobile user device. However the main limitations to high-performance wireless communication are interference from other users (co-channel interference), inter-symbol interference (ISI) and signal fading caused by multipath effects. Co-channel interference limits the system capacity and is defined as the number of users which can be serviced by the system. This work therefore deploys a conjugate gradient method for mitigating convergence error in adaptive beam forming for smart antenna. The conjugate gradient method was compared with the analytical and least square modulus to validate the methodology and determine the most effective approach in terms of error minimization. The results of the research outcome showed that; the conjugate gradient method performed better than the least square method and analytical approach. The outcome of the analysis are presented in graphical results. The convergence of the conjugate gradient method was achieved with a minimum of seven iterations.

Keywords: Smart Antenna, Artificial Neural Network, Array Factor, Conjugate Gradient

INTRODUCTION

A smart antenna system is a multi-element antenna that systematically combine received signals from each antenna to better the performance of the wireless system. Smart antennas has the capability to boost signal range, mitigate signal fading, handover, suppress interfering signals, and improve the capacity of wireless systems.

Signals transmitted or received by smart antennas cannot be tracked by any other receiving device thus, this enables very high secured information to be transmitted. This paper therefore focuses on the required algorithm to achieve adaptive beam forming in the antenna radiation pattern. The antenna makes use of array gain, diversity gain and interference suppression to improve capacity of wireless network which results in increased data rate. It enhances its performance by adding more users to the system with same data rate per user.

Multipath fading results due to reflection and scattering which is avoided by smart antennas. In terms of power consumption, user capacity and noise suppression, smart antennas provide better performance than existing antennas. They can change the radiation pattern dynamically by adjusting noise, interference and multipath effects to a side lobe radiation.

The difference between smart and fixed antenna is based on the radiation pattern which have adaptive and fixed lobe respectively. The smart antennas transmit or receive signals in adaptive or spatially sensitive manner. So many operations of PC's cellular networks noticed rapid increase in signal quality and coverage. This technology is recent in the field of wireless and mobile communication which are limited by factors such as multipath and co-channel interference.

Smart antennas are mainly of two types; the switched beam antenna and adaptive array antenna. Switched beam system have several fixed beam patterns. A decision is made as to which beam to access, at any given point in time based on system requirement. From multiple fixed beam generated, one beam is steered towards the target. Adaptive array antenna allows the beam to be continually steered to any direction to allow for the maximum signal to be received and /or the nulling of any interference.

I. Statement of the problem

High-performance wireless communications systems have some constraint when communication terminals send and receive signals. These signals are subject to mutual interference. The characteristics of the medium of propagation changes randomly, and the mobile radio channel introduces different variations in the power of the received signal. Other distortions such as frequency shifts and the spread of signals overtime are also a contributing factor. When power is radiated from an antenna, very little of it gets to the receiver. This problem is arrested by increasing transmitting power. The challenges related to signal connectivity, travel path and signal convergence has stimulated a lot of research in recent years. The constant change in the angle of arrival of signals has also limited the speed of the converging signal thereby increasing the convergence error of that signal. If attempted convergence is too fast, the weights of the signals will oscillate about the optimum weights which will lead to an inaccurate tracking of the desired solution. This work adopts a conjugate gradient method for mitigating the convergence error in adaptive beam forming for smart antenna.

II. REVIEW OF RELATED WORK.

Marwa *et al.*, (2020) undertook a study on the analysis of beam forming for smart antenna with the use of least mean square algorithm. The authors focused on the performance of LMS algorithm by adjusting the weights to reduce the mean square error that would exist in between the signal wave form. The identified drawback of least mean square approach include; many iterations before convergence is achieved.

Yigit *et al.*, (2005), worked on improvement of the performance of downlink beam forming using Adaptive Linear Neural Network (ADALINE). Auto regressive neural network was used to predict downlink vector weight with auto regressive modeling approach. Both combination resulted in improved performance of the downlink beamforming.

Zoogghby *et al.*, (2018) looked at the issue of multiple source tracking with smart antenna. In the work, a system was proposed and implemented for communication using satellite for terrestrial system. The authors built a neural tracking system of multiple sources using an algorithm tagged RBFNN; Radical Base Functional Neural Networks. It was found out that the RBFNN algorithm had high degree of accuracy and the sources greater than the number of antenna elements was located by the system using the algorithm.

Ashraf *et al.*, (2016) carried out a performance analysis of smart antenna system using the Least mean square (LMS), Recursive least square (RLS), Sample matrix inverted (SMI), Normalized least mean square (NLMS), Hybrid Least Mean Square/Sample Matrix Inversion (HLMS/SMI) algorithms for beam forming. It was seen that, increase in the number of radiating elements increased directivity and reduced the beam width. It was also concluded that the normalized least mean square algorithm performed better than the other aforementioned in terms of speed, convergence, stability of beam forming, simplicity of computation and low side lobe level.

Sarevska *et al.*, (2004) proposed a solution to the multiple source problems of tracking using neural network that was based on smart antenna. The authors estimated the angle of arrival and detected the signal with the help of the neural network. The authors found that the result had a very high speed.

Anil *et al.*, (2012) noted that the method of conjugate gradient generates vector sequence of iterates, including residuals corresponding to the very iterates and then search directions used in updating both the residual and iterates.

Joseph *et al.*, (2017) studied the performance of least mean square adaptive algorithm applied in adaptive beam forming using matlab. The work was simulated by using 30 degrees as the angle of arrival (AOA) and -50 as the angle of interference. It was concluded that when the number of antenna element was increased, narrower beams were produced.

Nabian *et al.*, (2018) proposed a solution to the multiple source problems of tracking using neural network which is based on smart antenna. The authors estimated the angle of arrival and detected the signal with the help of the neural network. The proposed system had a very high speed when compared with ordinary neural algorithms.

Chang, and Hu (2012) undertook the analysis of various reconfiguration components that have often been used to change antenna structure and function. Different categories of smart antenna systems were analyzed by the authors. It was proved by the authors that instead of using traditional antenna, smart antenna improved the overall performance of the system.

Arunitha *et al.* (2015) carried out a study of the adaptive beam forming algorithms. The authors comprehensively reviewed the different evolutionary algorithms used for adaptation. The author adopted the weight of the antenna array to maximize the expected output in the right direction while minimizing unwanted signal from undesired direction. For tracking user automatically, the authors made use of the algorithm for adaptive beam forming. Blind beam forming and non-blind beam forming algorithms were discussed, and the

simulation was carried out in the matlab environment. In the simulation, the number of elements used was 8 while the separation between radiating element was 0.5.

Vavrda (2015) described digital beam formers as a way of removing wanted signal from the unwanted, interfering signals. The constraints inherent in the application of techniques for digital beam forming as well as the adaptive beam forming was highlighted. The way digital beam forming and adaptive beam forming is achieved was explained. For digital beam forming, the author noted, digital technology is combined with antenna technology. Spatiotemporal signals were converted by the antenna into temporal ones, hence the signal are available for numerous techniques for signal processing.

Mallaparapu et al (2011) investigated non-blind adaptive beam forming algorithms. The authors observed from their work that for smart antenna beam forming can be employed when there is a need for channel band width increment and capacity enhancement, especially for wireless services. As noted by the authors, channel interference can be minimized for effective communication in wireless system using beam forming

Yuanjian and Xiaohui (2016) came up with a novel adaptive algorithm for beam forming for smart antenna. This was done by the authors by making an improvement on gradient vector projection to what is called uniform linear array. The performance of the developed adaptive beam forming algorithm was compared with the least mean square algorithm. It was found by the authors that the developed algorithm performed very well when compared with the least square method.

Saad (2013) carried out research to optimize phased array antenna radiation pattern. The author employed the method of least mean squared algorithm in the optimization process. The least mean squared algorithm incorporates neural networks in its application. The research was aimed at evaluating the effectiveness of the adaptive algorithm LMS, to evolve the antenna functionality.

Using some key parameters and some equations related to antenna, simulation was performed and results obtained. Great potential was observed in using the technique of neural network in the analysis of the effectiveness of least mean squared algorithm, especially as it concerns signal processing in phased array antennas.

Frank B. Gross (2015) compared different algorithms as to their effectiveness in improving the convergence error in adaptive beam forming antennas. The author realized that when compared with constant modulus, least square constant modulus and least mean square algorithms, the conjugate gradient method performed better in reducing convergence error.

III MATERIALS AND METHODS

I. Research Methodology

The methods adopted in the study includes the following

- i. Develop an adaptive beam forming antenna array model
- ii. Obtain data for assigned signal weight and ANN training
- iii. Develop a neural network model in Matlab
- iv. Train the neural network using feed forward back propagation algorithm
- v. Adaptive conjugate gradient method to minimize convergence error

II. Model Description

To analyze adaptive beam forming process we consider the propagation of a plane wave in an acoustic environment at the speed of sound (c) = 340m/s and impinges on a uniform linear sensor array consisting of M omnidirectional microphones.

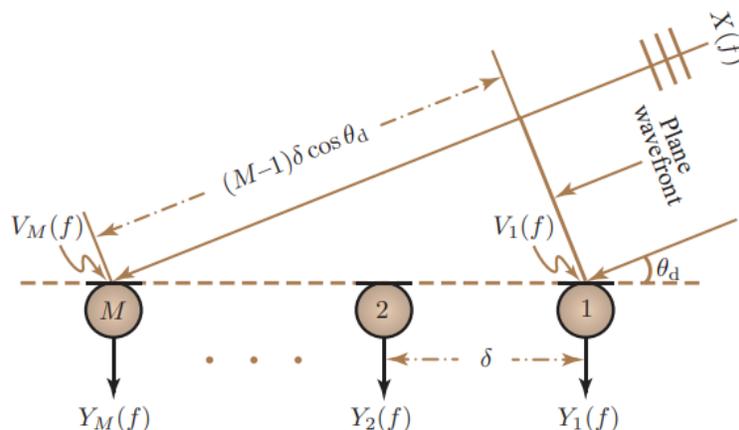


Figure 1 A uniform linear array with M sensors

The Signal model is given by

$$\begin{aligned}
 y(f) &= x(f) + v(f) \\
 &= d(f \cdot \cos\theta_d)x(f) + v(f)
 \end{aligned}
 \tag{1}$$

Where; $y(f)$ is observation signal vector (of length M), $d(f \cdot \cos\theta_d)$ is the steering vector associated with the desired signal $x(f)$, impinging on the array from the direction θ_d , and $v(f)$ is the noise signal vector.

The correlation matrix of $y(f)$ is

$$\begin{aligned}
 \Phi_y(f) &= \Phi_x(f) + \Phi_v(f) \\
 &= \phi_x(f)d(f \cdot \cos\theta_d)d^H(f \cdot \cos\theta_d) + \Phi_v(f)
 \end{aligned}
 \tag{2}$$

Where; $\Phi_x(f)$ and $\Phi_v(f)$ are the correlation matrices of $x(f)$ and $v(f)$, respectively, and $\phi_x(f)$ is the variance of $x(f)$.

Beamforming or linear filtering consists of applying a complex-valued linear filter, $h(f)$, of length M to $y(f)$

$$\begin{aligned}
 Z(f) &= h^H(f)y(f) \\
 &= h^H(f)[x(f) + v(f)] \\
 &= X_{fd}(f) + V_{rn}(f)
 \end{aligned}
 \tag{3}$$

Where; $Z(f)$ is, in general, the estimate of the desired signal, and $X_{fd}(f)$ and $V_{rn}(f)$ are the filtered desired signal and residual noise, respectively. Assuming that $X_{fd}(f)$ and $V_{rn}(f)$ are uncorrelated, the variance of $Z(f)$ is

$$\begin{aligned}
 \phi_z(f) &= \phi_{x_{fd}}(f) + \phi_{v_{rn}}(f) \\
 &= \phi_x(f)|h^H(f)d(f \cdot \cos\theta_d)|^2 + h^H(f)\Phi_v(f)h(f)
 \end{aligned}
 \tag{4}$$

A smart antenna system consists of array of antennas with digital signal processing techniques. The later uses two algorithms which are array factor (AF) and adaptive beam forming. The array factor algorithm (AF) is used for calculating the direction of arrival of all incoming signals. While adaptive beam forming algorithm used to update the weights of each element. Figure 2 shows the block diagram of the proposed adaptive beam forming model.

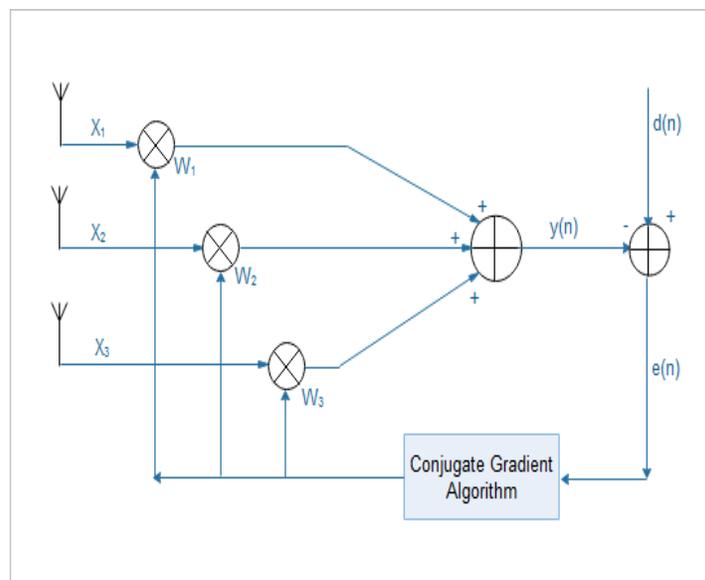


Figure 2 Block Diagram of Adaptive Beam forming Array Antenna Model

III. Data Collection

The data in this analysis were generated by writing a MATLAB code using the mathematical equation (4). Table 1-3 show the received signal, initial weight and array factor for different spacing respectively.

Table: 1 Received Signals at incident angle 30° for different spacing

N	d=1	d=0.5	d=0.25
1	1.7570 - 1.5062i	1.3785 - 0.7531i	0.6893 - 0.3765i
2	0.1416 + 0.0000i	1.5708 + 1.0000i	0.7854 + 0.0000i

3	1.7570 + 1.5062i	1.0785 + 0.7531i	0.6893 + 0.3765i
4	0.6974 + 1.6436i	0.8487 + 1.3218i	0.4244 + 0.6609i
5	0.2222 + 1.1337i	0.1111 + 1.0669i	0.0556 + 0.7834i
6	-1.3074 + 0.8566i	-0.6537 + 0.1283i	-0.3268 + 0.7142i

Table: 2 Weight of Signals at incident angle 30° for different spacing

N	d=1	d=0.5	d=0.25
1	1.0000 + 0.0000i	1.0000 + 0.0000i	1.0000 + 0.0000i
2	0.6661 - 0.7458i	-0.9127 + 0.4086i	0.2089 + 0.9779i
3	-0.1125 - 0.9936i	0.6661 - 0.7458i	-0.9127 + 0.4086i
4	-0.8161 - 0.5780i	-0.3033 + 0.9529i	-0.5902 - 0.8072i
5	-0.9747 + 0.2236i	-0.1125 - 0.9936i	0.6661 - 0.7458i
6	-0.4825 + 0.8759i	0.5087 + 0.8609i	0.8685 + 0.4956i

Table 3 Training Data

n	Input		Target
	$ W_{(n)} $	$ X_{(n)} $	$ Y_{(n)} = W_{(n)} * X_{(n)} $
1	1.0000	0.3142	0.3142
2	0.9830	0.1416	0.1392
3	0.9706	0.3211	0.3117
4	0.9713	0.7853	0.7628
5	1.0096	0.1553	0.1568
6	0.9905	0.5630	0.5577
1	1.0000	0.5708	0.5708
2	0.9830	0.8621	0.8474
3	0.9706	0.3154	0.3061
4	0.9713	0.5708	0.5544
5	1.0096	0.0727	0.0734
6	0.9905	0.6662	0.6599
1	1.0000	0.6935	0.6935
2	0.9830	0.5854	0.5754
3	0.9706	0.2588	0.2512
4	0.9713	0.6725	0.6532
5	1.0096	0.1002	0.1012
6	0.9905	0.1706	0.1690

IV. Mathematical Model

I. Determination of Array Factor

Array factor is used to determine the direction of arrival of all incoming signals

$$AF(\theta) = \sum_{n=0}^{N-1} w_n e^{j\left(\frac{-(N-1)}{z} + n\right)kdsin\theta}$$

Where

AF= array factor in degree

$K = \text{wave number} \left(\frac{2\pi}{\lambda} \right)$

$\lambda = \text{wavelength of incident wave}$

$w_n = \text{weight of } n^{\text{th}} \text{ radiating element}$

II. Determination of Incident Signals on nth radiating element

Incident Signals on nth (hypothetical assumption on the number of radiating element) describes the signal incident on the nth sensor

$$x_n(n) = \sum_{i=0}^{N-1} S_i(n) e^{j\left(\frac{N-1}{2}+n\right)kdsin\theta_i} + n_n(n) \tag{6}$$

Where;

$S_0(n) = \text{desired signal}$

$S_{1 \rightarrow (M-1)}(n) = \text{interference signal}$

$n_n(n) = \text{received noise signal at } n^{\text{th}} \text{ element}$

III. Determination of weighted sum of the output node

Weighted sum of the output node is the sum of all incident signal and associated signal weight

$$v_i = \left([w_1 \quad w_2 \quad w_3] * \begin{bmatrix} x_{1i} \\ x_{2i} \\ x_{3i} \end{bmatrix} \right) + b \tag{7}$$

$$v_i = (w_1 * x_{1i}) + (w_2 * x_{2i}) + (w_3 * x_{3i}) + b \tag{8}$$

Where;

$x_1(n) = \text{incident signal of radiating element 1}$

$x_2(n) = \text{incident signal of radiating element 2}$

$x_3(n) = \text{incident signal of radiating element 3}$

$w_1 = \text{weight of signals } x_1(n)$

$w_2 = \text{weight of signals } x_2(n)$

$w_3 = \text{weight of signals } x_3(n)$

$b = \text{bias which is associated with the storage of information}$

IV. Determination of Output Signal

Output Signal is a sum of all the signals to the nth radiating element and the associated noise distortion

$$y(n) = \phi(v_i) \tag{9}$$

$$y(n) = \phi((w_1 * x_{1i}) + (w_2 * x_{2i}) + (w_3 * x_{3i}) + b) \tag{10}$$

$$y(n) = \phi(v_i) = \left(\frac{1}{1+e^{-v_i}} \right) \tag{11}$$

$$\text{Output } (y) = \frac{1}{1+e^{-((w_1*x_{1i})+(w_2*x_{2i})+(w_3*x_{3i})+b)}} \tag{12}$$

Where;

$\phi = \text{activation function (Tan Sigmoid Function)}$

$v_i = \text{weighted sum of the output node}$

V. Determination of Error signal

Error signal is the difference between the desired signal and the output signal

$$e(n) = d(n) - y(n) \tag{13}$$

$$e(n) = d(n) - \bar{w} * \bar{x}(n) \tag{14}$$

Where;

$d(n) = \text{desired signal}$

$y(n) = \text{output signal}$

3.5 Conjugate Gradient Method

The conjugate gradient algorithm was used to update the weights by changing the phase shift and amplitude attenuation of the received signals so that the main beam is steered toward the direction of the desired signals thereby minimizing error. This method is used due to its fast convergence rate.

$$\alpha_k = \frac{r_k^T r_k}{P_k^T A P_k}$$

$$X_{x+1} = X_x + \alpha_k P_k \tag{12}$$

$$\beta_k = \frac{r_{k+1}^T r_{k+1}}{r_k^T r_k} \tag{13}$$

$$P_{x+1} = r_{k+1} + \beta_k P_k \tag{14}$$

Where;

α =learning rate

P_k = search direction

r_k = gradient computation

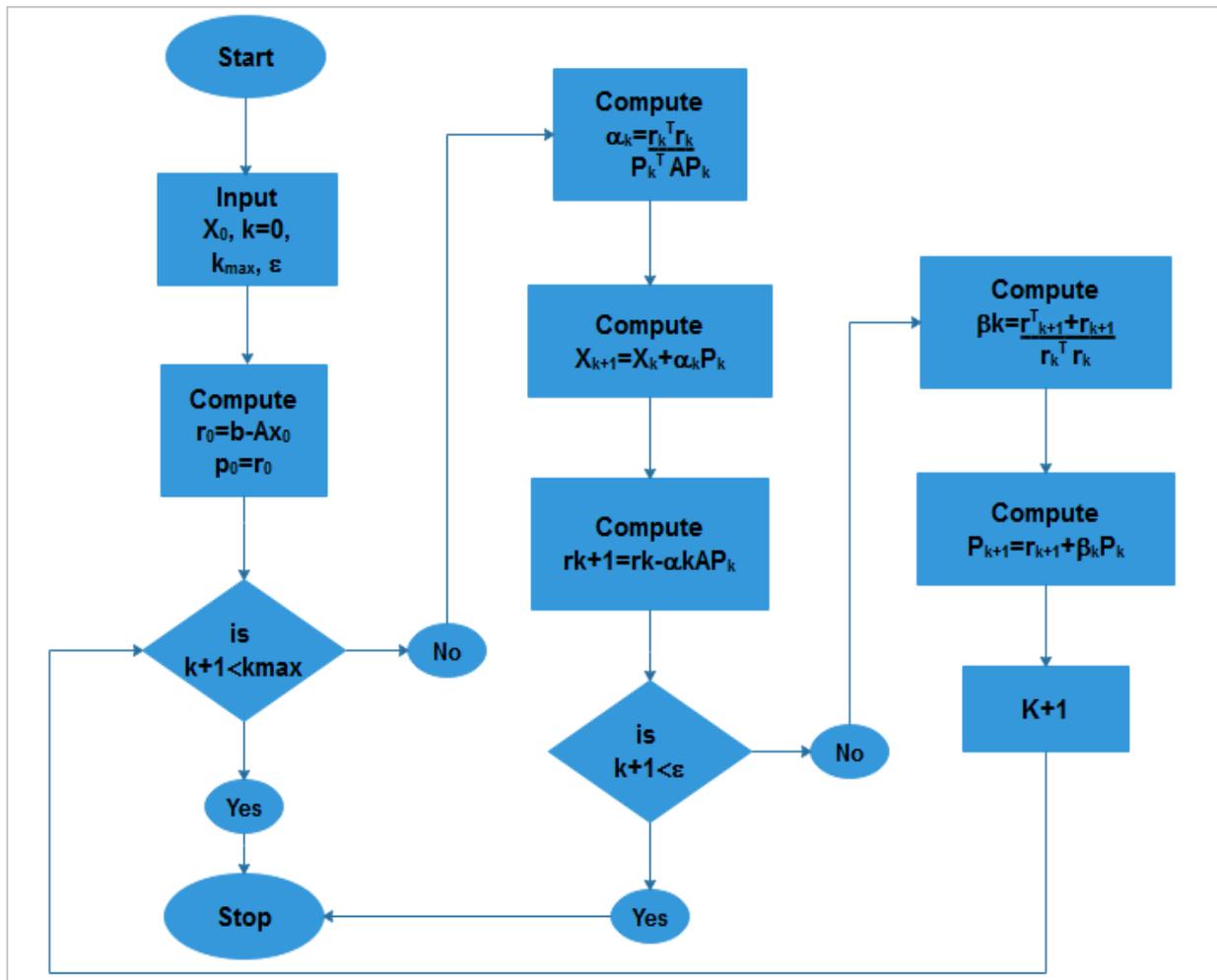


Figure 3: Flowchat of Gradient Conjugate Method

The description in figure 3 explains the programming sequence used to achieve the gradient conjugate simulation. Describing the input variables as X_0 with a range $(0, \epsilon)$ and inputting these variables in an equation, the results are analyzed by the decision of the value of k , if undesired values are got then the process is repeated with a new equation and a condition to be achieved and the repetition is continued till the desired condition is achieved. The results at various numerically described values will be analyzed and tabularized to enable valid comparisons of the various methods.

RESULT AND DISCUSSION

Table 4 Analytical Method

Element spacing(D)	Elements in series (n)	Received Signal $ x_{(n)} $	Weight $ w_{(n)} $	Output Signal $ y_{(n)} $	Desired Signal $ d_{(n)} $	Error $ e_{(n)} $
λ	6	0.3142	1.0000	0.3142	1	0.6858
		0.1416	0.9831	0.1392	1	0.8608
		0.3211	0.9707	0.3117	1	0.6883
		0.7853	0.7167	0.5628	1	0.4372
		0.1553	1.0097	0.1568	1	0.8432
		0.5630	0.9906	0.5577	1	0.4423
0.5λ	6	0.5708	1.0000	0.5708	1	0.4292
		0.8621	0.7510	0.6474	1	0.3526
		0.3154	0.9705	0.3061	1	0.6939
		0.5708	0.9713	0.5544	1	0.4456
		0.0727	1.0096	0.0734	1	0.9266
		0.6662	0.9905	0.6599	1	0.3401
0.25λ	6	0.6935	1.0000	0.6935	1	0.3065
		0.5854	0.9829	0.5754	1	0.4246
		0.2588	0.9706	0.2512	1	0.7488
		0.6725	0.8226	0.5532	1	0.4468
		0.1002	1.0100	0.1012	1	0.8988
		0.1706	0.9906	0.1690	1	0.8310

Table 4 presents the result obtained analytically. A closer look at the table shows that there was an error of 0.6858 when the input signal was 0.3142° for six radiating elements, $n = 6$ and a spacing of λ between the radiating elements. For a spacing of 0.5λ apart and an input signal of 0.4292° , the error was 0.5708. For 0.25λ spacing, the error was 0.3065. While the least error of 0.3065 occurred when the input signal was 0.6935° , the highest error of 0.8988 occurred when the input signal was 0.1002° .

Table 5 Conjugate Gradient Method (CGM)

Element spacing(D)	Elements in series (n)	Received Signal $ x_{(n)} $	Weight $ w_{(n)} $	Output Signal $ y_{(n)} $	Desired Signal $ d_{(n)} $	Error $ e_{(n)} $
λ	6	0.3142	1.7804	0.5594	1	0.4406
		0.1416	2.8100	0.3979	1	0.6021
		0.3211	1.6138	0.5182	1	0.4818
		0.7853	1.0219	0.8025	1	0.1975
		0.1553	2.6478	0.4112	1	0.5888
		0.563	1.2265	0.6905	1	0.3095
0.5λ	6	0.5708	1.1477	0.6551	1	0.3449
		0.8621	1.0358	0.893	1	0.107
		0.3154	1.9464	0.6139	1	0.3861
		0.5708	1.2055	0.6881	1	0.3119
		0.0727	6.2531	0.4546	1	0.5454
		0.6662	1.0839	0.7221	1	0.2779
0.25λ	6	0.6935	1.1902	0.8254	1	0.1746
		0.5854	1.2005	0.7028	1	0.2972
		0.2588	2.2249	0.5758	1	0.4242
		0.6725	1.1254	0.7568	1	0.2432
		0.1002	3.5739	0.3581	1	0.6419

0.1706	2.4343	0.4153	1	0.5847
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Table 5 is a presentation of the conjugate gradient method. The table shows that the least error of 0.107 was obtained when the input signal 0.8621° . The highest error of 0.6419 occurred when the input signal was 0.1002° . For a spacing of λ between the radiating elements the error was 0.4406. The error became 0.3449 when the radiating was separated by 0.5λ apart. When the separation between the radiating elements was 0.25λ apart, the error was 0.1746.

Table 6 Least Square Constant Modulus Method (LSCM)

Element spacing(D)	Elements in series (n)	Received Signal $ x_{(n)} $	Weight $ w_{(n)} $	Output Signal $ y_{(n)} $	Desired Signal $ d_{(n)} $	Error $ e_{(n)} $
λ	6	0.3142	1.4494	0.4554	1	0.5446
		0.1416	2.0318	0.2877	1	0.7123
		0.3211	1.4235	0.4571	1	0.5429
		0.7853	0.8560	0.6722	1	0.3278
		0.1553	1.8467	0.2868	1	0.7132
		0.5630	1.0689	0.6018	1	0.3982
0.5λ	6	0.5708	1.1887	0.6785	1	0.3215
		0.8621	0.8719	0.7517	1	0.2483
		0.3154	1.3966	0.4405	1	0.5595
		0.5708	0.9723	0.5550	1	0.4450
		0.0727	3.8281	0.2783	1	0.7217
		0.6662	0.9665	0.6439	1	0.3561
0.25λ	6	0.6935	1.0884	0.7548	1	0.2452
		0.5854	1.1245	0.6583	1	0.3417
		0.2588	1.5429	0.3993	1	0.6007
		0.6725	0.9463	0.6364	1	0.3636
		0.1002	2.8593	0.2865	1	0.7135
		0.1706	1.7767	0.3031	1	0.6969

Table 6 gives the presentation of the least square constant modulus method. A closer look at the table shows that the least error of 0.2452 occurred when the input signal is 0.6935° . The highest error of 0.6969 was observed when the separation between antenna radiating elements was 0.25λ and the input signal was 0.1706° .

Table 7 Comparison of Output Signal

Analytical	CGM	LSCM
0.3142	0.5594	0.4554
0.1392	0.3979	0.2877
0.3117	0.5182	0.4571
0.5628	0.8025	0.6722
0.1568	0.4112	0.2868
0.5577	0.6905	0.6018
0.5708	0.6551	0.6785
0.6474	0.8930	0.7517
0.3061	0.6139	0.4405
0.5544	0.6881	0.5550

0.0734	0.4546	0.2783
0.6599	0.7221	0.6439
0.6935	0.8254	0.7548
0.5754	0.7028	0.6583
0.2512	0.5758	0.3993
0.5532	0.7568	0.6364
0.1012	0.3581	0.2865
0.1690	0.4153	0.3031

In table 7, a comparison of the outputs obtained with the analytical method, conjugate gradient method, and least square constant modulus method is presented. The table 7 shows that the conjugate gradient method had highest values of error in most cases while the analytical method had the least error values in most cases. From the table, the highest output for the analytical, the conjugate gradient, and the least square constant modulus are: 0.6935, 0.8930, and 0.7548 respectively while the least outputs were 0.0734, 0.3581, and 0.2783 respectively.

Table 8 Comparison of the Error

Analytical	CGM	LSCM
0.6858	0.4406	0.5446
0.8608	0.6021	0.7123
0.6883	0.4818	0.5429
0.4372	0.1975	0.3278
0.8432	0.5888	0.7132
0.4423	0.3095	0.3982
0.4292	0.3449	0.3215
0.3526	0.1070	0.2483
0.6939	0.3861	0.5595
0.4456	0.3119	0.4450
0.9266	0.5454	0.7217
0.3401	0.2779	0.3561
0.3065	0.1746	0.2452
0.4246	0.2972	0.3417
0.7488	0.4242	0.6007
0.4468	0.2432	0.3636
0.8988	0.6419	0.7135
0.8310	0.5847	0.6969

As can be seen from table 8 presented above, the errors for the three methods were compared. It was observed from the table that the errors for the conjugate gradient method were smaller when compared to the errors obtained from the analytical method and in the least square constant modulus method. The least error for the three methods, the analytical, the conjugate gradient and the least square constant modulus methods, were 0.3065, 0.1070, and 0.2483 respectively.

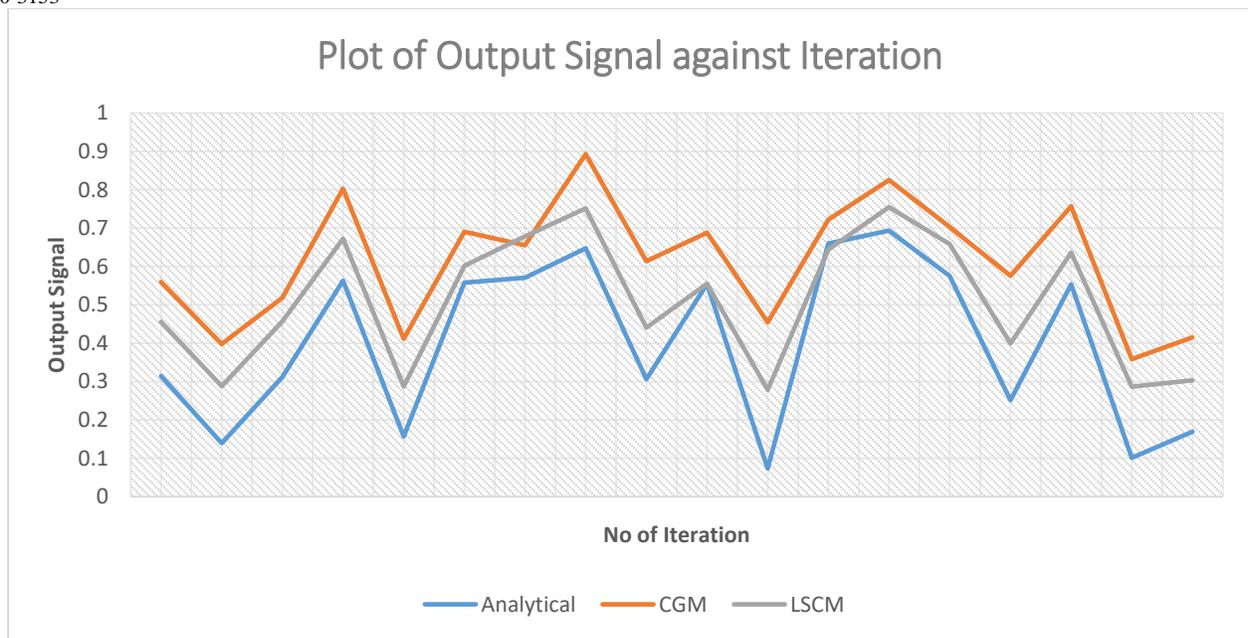


Figure 4: A Plot of Output against Iterations

Figure 4 is a plot of output signal against the number of iterations for the three methods used. The figure is a graphical representation of Table 7 and it is important to note that the iterations could be made numerically infinite so a certain range of output signal is analyzed and the link graph plot is chosen so as to visually indicate how each method performed at different iterated values. The Figure provides a graphical analysis of the output signal values. The graph shows that the analytical method has the least output signal value and the conjugate gradient method has the highest output signal value, surpassing the output signal value of the least square constant modulus method.

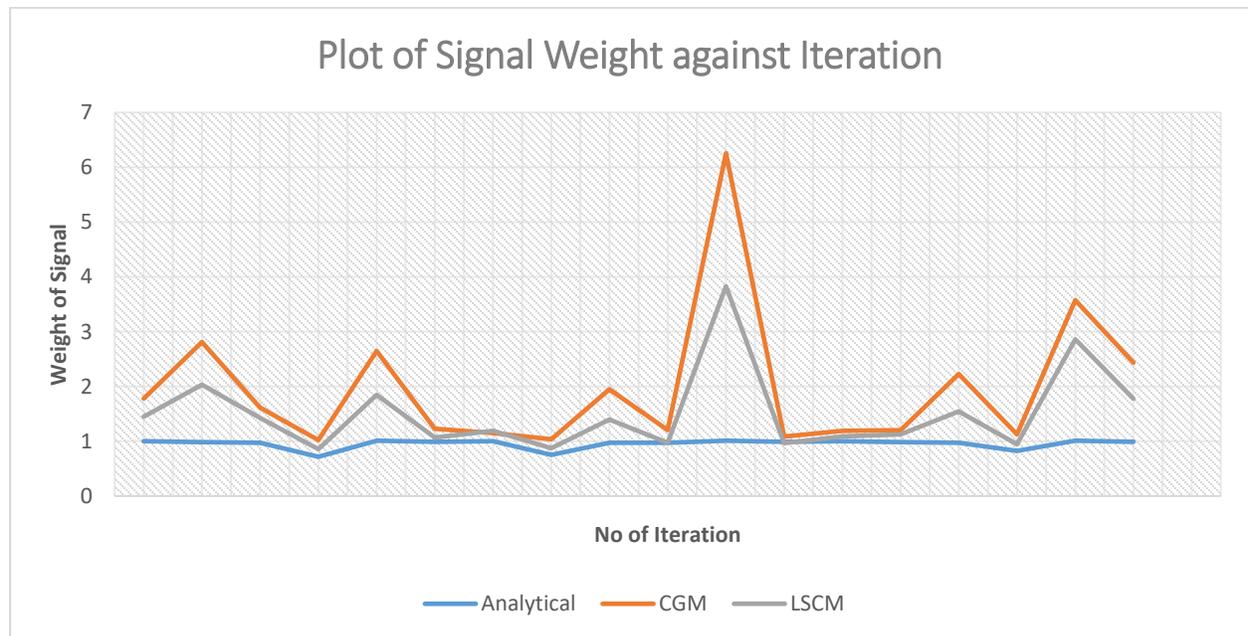


Figure 5: A Plot of Error against Iterations

Figure 5 presents a plot of signal weight against the number of iteration for the three methods used. The weight of the analytical method and that of the least square constant modulus method were closer. The constant gradient method had high weights compared to the other methods. This is because the adjustment in the phase shift and amplitude attenuation of the signal, thereby steering the main beam towards the desired signal.

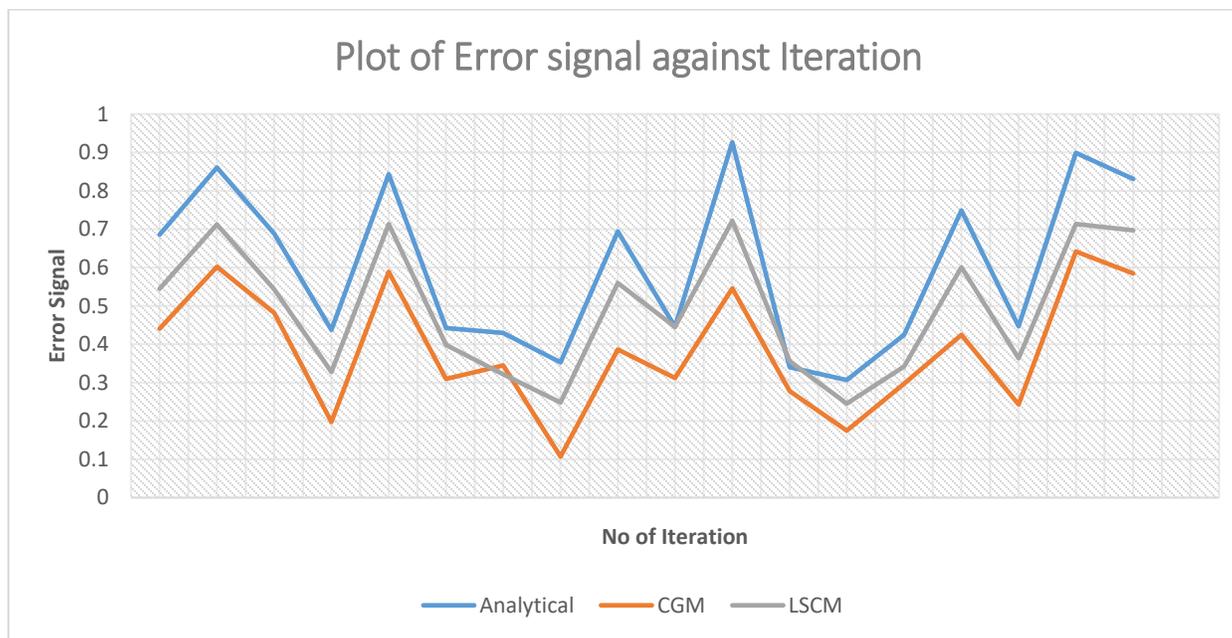


Figure 6: A Plot of Error against Iterations

Figure 6 presents the plot of error signal against the number of iterations. The figure is a graphical representation of Table 8 and the iterative value is a set of consecutive value representing numerical instances to achieve this analysis. Conjugate gradient method had the least error signal embedded in the output signal of the same iterative value. The error signal in the analytical method is the highest and that of the least square constant modulus method is intermediate but still very much higher than that of the Conjugate gradient method.

CONCLUSION

This study looked at reducing convergence error in adaptive beam forming antenna using conjugate gradient method. The research work also compared the effectiveness of the conjugate gradient method and the least square modulus method in terms of error minimization. Analysis and simulation of the conjugate gradient method were carried out in MATLAB environment. Mathematical modeling was carried to determine the output signal, error signal, input signal, etc. Training data for the artificial neural network was the input signal and the weight. The reason for the training was to obtain an anticipated output signal for all input signals fed into the system and also minimize error. For the training, supervised learning was used because the training target was known.

The result of this research work showed that the conjugate gradient method performed better than the least square method in terms of error minimization. The convergence of the conjugate gradient method was achieved with a minimum of seven iterations. Hence, researchers can rely on conjugate gradient method to reduce error in smart antenna system.

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Clinical Characteristics, Interventions and Outcomes for Patients with Moderate to Severe Covid-19 at Machakos Level 5 Hospital, Kenya.

Ambale C A¹, Mweni S², Kamita M³, Gendo S¹, Nyamweya P¹, Mutava D¹, Muthuiru J¹

¹Machakos Level 5 Hospital

²Machakos County

³Mount Kenya University

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Abstract- Background

The Covid-19 pandemic that begun in Wuhan china and rapidly spread to the whole world brought significant challenges to the healthcare systems. The symptoms and management of the disease varried across the globe as the we awaited the completion of clinical trials to determine the definitive treatment of the disease. The objective of this study was to describe the clinical characteristics, treatments and outcomes of patients with moderate to severe Covid-19 disease in a tertiary hospital in Kenya.

Methodology

This was a single-center, descriptive, retrospective cohort study. Medical records were reviewed for all patients with laboratory-confirmed moderate to severe SARS-CoV-2 infection. Data were collected using a pre-developed tool and exported to MS Excel then later exported to SPSS for analysis. Data analysis involved frequency distributions for categorical variables and descriptive statistics for continuous variables.

Results

A total of 64 patients' records were analyzed with of the patients presenting with difficulty in breathing 37 (57.8%) and cough 34(53.1%), 25 patients presented with hypoxia (SpO₂<92%). A total of 36 patients out of the 64 admitted were on oxygen therapy at some point during their hospital stay with 15 of them dying representing 42%. The mean duration of stay in the hospital was 8.97 days.

Conclusion

This descriptive study provides information on the range of symptoms, treatments, and outcomes available for patients seeking Covid-19 in resource-limited settings in Africa. The unavailability of some laboratory and radiological investigations could be contributing factors to poor outcomes.

Index Terms- Clinical characteristics, Treatment, Outcomes.

List of abbreviations and acronyms

ACF- active case finding
ANOVA- Analysis of variance
ARDS- acute respiratory distress syndrome
CDC - centres for disease control and prevention
CFR- Case fatality rate
COVID-19- CoronaVirus Disease 2019
CPAP- continuous positive airway pressure
DKA- Diabetic ketoacidosis. ICU - intensive care unit
DM- Diabetes mellitus
HDU- high dependency unit
HTN- hypertension.
MERS- Middle east respiratory syndrome
MKL5- Machakos level 5 hospital.
NCDs- Non communicable diseases
RNA- Ribonucleic acid

rRT-PCR- Real-Time Reverse Transcription-Polymerase Chain Reaction
SARS COV 2- Severe acute respiratory syndrome coronavirus 2
SPSS-Statistical package for the social sciences
WHO- world health organisation

I. INTRODUCTION

The coronavirus disease 2019 (Covid-19) whose is a viral disease caused by a novel virus that was first discovered in Wuhan China in December 2019(1). The disease rapidly spread throughout China and to the rest of the world, infecting and killing many (2). The first case in Kenya was reported on March 13, 2020 (3)(4) and as of September 26, 2020, we had a total number of 37,707 cases with 682 deaths. In Machakos County, the first case was reported on May 9, 2020 (5) and as of September 26, 2020, we had 1,308 cases and 26 deaths reported(6).

Machakos level 5 hospital (MKL5) is the tertiary referral facility in Machakos county (7) and lies between two Covid -19 hotspots (Nairobi and Mombasa counties). Before Covid-19, the hospital operated a six-bed Intensive Care Unit (ICU). To cater for existing patients and Covid-19 patients, the unit pared down to a three-bed ICU and one ICU unit to hold patients suspected to have Covid -19. In addition, one 12-bed ward was converted to a transition ward to cater for suspected Covid-19 patients who did not require ventilation, a 12-bed ward for patients with confirmed moderate/ severe Covid-19 with six ICU beds, and 6 ward beds with cardiac monitors. It should be noted that in Machakos Level V Hospital ICU beds include basic cardiac monitors, ventilators, wall-mounted oxygen ports, infusion pumps +/- attached suction pumps (8). Patients with confirmed Covid-19

Machakos county has 5 isolation units inclusive of Machakos Level 5 hospital isolation unit which caters to moderate to severe patients. Moderate to severe patients as per Machakos level 5 internal guideline and the Ministry of Health interim guidelines were defined as patients whose oxygen requirements were above 10litre/min or oxygen saturation levels of lower than 92% (9).

It is important to have detailed data on demographic characteristics, underlying medical conditions, and clinical outcomes for people hospitalized with confirmed Covid-19. These data can inform preventive strategies and community-specific interventions for infectious respiratory diseases in low and middle-income areas such as Machakos county. This study aimed to describe the clinical characteristics, treatments, and outcomes in patients with moderate /severe Covid-19 hospitalized in the MKL5 isolation unit between June and September 2020. Specifically, the study aimed to i) outline clinical characteristics and demographics of patients with moderate/severe Covid-19 hospitalized in the MKL5 isolation unit, ii) assess treatment interventions of patients with moderate/severe Covid-19 hospitalized in the MKL5 isolation unit, and iii) evaluate clinical outcomes of patients with moderate/severe Covid-19 hospitalized in the MKL5 isolation unit.

1.5 Significance of the study

There are various stakeholders to whom this study shall be significant. For the patients, the understanding of what influences patient outcomes will lead to improved mortality and morbidity rates.

To health care workers, this study will be the source of information on how patients are likely to present and what outcomes to expect.

For policymakers, this research will provide data to inform Covid-19 protocols in a low resource center. As the policies will come from the healthcare providers' past decisions there will be increased ownership and implementation of policies arising from the information collected.

II. METHODOLOGY

Study Area

Machakos Level 5 Hospital is a teaching and referral hospital, situated about 60 kilometers Southwest of Nairobi city. It has a bed capacity of 300 with several departments/sectors namely, medical department, surgical department, maternity department (maternal & child health), and specialized unit services which include ICU, isolation unit, cancer centre and renal unit. The isolation unit has 3 wards, HDU, which is a holding area for critically ill COVID-19 patients, and (central) isolation ward for fully admitted, moderately sick, and critically ill COVID-19 patients, which has a capacity of 16 beds. There is also a holding/transition ward for admitting patients suspected to have Covid-19 as they wait for their results.

Study Design

This was a single-center, descriptive, retrospective cohort study. We reviewed medical records (patient files) nursing records, laboratory findings, and radiological examinations for all patients with laboratory-confirmed moderate to severe SARS-CoV-2 infection. The admission data of these patients were collected using a case record form modified from the standardized International Severe Acute Respiratory and Emerging Infection Consortium case report forms. We collected data on age, sex, occupation, chronic medical histories, symptoms from onset hospital admission (fever, cough, dyspnoea, myalgia, malaise, rhinorrhoea, arthralgia, chest pain, headache, and vomiting), vital signs at ICU admission (heart rate, respiratory rate, blood pressure, temperature, SPO2), laboratory values on admission (hemoglobin concentration, lymphocyte count, platelet count, coexisted infection, treatment (oxygen therapy, vasoconstrictive agents,

antiviral agents, antibacterial agents, corticosteroids, thrombolytics, analgesics), Outcomes (length of stay, discharged alive or dead, transferred to another facility). The study population included all patients with moderate to severe covid-19 hospitalized at Machakos level Covid-19 isolation unit. There was no sample calculation in this case since all patients who were admitted to the isolation unit were evaluated.

Data Collection Methods

Data were collected from patient medical records using a pre-developed data collection tool. The data collection tool was pre-tested before data collection began. Before analysis, quantitative data was exported to MS Excel then later exported to SPSS for analysis. The collected data was cleaned, categorized, coded, and stored in password-protected folders.

Data Analysis Methods and Procedures

Data were collected using structured questionnaires and then entered in Microsoft Excel™. Data cleaning was done before any analysis could commence. Data analysis involved frequency distributions for categorical variables and descriptive statistics (means, medians, standard deviations) for continuous variables. Data was presented using bar charts, pie charts, and frequency distribution tables. Continuous variables were compared by using independent group t-tests where applicable while categorical variables were expressed as frequencies and percentages and compared by Pearson's chi-square. A two-sided α of less than 0.05 was considered statistically significant. All statistical analyses were performed with the SPSS (version 26.0) software.

Ethical Considerations

The research team obtained ethical clearance from an accredited ethics review board and a license from National Commission for Science, Technology, and Innovation. Permission to access patient files for data collection was obtained from the medical superintendent of Machakos Level 5 Hospital. All redacted data was captured anonymously from patient files. Personal identifiers were not captured. Data was stored under password protection and accessed only by members of the research team.

III. RESULTS

Patient demographics

A total of 64 patients' records were analyzed with the youngest patient being 24 years old and the oldest being 90 years old. The mean age was 50years. The males made up most of the patients at 41 (64%). The patients' ages were arranged in age groups with most patients being in the age group of 50-59 years followed by those in the 30-39 years age group.

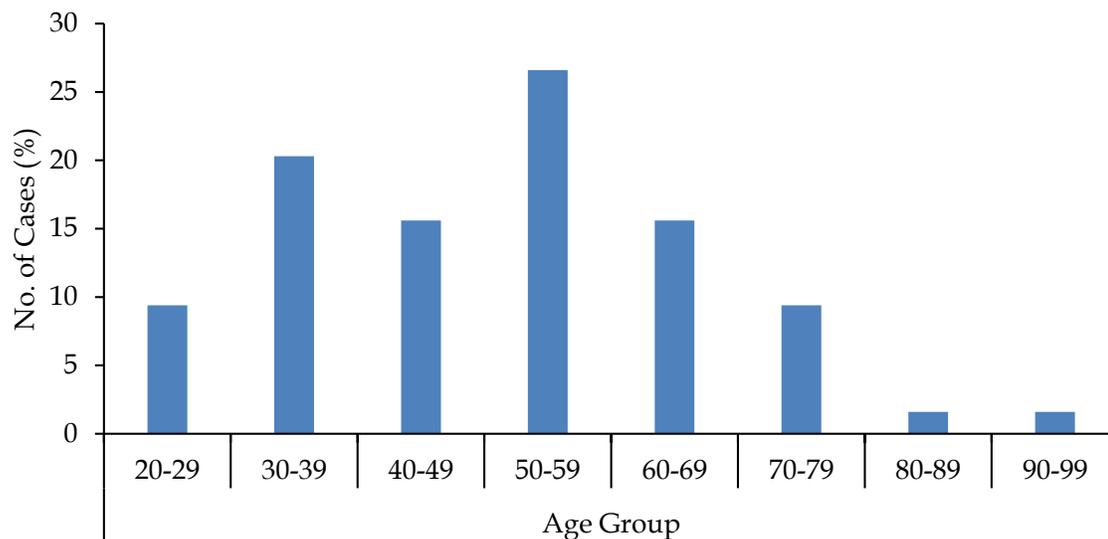


Fig 4.1 Age distribution for Covid-19 patients admitted at Machakos Level 5 Hospital Isolation Ward 2020

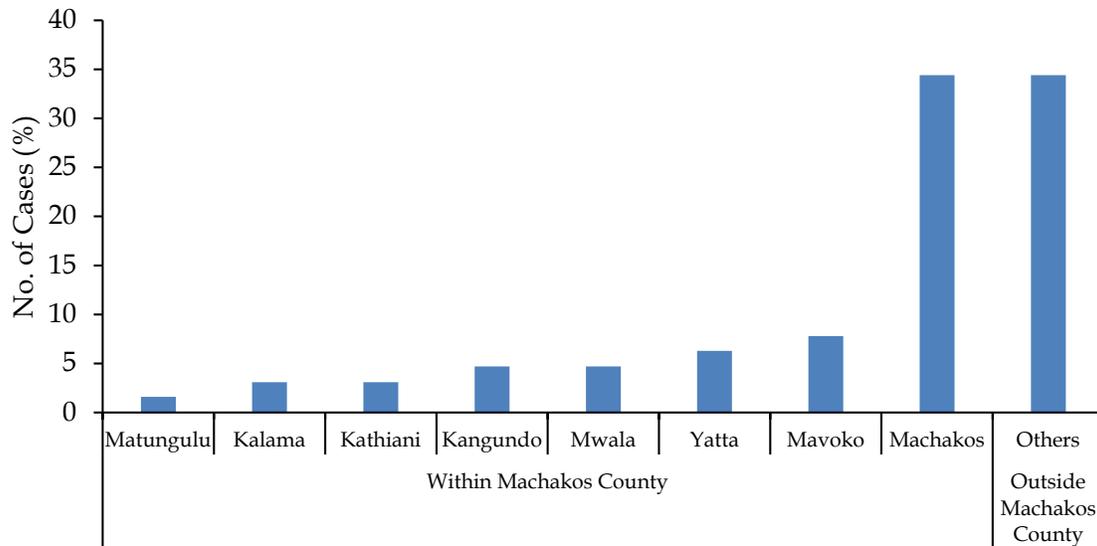


Fig 4.2 Residence of for Covid-19 patients admitted at Machakos Level 5 Hospital Isolation Ward in 2020

Patients were drawn from various parts of Machakos county and outside the county. Machakos town had the highest number of patients residing there.

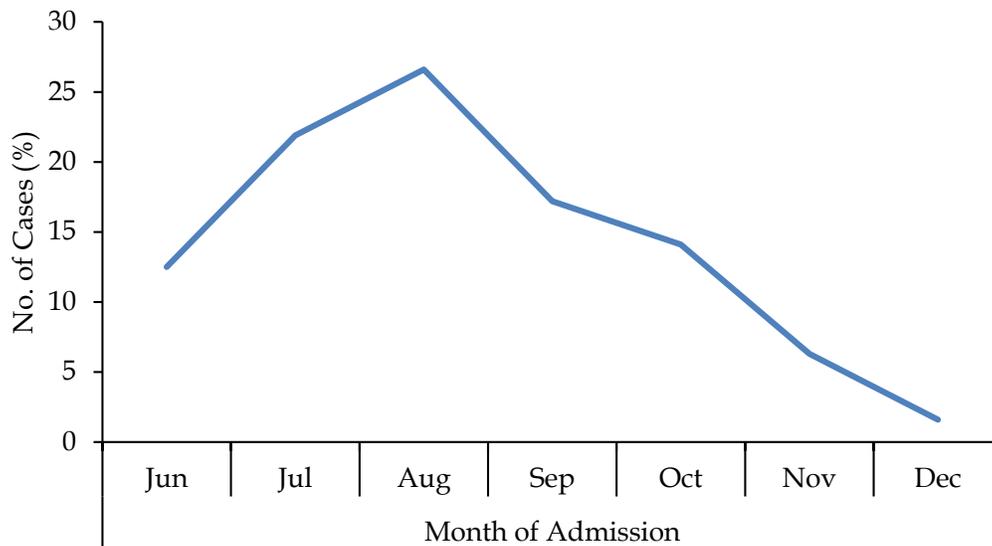


Fig 4.3 Month of admission for Covid-19 patients admitted at Machakos Level 5 Hospital Isolation Ward in 2020

Admissions into the isolation ward started in June and continued to rise exponentially, peaking in August, and then dropping in the next months.

Table 1: Length of stay in hospital Covid-19 patients admitted at Machakos Level 5 Hospital Isolation Ward in 2020

	N	Minimum (Days)	Maximum (Days)	Mean	Std. Deviation
Length of Stay	64	0	34	8.97	7.387
Valid N	64				

The length of stay in the hospital for the patients ranged from zero days (shortest stay) to 34 days (longest stay). The mean duration of stay in the hospital for the patients was 8.97 days.

Patient symptoms

Most of the patients presented with difficulty in breathing 37 (57.8%) and cough 34(53.1%). Of the 64 patients, 25 presented with hypoxia (SpO₂<92%).

Table 2: Presenting symptoms for Covid-19 patients admitted at Machakos Level 5 Hospital Isolation Ward in 2020

Symptoms	Presented with the Symptom	
	Yes (%)	No (%)
Shortness of Breath	22(34.4%)	42(65.6%)
Tiredness	9(14.1%)	55(85.9%)
Vomiting	8(12.5%)	56(87.5%)
Diarrhea	6(9.4%)	58(90.6%)
SPO2<92%	25(39.1%)	39(60.9%)
Fatigue	10(15.6%)	54(84.4%)
Cough	34(53.1%)	30(46.9%)
Fever	25(39.1%)	39(60.9%)
Headache	7(10.9%)	57(89.1%)
Chest Pain	6(9.4%)	46(71.9%)
Difficulty in Breathing	37(57.8%)	27(42.2%)
Joint Pain	7(10.9%)	57(89.1%)
Muscle Pain	4(6.3%)	60(93.8%)
Sore throat	6(9.4%)	58(90.6%)
Loss of Taste	2(3.1%)	62(96.9%)
Loss of Smell	2(3.1%)	62(96.9%)
Seizure	1(1.6%)	63(98.4%)
Others	21(32.8%)	43(67.2%)

Table 3: Relationship between symptoms and SpO₂ on Admission Covid-19 patients admitted at Machakos Level 5 Hospital Isolation Ward in 2020

Symptoms	SpO ₂ on Admission			
		Hypoxic	Normal	Severely Hypoxic
Difficulty in Breathing	Yes	14(37.8%)	9(24.3%)	14(37.8%)
	No	7(25.9%)	17(63%)	3(11.1%)
Fever	Yes	8(32%)	10(40%)	7(28%)
	No	13(33.3%)	16(41%)	10(25.6%)
Cough	Yes	12(35.3%)	11(32.4%)	11(32.4%)
	No	9(30%)	15(50%)	6(20%)
Fatigue	Yes	2(20%)	5(50%)	3(30%)
	No	19(35.2%)	21(38.9%)	14(25.9%)
Shortness of Breath	Yes	9(40.9%)	7(31.8%)	6(27.3%)
	No	12(28.6%)	19(45.2%)	11(26.2%)

Most of the patients who had difficulty in breathing were either hypoxic or severely hypoxic on admission (75.6%).

Pulse rate on admission was only captured for 48 patients, for 53 during their stay and for 43 on discharge. 11 (17.2%) of the patients had a high PR on admission, 14 (21.9%) at mid-stay, and 12(18.%)on discharge. Of the 64 patients, 42 (65.6%) were admitted with high blood pressure, 38 (59.4%) had high BP during their stay, and 33 (51.6%) on discharge.

Treatment and Outcome

Oxygen therapy was given to more than 50% of the patients admitted with 37 (57.8%) patients receiving oxygen via different modalities and flow rates. Antibiotics were administered to 60 out of the 64 patients representing 94 %. Of all patients. 15 of the patients who were on antibiotics died while 35 and 10 were discharged and transferred respectively. Thrombolytics were used in 35 patients, analgesics in 34 patients, and corticosteroids in only 17 patients.

Table 4: Relationship between pharmacotherapy and patient outcome for Covid-19 patients admitted at Machakos Level 5 Hospital Isolation Ward in 2020

		Patient Outcome		
		Death	Discharged	Transferred
Antibiotics	Yes	15(25%)	35(58.3%)	10(16.7%)
	No	0(0%)	2(50%)	2(50%)
Thrombolytics	Yes	8(22.9%)	22(62.9%)	5(14.3%)
	No	7(24.1%)	15(51.7%)	7(24.1%)
Analgesic	Yes	8(23.5%)	16(47.1%)	10(29.4%)
	No	7(23.3%)	21(70%)	2(6.7%)
Corticosteroids	Yes	4(23.5%)	12(70.6%)	1(5.9%)
	No	11(23.4%)	25(53.2%)	11(23.4%)

A total of 36 patients out of the 64 admitted were on oxygen therapy at some point during their hospital stay with 15 of them dying representing 42%.

48% of the patients who were discharged and 35% of the patients who died were on oxygen therapy. There was a significant association between being on oxygen therapy and death with a p-value of 0.049. There was a high likelihood of dying if the patient was on oxygen therapy.

Of the 64 patients admitted, 37(57.8%) were discharged home, 12(12.8%) were transferred to other facilities and 15 (23.4%) died.

Table 5: Relationship between SpO2 on admission and patient outcomes for Covid-19 patients admitted at Machakos Level 5 Hospital Isolation Ward in 2020

SpO2 on Admission	Patient Outcome		
	Death	Discharged	Transferred
Hypoxic	4(19%)	12(57.1%)	5(23.8%)
Normal	4(15.4%)	17(65.4%)	5(19.2%)
Severely Hypoxic	7(41.2%)	8(47.1%)	2(11.8%)
Total	15(23.4%)	37(57.8%)	12(18.8%)

The correlation between SPO2 on admission and patient outcomes was not statistically significant with a p-value of 0.342.

Laboratory investigations

The following investigations were recommended for the patients on admission and some for monitoring; Full blood count, liver function tests, urea and electrolytes, Random blood sugar, CRP, D-dimers, and Genexpert.

However, some of the tests were not available at the hospital and patients had to get them from elsewhere. Some could not do the tests due to costs.

Most of the patients who presented with high white blood cell counts were discharged compared to those who had low counts. Low RBC count was associated with death with most patients having low RBC count dying (60%).

There was no association between lymphocyte count and the outcome of the patients.

90% of patients who had high lymphocyte count were discharged while only 43% of those who had low lymphocyte count were discharged.

IV. DISCUSSION

Covid-19 has mostly affected adults with men bearing the biggest burden of the disease across the world. Many theories as to why men are more affected by the virus have been peddled, However, none has yet been proven scientifically sound. (reference). Testing rates in children is also low in our setup which might explain why there are fewer children with confirmed Covid-19 disease(reference) Machakos and Mavoko sub-counties accounted for most of the patients (45%). These sub-counties are in the metropolis where transmission is propagated by economic activities and gathering in social and recreation places. Of note, is the number of clients who hailed from outside the county. The hospital was serving as a regional referral center for patients from neighboring counties that did not have the facilities for managing severe Covid-19.

The first patient was admitted in June and the number kept rising exponentially until August in which the majority of the patients were admitted (45%). The months of July and August are cold seasons in the country and there are yet to be confirmed theories that the virus spreads more during such conditions. The number of patients declined from then onwards until December when less than 5% of clients were admitted. This can be attributed to the industrial action by health care workers that took place during that period and lead to the closure of the hospital. The cases reported in the country followed the same pattern with a peak in August and another peak in October. The cases dropped rapidly up to December when the lowest number of cases were reported in the country. This is however not corroborated by the numbers reported worldwide which continued to rise even after August peaking in January 2021 (32, 20).

In terms of the presenting symptoms, most of the patients presented with upper respiratory system symptoms including cough and difficulty in breathing which were the most common symptoms reported at 53% and 58% respectively though at a slower rate compared to other studies (77% and 63% respectively) (33). Patients presenting with fever were however fewer at 40% compared to 98% reported in other studies(34) Fever has also been reported as a common symptom among Covid-19 patients. In this study, gastrointestinal symptoms such as diarrhea and vomiting have also been reported in some patients. Loss of appetite, loss of taste, and loss of smell are rare symptoms associated with Covid-19 disease (20).

Hypoxia, defined as oxygen levels below 92% was experienced by 39% of the patients on admission and it was a predictor for poor outcomes with 41% of the severely hypoxic patients dying.

Management of the Covid-19 patients was mainly supportive. The ministry of health guidelines on Covid-19 management and the hospital protocols were followed and patients were managed based on the presenting symptoms (22).

Prophylactic use anticoagulants (Low molecular heparins) was recommended for all hospitalized patients but this was not always available in the hospital and some patients did not receive this treatment. Corticosteroids were also recommended in severely ill patients(6) the outcomes for patients who started corticosteroid therapy early were better than for those who started later.

Most patients who were severely hypoxic on admission died and there was a statistically significant relationship between oxygen therapy and death. This could be because the patients who needed oxygen were severely sick with a poor prognosis hence the outcome. Lymphocytopenia has been reported as a prominent feature in severely ill patients and to be associated with poor outcomes(34). In our study, there was a relationship between high lymphocyte count and survival as most of the patients who had a high lymphocyte count (90%) were discharged home. The survival rate for patients on oxygen was low with only 58% being discharged alive. This could be

attributed to the severity of the disease with those being severely ill and hypoxic having a poor prognosis. This finding is corroborated by findings from other studies that found high mortality rates in ventilated patients(3).

Limitation

The study population for this study was limited to Machakos level 5 hospital and this may not be generalizable to patients seeking treatments in other hospitals with different resource levels.

Conclusion

This descriptive study provides information on the range of symptoms, treatments, and outcomes available for patients seeking Covid-19 in resource-limited settings in Africa. The unavailability of some laboratory and radiological investigations could be contributing factors to poor outcomes.

Conflict of Interest

The authors have no conflict of interest to declare

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AUTHORS

First Author – Ambale C A, Machakos Level 5 Hospital

Second Author – Mweni S, Machakos County

Third Author – Kamita M, Mount Kenya University

Fourth Author – Gendo S, Machakos Level 5 Hospital

Fifth Author – Nyamweya P, Machakos Level 5 Hospital

Sixth Author – Mutava D, Machakos Level 5 Hospital

Seventh Author – Muthuiru J, Machakos Level 5 Hospital

Corresponding Author : Clarice Ambale, Email Address: clarisambale1983@gmail.com, Postal Address: P.O Box 19-90100 machakos

Understandings of Vietnamese EFL Students' Preferences on Written Corrective Feedback: A Case Study

Tran Van Ty*

* Faculty of Information Technology and Basics, Binh Thuan Vocational College, Vietnam

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Abstract— Written corrective feedback (WCF) is significantly important for students at all levels as it can help them enhance their second language writing ability after making errors in writing. However, without urgent understandings of students' preferences, the effectiveness of WCF definitely weakens. This study, thus, aimed at investigating students' preferences for WCF. To achieve this aim, relevant literature on WCF in terms of value, timing, sources, strategies, amount, and focus of WCF and students' preferences were reviewed. Based upon this conceptual framework, the survey study with a questionnaire was conducted at Binh Thuan Vocational College in Vietnam with the participation of 35 IT-majored students. The findings of this study showed that these students had positive perceptions and preferences of WCF in their writing learning. Based on the research findings, the paper concluded with pedagogical implications and a recommendation for further study in the line of research on WCF.

Index Terms— EFL students, preferences, WCF, vocational college, Vietnam

INTRODUCTION

Learning in a collaborative context embracing the provision of corrective feedback on learners' performance is much favored by most of language learners. Indeed, learning is pillared by a set of processes, one of which is feedback uptake (Al-Bakri, 2016). The root of providing written corrective feedback (WCF) in an educational environment is viewed as to consolidate and stimulate learning, which is vastly admitted by an increasing number of researchers in the field of second language writing. Such feedback "can help

LITERATURE REVIEW

A. Definitions of WCF

In the field of second language acquisition, "the term corrective feedback [refers] to any feedback provided to a learner, from any source, that contains evidence of learner error of language form" (Russell & Spada, 2006, p. 134). WCF, which is also called error correction, has been regarded as a typical way of enhancing students' writing accuracy and a vital part of the writing curriculum (Truscott, 1999). WCF is also defined as information provided by teachers to help students notice the errors or breakdowns of their performance

learners notice their errors and create form-meaning connections, thus aiding acquisition" (Ellis, 2009, p. 6), as well as enables the learners to make improvements (Askew & Lodge, 2000) in the future use (Harmer, 2004). Given the importance claimed in the literature for the role of feedback in language acquisition generally, it is no exception that feedback is also central to the development of writing performance (Grami, 2010; Alnasser, 2013). Its importance in this regard was first recognized when learner-centered approaches to writing instruction were developed in the 1970s (Hyland & Hyland, 2006).

Noticeably, students have different learning styles and preferences for teaching instructions (Katayama, 2007). Some scholars align to this assumption and argue that students' undesirable feedback might not be effective for developing their writing ability since it may frustrate and demotivate them. In other words, understanding students' preferences on WCF is crucial for maximizing the effectiveness of feedback on developing students' writing ability (Lee, 2013; Hamouda, 2011). Therefore, this paper aimed to investigate the vocational college students' preferences, studying at Binh Thuan Vocational College of Vietnam, for the different aspects of WCF in terms of feedback value, strategies of providing feedback, sources of feedback, amount and types of corrected errors, and time of feedback. To achieve this objective, the research question was posed as follow: *What are the IT-majored students' preferences of WCF in EFL writing classes?*

(Nicol & Macfarlane, 2006). In brief, WCF is the information or comments that the teachers deliberately utilize to facilitate the student writers' recognition of their written errors, and develop their better writing performance without errors, if any.

B. Value of WCF

In academia, giving WCF to students' errors is of great importance in improving their writing performance (Hyland & Hyland, 2006). Providing WCF on student writing is one of the pedagogical practices of language teachers who hope that this interactive practice might support the students in ameliorating their writing accuracy (Hyland & Hyland, 2006; Bitchener, 2008). Besides, according to Al-Bakri (2016), WCF

helps increase the students' positive attitudes and motivation to learn writing. However, there have long been controversial views on the effectiveness of WCF in improving students' foreign language writing ability. Some researchers argue that WCF is effective in foreign language writing practice (e.g. Chandler, 2003; Sheen, 2007; Bitchener, 2008), while others claim that WCF should not be utilized in foreign language writing education (e.g. Kepner, 1991; Truscott, 2007). Facing these controversial views, educational practitioners may feel hesitant about the utilization of WCF in their instructional practice. Meanwhile, researchers of foreign language writing may still want to continue proving whether or not WCF is useful in writing. In short, the improvement of students' writing performance and learning motivation is the ultimate goal of the provision of WCF.

C. Strategies of WCF

When describing the way in which WCF may be provided, the literature has chiefly divided the discussion into two main strategies of delivery: direct and indirect (Jamoom, 2016). Bitchener and Ferris (2012) define direct WCF as an "[explicit] correction that not only calls attention to the error but also provides a specific solution to the problem" (p. 148). By contrast, indirect feedback is defined as "indicating an error through circling, underlining, highlighting, or otherwise marking it at its location in a text, with or without [...] an error code, and asking students to mark corrections themselves" (Ferris, 2002, p. 63). In relation to sub-categories of indirect WCF, Bitchener and Knoch (2009a) suggest three ways: underlining or circling an error; describing the numbered errors at the bottom of the text; using a code to show where an error has occurred and what type of error it is. In another point, error codes are instruments that provide learners with feedback on their writing which allows the students to revise their understanding of certain linguistic items. In this way, students identify errors or what they believe are errors about the form and function of a variety of lexical and grammatical elements (Balderas & Cuamatzi, 2018). Direct WCF has the advantage that it provides learners with explicit guidance about how to correct their errors. This is clearly desirable if learners do not know what the correct form is (i.e. are not capable of correcting the errors themselves). Ferris and Roberts (2001) suggest direct WCF is probably better than indirect WCF with student writers of low levels of proficiency like junior secondary school students in the current study. In the same line, Ellis (2008) claims that to student writers of higher levels of proficiency, indirect feedback where the exact location of errors is not shown might be more effective than direct feedback where the location of the errors is shown, as students would have to engage in deeper processing.

D. Sources of WCF

Despite widely acknowledging that teacher correction is the most common and key way of responding to the students' writing performance (Hyland & Hyland, 2006), many researchers advocate the alternative use of peer correction (i.e. peer feedback) or self-correction. Liu and Hansen (2002) defined peer correction as using students "as sources of information and interactions for each other" (p. 1) in a way that makes students adopt the role and responsibility of a

teacher or editor as they comment on each other's writing in both written and oral forms. Meanwhile, self-correction draws the students' conscious attention to their individual errors which pushes them not only to notice their errors but to correct them by themselves (Bitchener, Young, & Cameron, 2005).

E. Timing of WCF

Timing of providing WCF is a debatable issue among researchers (Jamoom, 2016). Ferris (2002) notes that "many theorists believe strongly that premature attention to error may short-circuit students' ability to think, compose, and revise their content" (p. 61). Some researchers argue that providing WCF on the students' final draft is ineffective as students concern only about their grades, so that WCF better occurs in the middle of the writing process (e.g., Leki, 1991; Ferris, 1995b). Others insist that correction and comments should be given during the different writing processes such as revision, edition and final draft for students to improve their writing performance (e.g., Tribble, 1996; Mack, 2009). However, Frakenberg-Garcia (1999) believes that students need WCF immediately at the time they are trying to transform their ideas into written sentences on papers because they face many problems regarding language and content as they write. Hattie and Timperley (2007), furthermore, warn that giving students their texts with WCF after one week is late. WCF will be more beneficial if students receive it after a short time of submitting their writing (Hattie & Timperley, 2007; Mack, 2009).

F. Amount of WCF

One important decision a writing teacher must make is whether to mark a few specific error categories in a focused manner (i.e., selective WCF) or to mark all errors (i.e., comprehensive WCF) in an unfocused manner (Ferris, 2002; Ellis, 2008). There is an argument in favor of selective WCF and a counterargument in favor of comprehensive WCF. Advocates of selective WCF (e.g., Bitchener & Ferris, 2012; Lee, 2013) warn against marking all student errors because they believe that improving the students' self-editing strategies, that is process-writing, is more important than the form of the final product. However, an important counterargument in favor of the comprehensive WCF was recently done by Evans, Hartshorn, McCollum and Wolfersberger (2010), stating that in the real world, accuracy should be valued and perfection must be expected. Students thus need to learn to edit their entire texts, not only for anywhere two or three selected error patterns, and comprehensive error feedback can help to focus the writers' attention on the range of problems that their texts may incur.

G. Focus of WCF

Another important question a writing teacher faces is the type(s) of errors to be focused on: local errors which relate to language form or global ones which relate to the content and organization. In most studies (e.g. Sheen, 2007; Bitchener & Knoch, 2009a; Bitchener & Ferris, 2012; Lee, 2013), the errors can be dealt with content as "the information you provide in your essay", organization as "the way in which these ideas are organized", and language form as "the correct use of mechanics" (Ferris, Pezone, Tade, & Tinti, 1997, p. 23). While most students favored receiving more comments on language form (e.g. Norton, 1990; Ferris, 2002; Bitchener &

Ferris, 2012), the studies on teachers' beliefs and practices revealed inconsistent findings. Whereas some studies (e.g. Zacharias, 2007; Lee, 2013) reported teachers' beliefs according to which there is more to good writing than language form, other studies (e.g. Jodaie & Farrokhi, 2012) found the opposite, by indicating that teachers placed more emphasis on language form and believed that there should be as few language errors as possible. Such inconsistent findings in the same realm seem to be related to the differences in contexts and teachers' personalities. In other words, it can be expected that the difference of contexts and subjects will be reflected in different beliefs and practices as well.

H. Students' Preferences

In definition, students' preferences consist of affective reactions, and they can be conveyed through verbal and non-verbal processes (Baker, 1992). Under a cognitive perspective, when preferences are stimulated, the behavioral responses of an individual will be surely affected (McKenzie, 2010). It means that this individual will become ready to or keen on receiving the instruction (e.g. WCF) or resistant to it. Under a psychological stance, preferences can exert a huge influence on the psychological needs of individuals (McKenzie, 2010). Perloff (2003) illustrates that learners' preferences can predict that whether an individual likes or dislikes the evaluative object. In general, Bohner and Wanke (2002) posits that preferences act as a predictor that determines an individual's behaviors, and formation of behavioral routines. It is obvious that studying the students' preferences during the language learning process is of great significance; however, the teachers often fail to interpret their students' preferences regarding to three situations (Long, 1997). First of all, the teachers do not know the existing problems or issues confronted by the students since they do not obtain enough feedback from their students. Secondly, many students still keep on their learning process even within negative attitudes and low preferences, which may result in unsatisfactory outcomes and low motivation among these students in the future. Lastly, the teachers may not respond to the students' needs and interests exactly. In sum, an extensive understanding of the students' preferences of an instructional technique or method is

J. Research Site and Participants

The study was conducted at Binh Thuan Vocational College, situated at Truong Chinh Street, Phu Tai ward, Phan Thiet City, Binh Thuan province. There are 10 classes with the total number of 450 students categorizing into different majors. The teacher staff includes 72 teachers, six of whom are EFL teachers. The EFL teachers ranged from the age of 30-41; all of them are local residents of Binh Thuan province. Regarding the qualifications of EFL teachers, five of them got Bachelor of Arts (B.A), and only the other one obtained Master of Arts (M.A). Most teachers are extremely keen on their noble teaching career. In the school year 2021-2022, Binh Thuan Vocational College drew a special attention from the People's Committee of Binh Thuan Province. The school is sponsored lots of advanced equipment, which helps teachers and students to have many chances to work or study.

Thirty-five students of the IT-majored class, including 34

instrumental to the teachers' more effective pedagogical decisions.

I. Previous Studies and Research Gaps

Ferris and Roberts (2001) conducted their study to examine students' preferences regarding WCF on 63 university ESL students. The findings showed that the students' preference to receive WCF on local issues and that students considered errors in language form as serious and negatively affected their writing. The students favored the indirect WCF with error codes. Diab (2005a) explored 156 EFL university students' preferences regarding effective WCF at the American University of Beirut (AUB). Most students wanted to have as few errors as possible in their text. As for the focus of WCF, students believed that teachers' WCF should cover language form, organization and content. Moreover, most students believed in the direct WCF, believing that teachers should locate the errors, give correction, clue to correct. Zhu (2010) examined 58 EFL students' preferences at Polytechnic University (China) toward error correction by using questionnaire. 70% of the students appreciate their teacher to correct all the errors in their work, while 30% of the students want their teacher to correct only their serious errors. Those who like selective error correction said that we might lose confidence if we find our papers full of the corrections. It is clearly noticed that depending on different contexts and kinds of participants, the students' preferences were various regarding WCF. Alternatively saying, the students' preferences, attitudes on WCF in EFL/ESL writing classes were still open to debate. Thus, the writer decided to investigate the vocational students' preferences on WFC. In addition, some of the previous studies only reported the students' preferences on a few aspects of WCF; therefore, the writer intentionally probed the student participants' preferences on different aspects of WCF such as value, strategies, sources, timing, amount and focus of WCF to get a fuller picture of what they wanted in a systematic way.

METHOD

males and 1 female, took part in the study. Although they are neither the same age nor the same backgrounds, they were obliged to take the same course (General English Writing). The participants were required to pass the general English exam in the first semester. The majority of students for IT specialization were male, which accounted for 97.1% out of the whole quantity. Besides, they had different ages ranking from eighteen to over twenty. Also, the time for their learning of English was not the same. Because of the discrepancy mentioned above, the preparation for the lesson was frequently suited students' levels and interests. Overall, 21.3% of the whole student sample did not know at all about WCF, 75.9% knew a little bit about it, and only 2.8% knew much about this interactive technique. One-quarter preferred the product-approach-driven lessons (25.5%); on the contrary, up to three-quarters showed their preference on the writing lessons under the process approach (74.5%).

K. Questionnaire: Rationale, Description, Collection and Analysis

The researcher decided to employ a two-section questionnaire to collect data for the present paper due to three advantageous reasons. To the first reason, questionnaires are easy to manage with large numbers of subjects (Dörnyei, 2010). To the second reason, questionnaire results appear to be more reliable since this tool encourages greater honesty from respondents (Hopkins, 2008). To the third reason, the procedure of both collecting and analyzing questionnaire data consumes less time and effort (Denscombe, 2008). In detail, the first section was designed to gather the student participants' background information such as age, gender, general knowledge of WCF and English learning styles, which is presented above. The second section with total 19 items numbered from 1-19 focused on the students' preferences on WCF in writing classes under different aspects such as value (3 items), timing (2 items), sources (3 items), strategies (4

items), amount (2 items) and focus (5 items) of WCF. All these items of this main section are rated on a five-point Likert scale: 1=totally disagree; 2=disagree; 3=uncertain; 4=agree; 5=totally agree.

On the chosen dates, the questionnaire copies which had been translated into Vietnamese beforehand were delivered to 35 participants. On the receipt of questionnaires from the respondents, the researcher found that all 35 copies (100%) were valid and accepted. Finally, the researcher employed Statistical Package for the Social Sciences (SPSS) version 20.0 to analyze the descriptive statistics of the collected questionnaires in terms of percentage (P), mean (M) and standard deviation (S.D.). Besides, the English-majored sophomores' responses to the questionnaire items were inspected according to the rating intervals: 1.00-1.80: strongly disagree; 1.81-2.60: disagree; 2.61-3.40: moderately agree; 3.41-4.20: highly agree; 4.21-5.00: strongly agree (Pallant, 2007).

RESULTS

L. Perceptions about Value of WCF

TABLE 1. IT-MAJORED STUDENTS' PERCEPTIONS ABOUT VALUE OF WCF

Preferences	P(%)					M	S.D.
	SD*	D*	U*	A*	SA*		
I1: I think that WCF in my writing is important.	4.3	8.5	15.6	27.7	44.0	3.99	1.15
I2: I reckon that WCF makes my writing performance better.	8.5	18.4	16.3	22.7	34.0	3.55	1.35
I3: I reckon that WCF motivates me to learn English writing.	9.9	27.0	24.8	25.5	12.8	3.04	1.20

(*): SD=Strongly Disagree; D=Disagree; U=Uncertain; A=Agree; SA=Strongly Agree

As can be seen from Table 1, the large number of the students (44.0% strongly agree, 27.7% agree) thought that WCF in their writing was of importance (I1, M= 3.99, S.D.= 1.15). In specific, more than half of the student sample (34.0% strongly agree, 22.7% agree) considered that WCF made their

writing performance better (I2, M= 3.55, S.D.= 1.35). In addition, only more than one-third of the response community (12.8% strongly agree, 25.5% agree) reckoned that WCF motivated them to learn English writing (Item 3, M= 3.04, S.D.= 1.20).

M. Preferences about Timing of WCF

TABLE 2. IT-MAJORED STUDENTS' PREFERENCES ABOUT TIMING OF WCF

Preferences	P(%)					M	S.D.
	SD*	D*	U*	A*	SA*		
I4: I want my teacher to correct errors in the middle of writing process.	5.0	17.0	31.9	30.5	15.6	3.35	1.09
I5: I want my teacher to correct errors at the end of writing process	1.4	5.7	12.1	23.4	57.4	4.30	0.98

(*): SD: Strongly disagree; D: Disagree; U: Uncertain; A: Agree; SA: Strongly agree

From Table 2, considering timing of WCF, it seemed that at the end of writing process was viewed as the best point of time to provide WCF in EFL writing classes, divulged by four-fifths of the students (I5, M= 4.30, S.D.= 0.98, 57.4%

strongly agree, 23.4% agree). Interestingly, there was still nearly half of the student (15.6% strongly agree, 30.5% agree) who also wanted their teacher to provide WCF) in the middle of writing process (I4, M= 3.35, S.D.= 1.09).

N. Preferences about Sources of WCF

TABLE 3. IT-MAJORED STUDENTS' PREFERENCES ABOUT SOURCES OF WCF

Preferences	P(%)					M	S.D.
	SD*	D*	U*	A*	SA*		
I6: When I make errors in writing, I want my teacher to correct them directly.	0.0	1.4	5.0	24.8	68.8	4.61	0.65
I7: When I make errors in writing, I want my teacher to let me correct them with my classmates.	5.0	4.3	14.2	27.0	49.6	4.12	1.12
I8: When I make errors in writing, I want my teacher to let me correct them by myself.	4.3	16.3	13.5	39.7	26.2	3.67	1.16

(*): SD: Strongly disagree; D: Disagree; U: Uncertain; A: Agree; SA: Strongly agree

As Table 3 indicates, with reference to sources of WCF, all three possible sources of providing WCF in writing classrooms were preferred by the student participants. Evidently, all three items labeled I6, I7, and I8 had their mean value greater than 3.40, i.e. M= 4.61 (S.D.= 0.65), M= 4.12 (S.D.= 1.12), and M= 3.67 (S.D.= 1.16), respectively. In comparison, it seemed obvious that the student sample preferred teacher correction most (I6), acceded by peer correction (I7) and self-correction (I8), respectively. More specifically, nearly all of the student respondents (68.8%

strongly agree, 24.8% agree) hoped that when students made errors in writing, the teacher should correct directly. In addition, beyond three-quarters of this sample (49.6% strongly agree, 27.0% agree) expected that when students made errors in writing, the teacher should allow them to correct with their classmates. Finally, around two-thirds of the sample (26.2% strongly agree, 39.7% agree) was in need that when students made errors in writing, the teacher should let them correct by themselves.

O. Preferences about Strategies of WCF

TABLE 4. IT-MAJORED STUDENTS' PREFERENCES ABOUT STRATEGIES OF WCF

Preferences	P(%)					M	S.D.
	SD*	D*	U*	A*	SA*		
I9: I want my teacher to provide the correction to my errors.	3.5	14.9	4.3	39.7	37.6	3.93	1.16
I10: I want my teacher to underline or circle errors for me to correct.	5.0	17.0	31.9	30.5	15.6	3.35	1.09
I11: I want my teacher to number the errors, then describe the errors at the bottom of the text, and ask me to correct them.	19.1	37.6	12.8	19.9	10.6	2.65	1.29
I12: I want my teacher to use error codes (e.g. n=noun, v=verb) to indicate errors and ask me to correct them.	9.9	27.0	24.8	25.5	12.8	3.04	1.20

(*): SD: Strongly disagree; D: Disagree; U: Uncertain; A: Agree; SA: Strongly agree

From Table 4, it seemed patent that the majority of the students (37.6% strongly agree, 39.7% agree) still preferred teacher direct correction most, proven by the highest mean value (I9, M= 3.93, S.D.= 1.16). Other three strategies were not much preferred by the large quantity of the students. Evidently, only less than half of the student sample (15.6% strongly agree, 30.5% agree) favored their teacher underlining or circling errors for them to correct (I10, M= 3.35, S.D.=

1.09). Similarly, only roughly one-third of the respondents (12.8% strongly agree, 25.5% agree) wanted their teacher to use error codes to indicate errors for them to correct (I12, M= 3.04, S.D.= 1.20). Finally, only approximately thirty percent of the student sample (10.6% strongly agree, 19.9% agree) expected their teacher to number the errors, and then to describe the errors at the bottom of the text for them to correct (I11, M= 2.65, S.D.= 1.29).

P. Preferences about Amount of WCF

TABLE 5. IT-MAJORED STUDENTS' PREFERENCES ABOUT AMOUNT OF WCF

Preferences	P(%)					M	S.D.
	SD*	D*	U*	A*	SA*		
I13: I want my teacher to correct all errors in my writing.	24.1	27.7	14.2	17.0	17.0	2.75	1.43
I14: I want my teacher to correct only focused errors in my writing	4.3	17.0	7.8	29.8	41.1	3.87	1.24

(*): SD: Strongly disagree; D: Disagree; U: Uncertain; A: Agree; SA: Strongly agree

Table 5 depicts that approximately three-quarters of the student informants (41.1% strongly agree, 29.8% agree) preferred their teacher correcting only focused errors in their writing (I13, M= 3.87, S.D.= 1.24). However, only around one-third of the respondents (17.0% strongly agree, 17.0%

agree) wanted their teacher to correct all unfocused errors in their writing (I14, M= 2.75, S.D.= 1.43). It means that the big proportion of the students preferred WCF on some focused errors to that on all unfocused errors.

Q. Preferences about Focus of WCF

TABLE 6. IT-MAJORED STUDENTS' PREFERENCES ABOUT FOCUS OF WCF

Preferences	P(%)					M	S.D.
	SD*	D*	U*	A*	SA*		
I15: errors on content in my writing need correcting.	9.9	27.0	29.8	21.3	12.1	2.99	1.17
I16: errors on organization in my writing need correcting.	9.2	12.1	27.7	32.6	18.4	3.39	1.19
I17: errors on vocabulary in my writing need correcting.	2.8	12.8	9.9	24.1	50.4	4.06	1.17
I18: errors on grammar in my writing need correcting.	2.8	13.5	6.4	37.6	39.7	3.98	1.12
I19: errors on mechanics in my writing need correcting.	7.8	7.1	6.4	15.6	63.1	4.19	1.29

(*): SD: Strongly disagree; D: Disagree; U: Uncertain; A: Agree; SA: Strongly agree

As Table 6 depicts, with reference to focus of WCF, there were certain variations in the students' preferences of WCF focus or types of corrected errors. In general, most of the students preferred receiving WCF on local errors (i.e., vocabulary, grammar, mechanics) to receiving WCF on global

errors (i.e., content, organization). More specifically, approximately four-fifths of the student sample (63.1% strongly agree, 15.6% agree) wanted their teacher to correct errors on mechanics (I19, M= 4.19, S.D.= 1.29). By the second highest mean level, around three-quarters of the

student respondents (50.4% strongly agree, 24.1% agree) expected that lexical errors should be corrected (I17, M= 4.06, S.D.= 1.17). Another type of local errors to be corrected, that is, grammatical errors, was also much preferred by roughly three-quarters of the student sample (I18, M= 3.98, S.D.= 1.12, 39.7% strongly agree, 37.6% agree). On the contrary,

only half of the respondents (18.4% strongly agree, 32.6% agree) expected their teacher to correct errors regarding textual organization (I16, M= 3.39, S.D.= 1.19). Furthermore, less than one-third of the respondents (12.1% strongly agree, 21.3% agree), considered that errors on content in their writing needed correcting (I15, M= 2.99, S.D.= 1.17).

CONCLUSION

Generally speaking, the large number of the students realized the importance of WCF in their writing. As for timing of WCF, the majority of the respondents showed their stronger preference of WCF at the end of writing process. About places of WCF, many students preferred their teacher providing WCF in their writing on the margin of the paper near the errors. To sources of WCF, the student participants preferred teacher correction most, then peer correction, and self-correction, respectively. Relating to WCF strategies, the majority of the students still preferred teacher direct correction most, compared to other three strategies, including underlining or circling errors, using error codes, and numbering and describing the errors at the bottom of the text. As for amount of WCF, most of the student informants preferred their teacher correcting only focused errors in their writing in lieu of all unfocused errors in their writing. About WCF focus or types of corrected errors, a big part of the students favored receiving WCF on local errors (i.e., vocabulary, grammar, and mechanics) rather than receiving WCF on global errors (i.e., content, or organization).

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AUTHOR BIBLIOGRAPHY

Tran Van Ty was born in Nui Thanh District, Quang Nam Province (Vietnam) on February 10th, 1976. He earned his B.A. degree in English Language from Hue University (Vietnam) in 1998. In 2018, he accomplished his M.A. degree in TESOL from Ho Chi Minh City Open

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University (Vietnam). He has been teaching English for over ten years. Currently, he is working as a full-time English teacher at Binh Thuan Vocational College (Vietnam). His research fields include writing instruction and learner autonomy.

The Effect of Exclusive Breastfeeding and Supplementary Foods On The Event of Stunting In Children Under Five Years In Kendari City

Ahmad*, Hariani*, Petrus*, Sugiarti*

*Department of Nutrition, Health Polytechnic, Ministry of Health of the Republic of Indonesia, Kendari, Southeast Sulawesi, gizi.ahmad@gmail.com; anigizi68@gmail.com; petrus.poltekkti@gmail.com; sugiati.gizikdi@gmail.com.

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Abstract- Stunting is a nutritional problem that has not been handled until now. The prevalence of Stunting at the Mata health center in 2020 is 1.60%. The Mata Health Center ranks first in terms of low exclusive breastfeeding, which is 43.32%. The purpose of this study was to determine the effect of exclusive breastfeeding and complementary feeding on the incidence of Stunting in Children under five years (6-59 months) in the working area of the Mata Health Center of Kendari City.

Methods: This type of research is quantitative with a case control study design. The population is all Children under five years (6-59 months) in the working area of the Kendari City Mata Health Center 2021 as many as 1,274 people and there are 75 Children under Five years (6-59 months) who experience Stunting, while the sample of this research is 75 Children under five years with Stunting taken sideways and 150 Children under five years whose nutritional status is normal and taken using a matching system. Data on intake of exclusive breastfeeding and complementary feeding were obtained by interview using a questionnaire. Height data were obtained using a microtoice. Data were analyzed using the Odd Ratio (OR) test.

Results: The percentage of exclusive breastfeeding for Children under five years (6-59 months) in the working area of the Kendari City Mata Health Center is 56.4%, while early complementary feeding to Children under five years (6-59 months) is 44.0%. Children under five years (6-59 months) is 33.3%. Furthermore, the results of the chi-square test obtained a p-value of 0.000 and the results of the Odd Ratio test obtained OR 3.88 for the effect of exclusive breastfeeding on the incidence of stunting. Then obtained p-value 0.000 and OR 4.12 for the effect of complementary feeding on the incidence of stunting.

Conclusion: there is an effect of exclusive breastfeeding and complementary feeding on the incidence of stunting in Children under five years (6-59 months).

Keywords: Stunting, Exclusive Breastfeeding, Supplementary Foods, Children under five years

I. INTRODUCTION

Stunting is a major nutritional problem in Indonesia that can determine the quality of human resources[1]. Stunting is a condition of failure to thrive in toddlers due to chronic malnutrition so that they are too short for their age. Stunting children are susceptible to disease, physical and cognitive development difficulties, reduce intelligence, are at risk for degenerative diseases as adults, life threatening and the loss of the nation's generation[2]

The prevalence of stunting in the world in 2017 was 150.8 million (22.0%), according to the Stunting Toddler prevalence data collected by the World Health Organization (WHO), Indonesia is included in the third country with the highest prevalence of stunting in the Southeast Asia/South-East region. Asia Regional (SEAR). The average prevalence of stunting under five in Indonesia in 2017 was 36.4%[3].

Based on nutritional status monitoring, stunting has the highest prevalence compared to other nutritional problems such as undernutrition, underweight and obesity. The prevalence of stunted toddlers has increased from 2016 which is 27.5% to 29.6% in 2017 and based on Indonesia's health profile data in 2018 the percentage of very short toddlers and short toddlers aged 0-59 months is 11.5% and 19, 3% or added up to 30.8%(3) Similarly, the Basic Health Research Data Prevalence of Stunting Toddlers in 2018 was 30.8%[4].

Southeast Sulawesi Province in 2017 was in sixth place, while the percentage of very short toddlers and short toddlers aged 0-59 months was 15.2% and 21.2% and in 2018 in Southeast Sulawesi Province there was a decrease in the incidence of stunting as for the percentage in Very short toddlers and short toddlers aged 0-59 months by 10.1% and 18.6%[3].

Based on preliminary data obtained from the Kendari City Health Office in 2018, the prevalence of stunting reached

46.99% and in 2019 it was 26.12%, while the prevalence of exclusive breastfeeding in 2019 reached 62.49%, this figure has not reached the Strategic Plan target. in 2019 which is 85% (Dinas Kesehatan Kota Kendari, 2020).

The Health Center Mata is one of the Public health center in the coastal area of Kendari City whose prevalence of stunting ranks fourth after the Benua- Benua, Abeli and Nambo Health Centers. Stunting prevalence at the Mata Health Center is 1.60%. In addition, the Mata Health Center ranks first in terms of low exclusive breastfeeding, which is 43.32%. The results of the initial data collection also found that the working area of the Mata Health Center consisted of 5 villages, namely Mata, Purirano, Mangga Dua, Kendari Caddi and Kasilampe villages. Of the five sub-districts, Purirano sub-district is a village with higher stunting conditions than other urban villages, namely from 75 stunting toddlers, 28% are from Purirano sub-district (Public health center Mata, 2020).

The government has made various efforts to tackle stunting, but the prevalence of stunting is still high. Stunting prevention programs are stated in the Minister of Health Regulation Number 39 of 2016 concerning nutrition interventions for the first 1,000 days of life and providing sensitive and specific nutrition[5], but the program has not shown a decrease in prevalence stunting.

Several research results show that the most dominant factor influencing the incidence of stunting is non-exclusive breastfeeding[6]. The risk of becoming stunted is 3.7 times higher in Toddlers who are not exclusively breastfed compared to Toddlers who are exclusively breastfed[7]. This certainly illustrates that children who are not given exclusive breastfeeding mean that they are given complementary foods early, ie before 6 months the child has been given MP-ASI[8]. Similarly, research by Aridiyah, et al., 2015 found that one of the factors that influence the occurrence of stunting in children under five in rural and urban areas is exclusive breastfeeding and the age of complementary feeding[9]. Based on these problems, the researchers are interested in conducting research that aims to determine "The Effect of Exclusive Breastfeeding and Complementary Breastfeeding on Stunting Incidence in Toddlers (6-59 Months) in the Kendari City.

II. METHOD

This type of research is quantitative research using a case control study design. This research was carried out on April 5-17, 2021 in the working area of the Kendari City Mata Health Center. The population of this study were all toddlers (6-59 months) in the working area of the Kendari City Mata Health Center 2021 as many as 1,274 people and there were 75 toddlers (6-59 months) who experienced stunting. The sample of this study was some toddlers (6-59 months) in the working coastal area of the Kendari City Mata Health Center in 2021 as many as 225 samples consisting of case samples and controls. The sample cases in this study were Toddlers (6-59) months who experienced stunting as many as 75 people. The control sample was toddlers (6-59 months) who did not experience stunting, namely 150 people. The case sampling technique used total sampling, namely the entire population was used as a sample. The control sampling technique is using a matching system, namely matching the sex and age of toddlers.

Identity data (age, gender, education, occupation) were collected by means of interviews using a questionnaire. Data on exclusive breastfeeding and complementary feeding were collected by interview using a questionnaire. Stunting data was collected by measuring height using a microtoice with an accuracy of 0.1 cm and calculated using the Z-Score formula with height/age index. Data were analyzed by univariate analysis to identify research variables which were carried out descriptively and bivariate analysis using Chi-Square and Odd Ratio (OR) tests.

III.RESULTS OR FINDING

The results showed that in terms of age characteristics, it can be seen that of the 225 samples, most (32.0%) were 24-35 months old and a small portion (6.7%) were 48-59 months old. Furthermore, from the aspect of the gender of Toddlers, most (62.7%) are male and the rest (37.3%) are female. For more details on the distribution of samples based on their characteristics can be seen in table 1 below

Table 1. Distribution of Sample Characteristics

Sample Characteristics	n	%
Toddler Age (Months)		
6-11	30	13,3
12-23	60	26,7
24-35	72	32,0
36-47	48	21,3
48-59	15	6,7
Total	225	100
Toddler Gender		
Male	141	62,7
Female	84	37,3
Total	225	100
Mother's Age (Years)		
<20	1	0,4
20-35	175	77,8

>5	49	21,8
Total	225	100
Mother's Type of Work		
Honorary	5	2,2
Housewife	210	93,3
Employee	7	3,1
Trader	2	0,9
Government employees	1	0,4
Total	225	100
Mother's Education Level		
Primary school	7	3,1
Junior high school	53	23,6
Senior High School	149	66,2
Diploma	2	0,9
Bachelor	14	6,2
Total	225	100

The univariate analysis showed that from 225 samples, there were 150 people (66.7%) with normal nutritional status (controls) and 75 people (33.3%) with stunting nutritional status (cases). Then for exclusive breastfeeding, most of them gave exclusive breastfeeding as many as 127 people (56.4%) and the rest did not give exclusive breastfeeding as many as 98 people (43.6%). Furthermore, the provision of MP-ASI showed that of the 225 samples, most of them gave good MP-ASI, namely 126 people (56.0%) and the rest gave MP-ASI, namely 99 people (44.0%). For more details can be seen in table 2 below

Table 2. Univariate Analysis Results

Research variable	Sample	
	n	(%)
Toddler Nutritional Status		
Normal	150	66,7
Stunting	75	33,3
Total	35	100,0
Breastfeeding		
Exclusive		
Exclusive breastfeeding	127	56,4
No Exclusive Breastfeeding	98	43,6
Total	35	100,0
Complementary feeding		
Good MP-ASI	126	56,0
Early MP-ASI	99	44,0
Total	50	100

The effect of exclusive breastfeeding on the incidence of stunting in toddlers (6-59 months) shows that from 225 samples, there were 75 cases, namely samples with stunting nutritional status and 150 controls, samples with normal nutritional status. Then out of 75 cases, most of them were not given exclusive breastfeeding as many as 49 people (65.3%), the rest were given exclusive breastfeeding as many as 26 people (34.7%), then from 150 cases, most of them were given exclusive breastfeeding, namely 101 people (67 cases), the rest were not given exclusive breastfeeding as many as 49 people (32,7%).

The results of the Chi-Square test at the 95% confidence level ($\alpha=0.05$), p-value is 0.000 and the Odd Ratio (OR) analysis results obtained an OR value of 3.88 with lower limit (LL) – upper limit (UL)) is 2.16-6.97. This shows that the p-value <0.05 and the OR value (3.88)> 1, then H_0 is rejected and H_a is accepted, which means that there is an effect of exclusive breastfeeding on the incidence of stunting in Toddlers (6-59 months) in the work area. Kendari City Mata Health Center, the sample who was not given exclusive breastfeeding had a 3.88 times risk of experiencing stunting compared to the sample who was given exclusive breastfeeding.

The effect of complementary feeding (MP-ASI) on the incidence of stunting in Toddlers (6-59 months) shows that from 225 samples, there were 75 cases, namely samples with stunting nutritional status and 150 controls, samples with normal nutritional status. Then out of 150 controls, most were given good complementary feeding, namely 101 people (67.3%), the rest were early MP-ASI as many as 49 people (32.7%). Then from 75 cases, most of them were given early MP-ASI as many as 50 people (66.7%), the rest were given good MP-ASI as many as 25 people (33.3%). The results of the Chi-Square test at the 95% confidence level ($\alpha=0.05$), the p-value is 0.000 and the results of the Odd Ratio (OR) analysis are the OR value of 4.12 with the lower limit (LL) – upper limit (UL)) is 2.28-7.42. This shows that the p-value

Table 3. Results of Bivariate Analysis

Variable	Status Gizi				Total		OR (CI 95%)
	Normal		Wasting				
	n	%	n	%	n	%	
Gift Exclusive Breastfeeding							
Exclusive breastfeeding	101	67,3	26	34,7	127	56,4	3,88 (2,16-6,97)
No Exclusive Breastfeeding	49	32,7	49	65,3	98	43,6	
Total	150	100	75	100	225	100	
Complementary Foods for Breastfeeding (MP-ASI)							
MP-ASI Good	101	67,3	25	33,3	126	56,0	4,12 (2,28-7,42)
MP-ASI Early	49	32,7	50	66,7	99	44,0	
Total	150	100	75	100	225	100	

The sample who was not given early complementary feeding has a 4.12 times risk of experiencing stunting compared to the sample who was given good complementary feeding.

Exclusive Breastfeeding

The results showed that of the 50 samples, most were given exclusive breastfeeding as much as 56.4% and the rest did not give exclusive breastfeeding as much as 43.6%. Toddlers who are exclusively breastfed are toddlers who are only given breast milk at birth until they are 6 months old, while toddlers who are not given exclusive breastfeeding are toddlers who are not given other foods other than breast milk such as soft foods when they are 3 months old, 5 months old.

One of the causes of not being given exclusive breastfeeding is local culture and traditions, which are usually suggestions from the parents-in-law and parents of the respondent that babies be given honey or water or mixed with sugar, even babies aged 0-6 months have gotten bananas, this is done regularly. hereditary so that babies do not get exclusive breastfeeding besides that there is still an understanding of mothers when babies get formula milk, babies will get fatter so it is not enough just to breastfeed. However, there are also mothers who give exclusive breastfeeding, one of which is because the information provided by health workers increases the mother's understanding of the importance of exclusive breastfeeding for the growth and development of toddlers in the future [10].

This research is reinforced by [11]that exclusive breastfeeding is given when babies are 0-6 months old. Mother's Milk (ASI) is exclusive food for babies[11]. The nutritional value contained in breast milk is very high so that babies do not need any additional composition from outside[12]. Exclusive breastfeeding means that babies are only given breast milk without additional solid foods such as bananas, papaya, milk porridge. Exclusive breastfeeding is recommended for a period of up to 6 months [13]. Breast milk (ASI) is the best food for babies, especially in the first months of life. Breast milk contains all the nutrients to build and provide the energy needed. Breast milk is the main and most perfect source of food for infants aged 0-6 months who are then called exclusive breastfeeding [12].

Provision of complementary feeding to Toddlers (6-59 months)

This study shows that of the 225 samples, most of them were given good complementary feeding, namely 56.0%, samples that received good complementary feeding were samples that consumed other foods other than breast milk when they were 6 months old. Then in this study there were also 44.0% samples given early MP-ASI, namely toddlers who received food other than breast milk before the age of 6 months.

This research was strengthened by the Ministry of Health of the Republic of Indonesia (2014) that complementary foods for breast milk (MP-ASI) are foods or drinks that contain nutrients given to toddlers or children aged 6-24 months to meet their nutritional needs[14,15]. There are various terms for complementary foods, namely complementary foods, complementary foods, solid foods, weaning foods, transitional foods, beiscot (a term in German which means food other than milk given to toddlers). The whole term refers to the understanding that breastfeeding and breast milk substitutes are transitions to gradually change to family or adult food[16].

Stunting Prevalence in Toddlers (6-59 months)

The results showed that from 225 samples, there were 66.7% with normal nutritional status (controls) and 33.3% with stunting nutritional status (cases). Nutritional status is an expression of a state of balance in the form of certain variables, or the embodiment of nutriture in the form of certain variables. Nutritional status is a measure of the fulfillment of nutritional needs obtained from the intake and use of nutrients by the body. Food consumption affects a person's nutritional status[17].

The low nutritional status of Baby under 2 years is caused by direct and indirect factors. Direct factors include food intake and infectious diseases suffered by Bayi di bawah 2 [18]. According to [19], quoting directly from Lie goan hong, he stated that

diet is a variety of information that provides an overview of the types and amounts of foodstuffs eaten by one person every day and is a characteristic of a particular community group[19]. In general, Baby under 2 years newborns have an irregular feeding schedule, Baby under 2 years can eat 6-12 times or more in 24 hours without a regular schedule. Baby under 2 years breastfeeding can be done every 3 hours because Baby under 2 years's stomach will be empty within 3 hours after breastfeeding. In line with increasing age, the gap between breastfeeding times becomes longer, because the stomach's capacity is enlarged and the mother's milk production increases, then after the baby is 6 months old, the milk production decreases. Meanwhile, Baby under 2 years needs increase with age and weight, so that food intake from breast milk alone cannot meet the nutritional needs of Baby under 2 years. Therefore, from here Baby under 2 years needs additional food or other companions[14,17].

Effect of exclusive breastfeeding on the incidence of stunting

The results of this study indicate that from 225 samples, there were 150 controls, namely samples with normal nutritional status and 75 cases, namely samples with stunting nutritional status. Then out of 75 cases, most (65.3%) were not given exclusive breastfeeding, this is because breast milk really supports the growth and development of toddlers, if not given it can inhibit the growth of bone cells in toddlers. However, in this study there were also 34.7% of the samples given exclusive breastfeeding, having stunting nutritional status, this is because many factors cause stunting, it is suspected that stunting occurs due to stunting.

Factors of infectious disease suffered by children under five. Furthermore, this study also found that 67.3% of toddlers who were given exclusive breastfeeding had normal nutritional status, this situation was because exclusive breastfeeding was rich in nutrients and adapted to the nutritional needs of infants when they were 0-6 months old, this shows that the nutritional needs obtained when the baby is in accordance with the age and the baby can avoid the possibility of infectious disease then there are 32.7% of the samples who are not given exclusive breastfeeding have normal nutritional status. This is presumably because the food consumed is in accordance with the needs of toddlers.

The results of the Odd Ratio (OR) test show that there is an effect of exclusive breastfeeding on the incidence of stunting in Toddlers (6-59 months) in the working area of the Kendari City Mata Health Center, namely the sample who is not given exclusive breastfeeding has a risk of 3.88 times experiencing stunting compared to the sample who is breastfed. Exclusive.

This study is in line with Putrid and Lake's (2020) research that the most dominant factor influencing the incidence of stunting is non-exclusive breastfeeding. given exclusive breastfeeding⁽⁹⁾ this certainly illustrates that children who are not given exclusive breastfeeding means that complementary foods are given early, ie before 6 months the child has been given complementary feeding. Similarly [20], research by [21] found that one of the factors that influence the occurrence of stunting in children under five in rural and urban areas is exclusive breastfeeding [21].

This research is reinforced by the theory of [22,23] that exclusive breastfeeding reduces the incidence of infectious diseases related to the nutritional status of children under five. Exclusive breastfeeding will increase the baby's immune system, so that the body's resistance to infection will increase [24]. This research is strengthened by the theory that feeding babies is one of the most important things to support the health and growth process of babies. Proper feeding of infants will prevent malnutrition and retardation, while inappropriate feeding increases the risk of enteral problems, infection and even death[16]. Similarly, [25] that food for babies up to 6 months is mother's milk, known as exclusive breastfeeding. After that, the baby must receive additional food in the form of complementary food for breast milk (MP-ASI). Breast milk is given to children until they are 24 months old, after that they must have received full food like adults[26].

Effect of complementary feeding (MP-ASI) on the incidence of stunting

The results showed that 66.7% of the samples given early complementary feeding experienced stunting, this was because the food was given too early or too quickly so that the food could not be absorbed properly in the body, then this study also found 33.3% of the samples The MP-ASI is good for stunting, this situation is thought to be due to other factors that cause stunting, for example the quality and quantity of the MP-ASI given is not in accordance with the needs of the baby, so that although MP-ASI is given when he is 6 months old, but if the amount and type of food If given inadequately, it can cause a lack of nutritional status in Toddlers. Then in this study there were also 67.3% of the samples given MP-ASI was good, had normal nutritional status, this situation was because the provision of MP-ASI could support the growth and development of toddlers and there were also 32.7% of the samples given early MP-ASI, have a normal nutritional status, this is due to other factors that strengthen the nutritional status of Toddlers such as the nutritional intake provided is very adequate and sufficient for the nutritional needs of Toddlers, so that although it is given too early, it can improve the nutritional status of Toddlers.

The results of the Odd Ratio (OR) test showed that there was an effect of early complementary feeding on the incidence of stunting in Toddlers (6-59 months) in the working area of the Kendari City Mata Health Center, namely samples that were not given early MP-ASI had a risk of 4.12 times experiencing stunting. compared to samples given good MP-ASI. According to the researcher's assumption, giving early MP-ASI is one of the risk factors for stunting in Toddlers, if Toddlers are given MP-ASI early, they are more at risk of experiencing Stunting than Toddlers who are given MP-ASI both according to the age of giving MP-ASI, which is 6 months.

This study is in line with [27] that the age of Toddlers when they first received MP-ASI had a significant relationship with Stunting status in Toddlers in the working area of the Maron Health Center. The correlation between toddlers' age when they were first given complementary feeding with stunting status was found to be -0.182, meaning that the more appropriate the age of giving complementary feeding to toddlers, the lower the risk of stunting. The results of this study prove that there is a relationship between the history of giving MP-ASI with Stunting status in Toddlers aged 24-59 months in the working area of Maron Health

Center. The Odds Ratio value of 1.568 indicates that Toddlers who are given MP-ASI correctly according to age have 1.568 times the chance to grow not Stunting than Toddlers who are given MP-ASI incorrectly

This research is reinforced by the theory that at the age of 6 months, the baby's digestion is ready to receive food. Giving MP-ASI early before 6 months or more than 6 months can cause babies to be malnourished and will experience iron deficiency, and experience delayed growth and development. 6 months the nutritional status is more normal than at the age of 0-3 months or 4-5 months. Malnutrition status in toddlers can be due to the introduction of MP-ASI for less than 6 months. The results of research that support [28], that there is a close relationship between the first age of giving MP-ASI with nutritional status on the index BB/U and TB/U are weak, with a positive direction of relationship, meaning the earlier the age of giving MP-ASI then the nutritional status of children is getting worse[28].

IV. CONCLUSION

There is an effect of exclusive breastfeeding on the incidence of stunting in Toddlers (6-59 months), namely samples that are not given exclusive breastfeeding have a 3.88 times risk of experiencing stunting compared to samples given exclusive breastfeeding. There is an effect of complementary feeding on breast milk (MP-ASI) on the incidence of stunting in toddlers (6-59 months), namely samples that are not given complementary feeding properly have a risk of 4.12 times experiencing stunting compared to samples given good complementary feeding.

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AUTHORS

First Author - Ahmad, Master of Health Nutrition, Health Polytechnic, Ministry of Health of the Republic of Indonesia, Kendari, Southeast Sulawesi, gizi.ahmad@gmail.com

Second Author – Hariani, Master of Health Nutrition, Health Polytechnic, Ministry of Health of the Republic of Indonesia, Kendari, Southeast Sulawesi, anigizi68@gmail.com

Third Author – Petrus, Master of Health Nutrition, Health Polytechnic, Ministry of Health of the Republic of Indonesia, Kendari, Southeast Sulawesi, petrus.poltekkdi@gmail.com

fourth Author - Sugiarti - Health nutritionist, Health Polytechnic, Ministry of Health of the Republic of Indonesia, Kendari, Southeast Sulawesi, sugiati.gizikdi@gmail.com

Correspondence Author – Hariani, Master of Health Nutrition, Health Polytechnic, Ministry of Health of the Republic of Indonesia, Kendari, Southeast Sulawesi, anigizi68@gmail.com. +62-82292744708

Public health perspective of untreated dental caries among 5–7-year-old school children in rural Sri Lanka – A cross-sectional survey

KLM Kumari*, Irosha Perera**

*Institute of oral health, Maharagama, Sri Lanka,

**Preventive Oral Health Unit, National Dental Hospital (Teaching) , Sri Lanka, Ward Place, Colombo 7, Sri Lanka

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Abstract: Untreated dental caries and its clinical consequences has become a public health problem notably polarized to socio-economically deprived children in many countries thus demonstrating social inequality. However, severity of untreated dental caries according to clinical consequences was rarely reported in literature in the past, until development of PUFA/pufa index by Mons et al., 2010. The dmft/DMFT indices of basic methods of World Health Organization (WHO) have become the choice for all national oral health surveys and epidemiological surveys conducted across the globe. Nevertheless, those indices of caries status provide limited information about the severity of advanced carious lesions.

A cross sectional study was conducted among Grade 1 school children in a rural MOH area of Sri Lanka and sample comprised of 198 girls and 203 boys. Dental caries was measured according to WHO criteria and clinical consequences of untreated dental caries were measured using pufa/PUFA indices. The prevalence of untreated dental caries among 5–7-year-old school children was 54.6% with a mean dmft of 3.2 ± 3.27 and pufa prevalence was 34.2% with a mean pufa of 1.05 ± 1.45 . Untreated caries pufa ratio was 41% among these children as 41% untreated teeth had progressed to odontogenic infections. Both the prevalence and the severity of untreated dental caries and their clinical consequences among Grade 1 school children of this rural poverty stricken MOH area was high, reflecting more severe forms of untreated dental caries.

Key words: Clinical consequences of dental caries, Grade 1 school children, pufa, Severity, untreated dental caries

Introduction:

Dental caries denotes the most common chronic childhood disease and a major public health problem globally, despite improvements of oral health status of people over past few decades (FDI World Dental Federation, 2014; Oziege & Esan, 2013). As substantiated by research evidence and established scientific knowledge, dental caries is an easily preventable disease and most of the consequences of it could be prevented and controlled by introducing simple preventive measures or by providing simple restorations at early stages (Anil & Anand, 2017). Without appropriate timely treatment, dental caries in primary and permanent teeth could compromise child's ability of eating, sleeping as well as good functioning at school and home (Casamassimo et al., 2009).

According to current studies, the global prevalence of untreated dental caries of all ages is 40% (FDI World Dental Federation, 2015). Untreated dental caries in permanent teeth was the most prevalent disease among 291 diseases in the study of global burden of diseases which was conducted between 1999-2010 (Marcenes et al., 2013). Furthermore, untreated caries in deciduous teeth was the 10th most prevalent disease condition affecting 621 million children worldwide (Kassebaum et al., 2015). It is reported that about 7 in 10 children in India and 1 in 3 teenagers in Tanzania are affected by oral pain caused by untreated dental decay. The burden of untreated dental decay is most frequent in middle income countries and about 2/3 of them have not received appropriate treatment. Low-income countries are having lower level of dental decay but almost all remains untreated. Even high-income countries have about 50% untreated dental decay (FDI World Dental Federation, 2015). There is a large disparity of distribution of dental caries between different populations as the burden is disproportionately concentrated among the poor (Perera & Ekanayake, 2008).

According to the National Oral Health Survey of Sri Lanka 2015-2016, the proportion of untreated dental caries dominated the overall caries experience among all age groups (Ministry of Health, 2018). Especially among 5-year-old children, 63.1% had decayed, missing,

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and filled teeth and 60.7% of them had untreated dental caries in their deciduous dentition. Moreover, 1.5% had untreated dental caries of their permanent teeth. According to School Health Programme of Sri Lanka the number one morbidity among school children is the dental caries (*Annual Report on Family Health Bureau 2016 Family Health Bureau Ministry of Health Sri Lanka, 2016*).

High prevalence of untreated dental caries not only reflects the burden of dental caries but also severity of oral health care neglect. Studies have shown that treatment for dental caries is limited for young children especially in low- and middle-income countries (Pitts et al., 2005). However, untreated dental caries affects children's growth, general health, educational achievements and thus the quality of life of millions of children (Filstrup et al., 2003; Sheiham & Watt, 2000). The unaesthetic nature of the disease may affect a child's self-esteem and the social development. Therefore, failure to identify and provide care adequately at early stages of dental caries in children can be resulted in expensive and more serious long-term consequences. It will be a burden which makes poor people poorer. In UK number one reason for hospitalization of children is the consequences of untreated dental caries (Levine, 2021). The most common reason for hospitalization of children in British Columbia and Canada is the burden of untreated dental caries (Filstrup et al., 2003).

One of the best measures of severity of untreated dental caries is measuring clinical consequences including pulpal involvement, inflammation of surrounding oral mucosa, formation of fistula in relation to the untreated tooth due to chronic infection and a dental abscess. However, severity of untreated dental caries according to clinical consequences was rarely reported in literature in the past until development of PUFA/pufa index (pulp exposed, ulceration of oral mucosa, fistula, abscess in relation to untreated teeth) by Mons et al., 2010. The conventional DMFT index (Decayed, Missing, Filled Teeth) introduced by WHO for data collection of national oral health surveys which is commonly being used for epidemiological surveys provided limited information about the severity of advanced carious lesions (Mehta & Bhalla, 2014).

There are no published studies on clinical consequences in Sri Lankan context, especially in rural and poverty-stricken geographical areas. This is the first study conducted in Sri Lanka to explore the severity of untreated dental caries according to clinical consequences and it was measured using "pufa" index.

Methodology:

A descriptive cross-sectional study was conducted to assess the Prevalence and Severity of untreated dental caries among 5-7 years school children in Wellawaya Medical Officer of Health (MOH) area of the Monaragala district of Sri Lanka. Monaragala is one of the most poverty-stricken districts among all 25 districts of Sri Lanka. About 97.7% of population of Monaragala district is categorized as rural and 2.3% belongs to estate sector (*Central Bank of Sri Lanka, 2015*).

Monaragala district consists of a population of 451058 and the population of Wellawaya MOH area was 6880. There are 32 government schools with grade 1 classes in Wellawaya MOH area and 1279 grade 1 school children were there during the study period. This study was conducted within the period of 10th August to 31st December, 2016. All the Grade 1 school children attending government schools within Wellawaya MOH area were included to the study. Students who were absent on the days of data collection and only three Students who did not allow to, perform intra oral examination were excluded from the study.

Children were recruited for the study using a cluster sampling technique combined with probability proportionate to size. Self-administered, structured questionnaire was used to collect information about socio demographic data of the children. A modified version of DMFT index (WHO basic method of recording dental caries) was used to record dental caries of children. Pufa/PUFA index was used to record the severity of untreated dental caries. All the teeth were examined for pufa/PUFA and 1 score was given for each tooth with pufa/PUFA. PUFA stands for permanent dentition and pufa stands for deciduous dentition. Untreated dental caries Pufa/PUFA ratio was calculated by $\text{pufa} \times 100 / \text{d} + \text{D}$ d = decayed deciduous teeth, D = decayed permanent teeth. Principal Investigator was trained to record dmft score and to identify clinical consequences of untreated dental caries according to pufa index under the supervision of a Consultant in Restorative Dentistry and standardization of the clinical examination procedure was done to minimize intra examiner variability. Similar studies found in literature were referred to further clarify the data recording methods.

All the children were examined by the principal investigator. Data recording was done by a School Dental Therapist who received a training. Children were examined before the mid-day meal as far as possible. Others were asked to brush their teeth before examination. Children were examined using dental mirrors with a spot light in a class room or at the school dental. A portable dental chair was used for oral examination of children in sitting position. Since the Investigator was the only examiner, intra examiner variability was considered and to check repeatability, 3 children were re-examined at the end of each day.

Since dental caries recorded in permanent dentition was negligible all the calculations were done exclusively for the primary dentition. Prevalence of untreated dental caries was described as the percentage of children having at least one active carious lesion. Mean dmft and Standard Deviation (SD) was calculated for the population and the percentage (%) of d component of dmft was calculated. Median

dmft score and the interquartile range were calculated for the study population since distribution of dental caries was a skewed distribution. Pufa prevalence, mean pufa score, and the untreated teeth pufa ratio were calculated as indicators of the severity of untreated dental caries according to clinical consequences. Prevalence of pufa was considered as the percentage of children with 1 or more pufa score. Percentage of pulpal involvement (p %), percentage of ulceration of mucosa due to pulp exposed grossly carious tooth fragment (u %), percentage of fistula (sinus tract) in relation to pulp exposed tooth (f %), percentage of abscess in relation to carious tooth (a %) from the whole pufa score. Untreated teeth pufa ratio for the population was calculated as “pufa+PUFA/D+d x 100.” (D= number of decayed permanent teeth, d=number of decayed deciduous teeth.) Mean pufa and SD for the study population and contribution of different component of pufa index was also calculated.

Ethical clearance for the study was obtained from Ethical Review Committee of faculty of Medicine, University of Colombo. Voluntary participation was allowed administrative requirements Permission was obtained from zonal education director of Wellawaya, school principals of relevant schools, RDHS Monaragala, and MOH Wellawaya. Dates of data collection were pre informed to school principals.

Untreated dental caries was considered as Active carious lesions in any tooth surfaces, both extended to pulp or not extended to pulp, which has not filled appropriately. The percentage of children with at least one untreated tooth was considered as the prevalence of untreated dental caries. Pufa ratio: average of the percentage of untreated teeth which has extended into pulp or more in the population.

Pufa ratio = Pufa+PUFA/D+d x 100 D= number of untreated permanent teeth. d= number of untreated primary teeth. Pufa = pufa score (Number of teeth with pulpal symptoms.)

Results :

Distribution of study sample by age, sex is shown in the table 1.1 below. A total of 401 children were included in the study sample and the response rate was 93.9%. Moreover, 50.9% of the sample comprised of males. The ages of children ranged from 05 to 07 years with a Mean age of 5.9 years.

Table 1.1 characteristics of the study sample

Characteristic	Number of children	% Of children
Age Group		
5 years	138	34.4%
6 years	129	32.2%
7 years	134	33.4%
Total	401	100%
Gender		
Male	203	50.6%
Female	198	49.4%
Total	401	100%

There was a 54.6% prevalence of untreated dental caries among children and a higher untreated dental caries prevalence among males (65.5%) compared to females (43.4%) (Table 1.2)

Table 1.2 prevalence of untreated dental caries

Variable	Untreated dental caries			
	Present Number	percentage	Absent Number	Percentage
Male	133	65.5%	70	34.5%
Female	86	43.4%	112	56.6%
Total	219	54.6%	182	45.4%

Mean dmft for the study population was 3.2±3.27. The “d” component of dmft was 2.56±2.92 and it was 80% of dmft. Median dmft was 2 and median number of untreated teeth was 2. Males showed a higher dmft (3.56±3.36) than females (2.84±3.14) (Table 1.3).

Table 1.3 Average dmft score, the mean number, % of d component of dmft, median dmft and median untreated teeth of the study sample

number of

Variable	Mean dmft ±SD*	Mean number of untreated teeth SD*	Percentage of untreated component	Median dmft (IQR)**	Median Number of untreated teeth(IQR)**
Male	3.56 ± 3.36	2.83 ± 3.12	79.5%	3 (1-6)	2 (0-4)
Female	2.84 ± 3.14	2.27 ± 2.68	79.9%	2 (0-4)	2 (0-4)
Total	3.2 ± 3.27	2.56 ± 2.92	80.0%	2 (0-5)	2 (0-4)

Severity of untreated dental caries was measured according to pufa index. Mean pufa score for the study population was 1.05±1.46 and the median value of pufa score for the study sample was zero. The “pufa prevalence” was considered as the percentage of children with pufa score 01 or more and for the study sample untreated dental caries pufa prevalence was 34.2%. (Table 1.4)

Table 1.4 pufa prevalence of study sample:

Variable	Number & percentage of children with pufa score ≥1	Mean pufa score ±1	Median (IQR)
Male	68(33.5%)	1.06±1.56	1(0-2)
Female	69(34.8%)	1.04±1.35	1(0-2)
Total	137(34.2%)	1.05± 1.4	0(0-2)

Contribution of different component to the pufa index was demonstrated in table 1.5. P component of the pufa index was dominating the pufa score and mean p was 0.67.

Table 1.5 Composition of mean pufa by different component for the study sample.

Component of pufa	Mean (SD)	Medial (IQR)
p	0.67±1.09	9(0-1)
u	0.19±0.52	0(0-0)
f	0.13±0.42	0(0-0)
a	0.06±0.26	0(0-0)
pufa	1.05±1.46	0(0-2)

Proportion of children with different pulpal symptoms is shown in table 1.6 below. Pufa prevalence was 34.2% for the study population. Most common form of pufa was p and it was 25.9% (Presence of teeth with a pulp exposed cavity or with the broken crown part was coded as “p”).

Table 1.6 percentage of children with different signs of pulpal involvement of untreated dental caries.

Pulpal signs	Present Number (%)	Absent Number (%)
P	104 (25.9%)	297(74.1%)
u	37 (9.2%)	364(91.0%)
f	28 (7.0%)	373(93.5%)
a	14 (3.5%)	387(96.5%)
pufa	137 (34.2%)	264(65.8%)

Untreated dental caries pufa ratio:

Untreated dental caries pufa ratio was calculated for the study sample as a measure of severity of untreated dental caries & it was 41%.

Pufa ratio = $\frac{\text{average number of teeth with pufa score 1 or more (mean pufa)} \times 100}{\text{Average number of untreated teeth (Mean d)}}$

Average number of untreated teeth (Mean d).

Mean pufa = 1.05 , Mean d = 2.56

pufa ratio = $1.05/2.56 \times 100 = 41\%$

pufa ratio = 41%

Discussion:

Present study was undertaken to explore the burden of untreated dental caries, and its clinical consequences among 5–7-year-old Grade 1 school children in Wellawaya MOH area of the Monaragala district: a rural poverty-stricken district in Sri Lanka. It is noteworthy to mention that due to the negligible proportion of untreated dental caries in permanent teeth, analysis exclusively limited to the primary teeth among 5-7 year –old Grade 1 school children.

Dental caries has polarized into socio economically deprived communities therefore, it was considered this rural MOH area as a more suitable setting to study about the prevalence and the severity of untreated dental caries. The Grade 1 school children were selected for the study, since this group of children having maximum caries experience in deciduous dentition and feasible to access as they are in schools. According to WHO recommendations ideally five-year-old children are selected to national oral health surveys. However, with the scope of this study all the children in Grade 1, between 5- 7-year-old were selected. The pufa index was used to measure the severity of untreated dental caries according to clinical consequences, since it was designed to use in oral health surveys especially in low- and middle-income countries, to evaluate the unmet treatment need of dental caries.

Present study revealed 54.6% prevalence of untreated dental caries among 5–7-year-old Grade 1 school children (Table 4.5). Mean dmft was 3.2 ± 3.27 and the d component was 2.56 ± 2.92 (80% of dmft) for the 5–7-year-old Grade 1 school children (Table 4.6). However, National oral health survey of Sri Lanka 2015/2016 has reported that mean dmft of 5-year-old children as 3 ± 3.5 and mean d component as 2.7 ± 3.4 which is a 96.2% of dmft score. Moreover, it has revealed that prevalence of active dental caries among same age group as 60.7% (Ministry of Health Nutrition and Indigenous Medicine, 2018). Mean dmft of both study groups is consistent though, there is a notable difference in d components among two groups. Probably this may be due the school dental services which is well-established and functioning in the region. The target group of National Oral health Survey, 5-year-old children probably might not start schooling and they may have more untreated caries compare to school children. In Sri Lanka the target group of school dental services was Grade 1, Grade 4 and Grade 7 children until recent past. Even at present school dental service has not re-oriented to cater all the pre-school children, resulting more severe forms of consequences of untreated dental caries among Grade 1 school children.

Specially, the eye-opening fact that is explored by present study is the importance of in-cooperation of pufa index to measure the severity of untreated dental caries in order to uncover the oral health status of children, accurately. Otherwise, the conventional dmft index gives an impression that oral health status of both study group as more or less similar. However, present study reports 34.2% of children in study group are having clinical consequences of untreated dental caries with a mean pufa of 1.05 ± 1.46 (Table 4.7). Moreover, 41% of untreated dental caries among these children have become odontogenic infections.

However, the Sri Lanka NOHS 2002/2003 reported the prevalence of untreated caries, and mean dmft among 5- year- old children of the Sri Lanka as 63.51% and 3.51 respectively. Further the mean d component was 3.369 (92% of dmft). Unfortunately, NOHS2015/2016 has revealed that dmft of the same age group as 3 which might suggest a little improvement of oral health status after 12 years. However, the d component or the untreated caries component is 96.2% of dmft which is suggestive of a reverse in oral health status of 5-year-old children. It would have given the clearer picture about the oral health status of these children if severity of untreated dental caries has been measured with pufa index.

The comparison of oral health status of the children in present study group and two consecutive NOHSs are demonstrating table 1.6 below.

Comparison of mean dmft values shows a more or less similarity in dental caries status of these children over the years. However, this shows stagnating untreated dental caries among 5-year-old children in Sri Lanka over a period of 12 years. Marked reduction in the prevalence of untreated dental caries in present study could be attributed to the provision of school dental services for them. However, by that time 34.2% children had clinical consequences of untreated dental caries. If they were catered by school dental services at early pre-school age, it could have been possible to avoid clinical consequences of untreated dental caries among these children.

Table 1.7 Comparison of study findings of Sri Lanka on dental caries

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Study	Study period	Study group	Mean Dmft (SD)	Prevalence of untreated dental caries (d)	Ratio of %dmft/% d	Pufa prevalence
NOHS	2002-2003	5-year-old children	3.51	63.51%	92%	-
NOHS	2015-2016	5-year-old children	3 (3.5)	60.7%	96.2%	-
Present study	2016	5–7-year-old children	3.2(3.27)	54.6%	80%	34.2

Present study finding was comparable with the findings of the study conducted among 6-year-old primary school children in Denuwara educational zone: a semi – urban area of the Kandy district (Herath et al., 2011). This study demonstrated mean dmft as 3.5 (± 0.36), and the “d” component of dmft index was 76.26%. However, a possible reason for the existing little high contribution (80%) (table 4.6) of the d component to the mean dmft in present study compare to this study could be due to the lower utilization of oral health care services which may be associated with low socio-economic status of present study setting.

Moreover, a similar study was conducted in Karad city India, in 2014 among 3–5-year-old children. This study demonstrated 2.57 ± 0.56 mean dmft score and d component was 2.56 ± 0.04 . Mean pufa score was 1.56 ± 0.40 (Snehal et al., 2015). Untreated percentage is high among Indian children. However, mean pufa is low among Sri Lankan children demonstrating a better oral health status compare to children of the Indian study. However, comparing only the conventional mean dmft value among these study populations gives a wrong impression as mean dmft is high for the present study.

As reported in literature pufa prevalence among 6–7-year-old Brazilian children was 23.7% (Figueiredo et al., 2011). Which deemed lower than 5-7 –year-old children in the present study. This could be due to health system related and family factors which enable oral health seeking behavior among Brazilian children.

The National oral health survey in Philippine has reported pufa prevalence among six-year-old children as 85% and in India among 5–6-year-old children pufa prevalence was 43%, necessitating the huge need of oral health care of children (Grund et al., 2015). However, compared to those study findings pertaining to Southeast Asian countries, rural Sri Lankan children aged 5–7-years still had better oral health with a 34.2% pufa prevalence. This could be attributed to health system differences and other socio-cultural factors in Sri Lankan and Southeast Asian country contexts.

Limitations of the study.

Present study finding could not be generalized to all Sri Lankan 5–7-year-old Grade 1 school children, as differences exist in service provision and utilization in different parts of the country. Clinical examination was done using mouth mirrors and invisible active dental caries could have missed as probing was not done.

Conclusion:

the prevalence of untreated dental caries and their clinical consequences among Grade 1 school children of this rural MOH area was high thus reflecting more severe forms of untreated dental caries compared to most of developed countries. Hence, the research findings should be translated to framing policies and strategies to address the existing burden of untreated dental caries of children within the available oral health care infrastructure in this rural and poverty-stricken region..

Implementing preventive oral health care services targeting early pre-school age would reduce the burden of untreated dental caries and its consequences. pufa/PUFA index should compliment dmft/DMFT index in all epidemiological surveys that provide better insights into one of the most common unmet health need of children across the globe, which is dental caries.

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Authors:

First Author - KLM Kumari, Institute of Oral Health, Maharagama, Sri Lanka

maliththikumarii@gmail.com

Second Author- Irosha Perera, Preventive Oral Health Unit, National Dental Hospital (Teaching) , Sri Lanka, Ward Place,
Colombo 7, Sri Lanka

irosha_rukmali@yahoo.com

Correspondence Author- KLM Kumari, maliththikumarii@gmail.com, +94 71 9016878

BIG DATA : NIK = NPWP

Po Sing Hiong

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I. INTRODUCTION

Undergoing Tax Reform which was quite accurate when the Law on the Harmonization of Tax Regulations was passed or known as the HPP Law as of 29 October 2021 specifically in the General Provisions on Taxation (KUP) in article 2 paragraph 1 a which reads as follows: *NPWP (Taxpayer Identification Number) for Individual Taxpayers who are Indonesian residents uses the Population Identification Number (NIK) listed on the KTP (identity card), 1#*. In light of the conditions stated in this HPP Law, the tax base is very wide open without any previous limitations, especially if it is supported by a demographic bonus, 2#.

This policy will certainly have a broad impact on understanding the meaning of a tax both from the point of view of the Fiskus (Tax Officer) and from the perspective of the Taxpayer, each of which will *reorient* from their respective point of view. For the tax authorities, this policy has a very big meaning in the spirit and authority of the duties and responsibilities as State Servants, while for the taxpayers, they will understand this policy

as a condition of increasingly narrow or limited tax planning and tax avoidance for taxpayers in carrying out their duties and responsibilities in carrying out their duties and responsibilities. tax matters.

At the macro level, this policy is motivated by at least 2 things, namely the first is the Tax Target which continues to increase every year according to the needs of the country's development to maintain the economy of the Republic of Indonesia so that the heavy burden of responsibilities borne by the Fiskus must be followed by an increase or expansion Tax base (tax base) so that the target can be achieved, and the second is the still low Tax Ratio in Indonesia. Tax Ratio is simply calculated from the percentage of Tax Revenue in a certain period compared to Gross Domestic Product (Production results of which goods and services obtained from the amount of public consumer spending plus government spending as well as investment value plus the net realization of exports minus imports that occurred within a certain period), 3#.

The following is a table of Tax Ratios in Indonesia, 4# over time as follows:

	2014	2015	2016	2017	2018	2019	2020	2021
Tax Target	1,072 T	1,294 T	1,539 T	1,283 T	1,424 T	1,577 T	1,198 T	1,229 T
Realization	985.1 T	1,055 T	1,283 T	1,147 T	1,315 T	1,332 T	1,069 T	1,277 T
Percentage	91.9 %	81.5 %	83.4 %	89.4 %	92 %	84.4 %	89.2 %	103.9%
TAX RATIO	9.4 %	9.2 %	9 %	8.5 %	8.8 %	8.4 %	8.33 %	9.11 %

The table above can be described how low the Tax Ratio in Indonesia from 2014 to 2021 is still below 10% whereas other neighboring countries are already at plus minus 15%. This is certainly a separate homework for the Fiskus and the Government in increasing the existing Tax Ratio so that it can get out of the condition below 10%. The low number of the existing Tax Ratio also shows the condition where there are still many leakages in the existing tax revenue sector in other words there is still a lot of potential tax revenue that can be explored and absorbed by the Fiskus in meeting the Tax Revenue Targets in the Republic of Indonesia.

The above conditions can be understood as the background on the provisions of tax regulations contained in the Law on Harmonization of Tax Regulations or known as the HPP Law

Article 2 paragraph 1 a which makes NIK as NPWP for Indonesian residents in the context of expanding the existing tax base in the Republic of Indonesia. Based on these provisions, these provisions must be followed by *changes in the perspective of each party*, below we will look at it from the Fiskus point of view and the Taxpayer's point of view so that we can obtain a more comprehensive and constructive view.

II. FISCUS'S POINT OF VIEW

1. *Problem*: The target of tax deposits is increased every time

Solution: The increase in the tax revenue target every year must be understood correctly and precisely by the Tax Officer, not the

other way around blindly in achieving the targets set by the government such as *the slogan of collecting taxes is like taking eggs from the existing chicken does not kill the chicken*. This condition must be understood by Fiskus about the ins and outs of the existing business world from taxpayers so that Fiskus will know comprehensively whether the taxpayer has been maximal in carrying out his tax obligations and compliance or vice versa can still be improved. With the enactment of the new Taxation provisions above, the Fiskus will directly get open access to data from the NIK of all Indonesian citizens. This very large amount of data (big data) must be able to be empowered properly and responsibly, not the other way around. With this data, processing will be carried out in various categories and analyses so that the profile of each NIK holder can be seen in more detail, not to extort or kill the Taxpayer because Taxpayers also have *living expenses*, not all of which are recognized as expenses by the tax authorities, such as under-table costs that are currently also experienced by all taxpayers who run businesses in Indonesia. So the next problem is to what extent is the readiness of Human Resources from the Tax Authorities in processing and analyzing properly? In general, the composition of Human Resources capable of processing data in terms of the younger generation must be greater than the older generation. Therefore, this understanding must of course be seen with 2 practical steps, namely the first is the holding of **ADVANCED TRAINING** for Tax Officers who are more intense about the ins and outs of the business world per category or business sector that exists in a society where it must be remembered that the business world is the world. dynamic so that training must be advanced training that is continuous by inviting executives or experts and in the end, the tax officers can understand the opportunities and challenges that exist in the business world which in the end can be right on target. With training from Business Practitioners, Fiskus will be more humane in carrying out their duties and responsibilities so that the awareness and understanding of each Taxpayer can be built properly instead of unfounded fears. And for maximum results then the second thing that is no less important is the **DISTRIBUTION OF TAX OFFICERS ACCORDING TO BUSINESS CATEGORIES**, this is very important to be done by the Director General of Taxes so that the concentration of Tax officers can be maximized in carrying out their duties and responsibilities properly and correctly. In contrast to the current condition where tax officers are divided by area by supervising various sectors of the existing business world, what happens is that the tax officers are less than optimal in carrying out their duties and responsibilities. If the Fiskus is divided by business category, then the understanding - analysis of compliance will be more optimal and optimal which in the end the target of tax revenue can be realized.

2. *Problem:* Taxpayers do not understand Taxation Regulations

Solution: Taxpayers must be seen as **PARTNER/COOLERS**, this point of view will make the relationship between Tax officers and Taxpayers a mutually supportive or supportive condition, not the other way around like cow breeders who only think about how to milk cows for sale. Taxpayers must at all times be **EDUCATED** about the new Taxation regulations so that their ignorance can be resolved. As we all know that tax regulations are constantly

changing and not all taxpayers follow them if they are not followed, taxpayers will be trapped in a situation of not knowing about changes to tax regulations where there will be problems with bills and tax penalties are not small in number. Often taxpayers simply hand over tax matters to third parties, for example, tax consultants, this is not to blame, but if the taxpayer does not have the correct understanding then the decision to submit to third parties in absolute terms without being directly involved in it this policy is not entirely correct in the sense can still cause errors in applying the applicable tax regulations which can later lead to tax disputes. Fiskus must hold **TAX REGULATION SOCIALIZATION** in a more relaxed and enjoyable format *so that taxpayers are interested in following it, including as a means of communication between Fiskus and taxpayers so that in the end taxpayers not only understand the applicable regulations but also are aware of their tax obligations as citizens the good also woke up*. It is an important task for Fiskus in building awareness of tax obligations in the capacity of defending the State, not just being afraid and avoiding their tax obligations. If taxpayers are chased to increase their tax payments without being aware of it, then what happens is fear and compulsion where in the end the taxpayer can have a negative connotation like in recent social media where there is the hashtag #stop paying taxes. Whereas the tax is for the state and is returned to the community.

3. *Problem:* Fiskus in carrying out their duties is trapped in Subjectivity

Solution: This situation must be eliminated or reduced as happened in the field, often taxpayers experience conditions in the field that between Tax officers A and B have different points of view so taxpayers experience confusion and even anger because of The difference in point of view of Tax Officers A and B will have an impact on changing the calculation of the number of tax obligations of the taxpayer and course experiencing a large tax penalty for the taxpayer. The Director General of Taxes is obliged to uniform the point of view of his Tax Officers in reading and analyzing and translating existing and future tax regulations because the Tax Regulations are always published on new things, in the end, a common understanding is reached between all Tax Officers.

4. *Problem:* Fiskus does not yet have an Independent Supervisory Agency

Solution: The Director General of Taxes is required to build a good supervision system for their Tax Officers when carrying out their duties and obligations, in this case, it is necessary to establish a **TAX SUPERVISORY** or **PROVOST** like other State Institutions. This decision will be very good to prevent irresponsible elements from Tax Officers and Examiners who will tarnish the authority and good name of the Director General of Taxes in the eyes of the public. This supervisor can also be a channel for complaints by taxpayers in the event of experiencing discomfort in the services of existing tax officers so that the Director General of Taxes can obtain input, both suggestions for improvement and other improper actions, including criminal acts. As we all know, the tax office is also a human being who can make mistakes both intentionally and unintentionally. If this Supervisory Board is formed it will reduce these errors so that taxpayers will ultimately respect tax officers who carry out their

duties and responsibilities as servants. The Republic of Indonesia. With the establishment of this Supervisory Board, if there is a Tax dispute, it can also assist in its resolution before being brought to the Tax Court so that in the end it can reduce the burden of the Tax Court which takes a lot of time and costs. The existence of this supervisor must be filled by people who are competent in the field of taxation and must be a neutral party not the Director General of Taxes.

The above matters become a new reference and paradigm for Fiskus in carrying out its duties and responsibilities so that the potential for taxes can be realized properly without any turmoil from the community, moreover, it becomes a guideline in serving the community in general and taxpayers in particular so that taxpayers know and are aware of their obligations. The obligation to pay taxes is a form of responsibility of the citizens of the Republic of Indonesia in supporting existing economic activities. The tax target that has been set together, in the end, is not just a workload, but the approach from the above point of view will make the target achieved with the spirit of serving better and correctly and not vice versa doing arbitrary actions against taxpayers in pursuing tax targets alone without changing point of view in carrying out duties and responsibilities.

III. TAXPAYER'S VIEWPOINT

1. *Problem:* Taxpayers do not fully understand their rights and obligations.

Solution: The NIK policy as NPWP creates a new paradigm in carrying out the tax obligations of each Taxpayer where the previous NIK data can be used by other parties to transact for the sake of the minimum tax burden possible to get the maximum profit, 5#, so with this new policy changes so that using NIK for transactions without being followed by other tax obligations becomes a red light or in other words will result in a Tax Bill up to the Fine. The use of another party's NIK must be followed by other reporting obligations such as Annual SPT and others so that the practice of using another party's NIK is not recommended to be repeated because it will result in very large Bills and Fines so that the assumption of Taxes as a burden that will ultimately be avoided to be paid, 6#, should start changing. Taxpayers have limited space to move in carrying out their tax obligations for the efforts made, so this is the time for taxpayers to improve themselves by utilizing their respective Account Representatives as a means of consulting tax issues properly. Indeed, in daily practice there are still many people who run businesses without carrying out their tax obligations, in this case, the taxpayers should not be jealous, this is the time to improve by using DATA APPROPRIATE FOR TRANSACTIONS.

2. *Problem:* The era of digitizing Financial Transactions so that Data becomes Open

Solution: Taxpayers in running a business have entered a *cashless system so that* data on these transactions can be accessed by Tax Officers both in terms of issuing Tax Invoices for these transactions as well as in terms of payment flows or existing finances. Very many are not aware of this so many taxpayers get SP2DK from the tax office for transactions involving parties that issue tax invoices, this condition in the field can also occur for

these transactions many parties who issue tax invoices do not submit on the issued Invoice to the paying parties so that there are several cases where the party who received the SP2DK on the Invoice issued for him did not receive the Tax Invoice for the transaction, there was a rebuttal from the Taxpayer. Another thing is banking data that can be obtained by tax officers so we are now entering the era of information disclosure so that taxpayers are not ready or not ready to change their old mindset or in other words, don't get stuck in the old nostalgia that banking data is still not accessible by officers. Tax. For things like this, it is time for Taxpayers to make improvements and good records, through the SIMPLE ACCOUNTING SYSTEM, 7#, which helps to tidy up and implement, and report matters relating to their tax obligations. By making this change, taxpayers will be protected from SP2DK and other administrative fines. This is the time for Taxpayers to be Administratively Orderly so that they can avoid Taxation problems in the future.

3. *Problem:* Many and frequent changes in Tax Regulations
Solution: Changes in Tax Regulations that are currently and will occur must be followed by taxpayers, in this case, the taxpayer is obliged to understand it, not just submit it to a third party, for example, a Tax Consultant without wanting to learn to understand. This is very dangerous when taxpayers submit their tax matters to the Tax Consultant as if everything is in order and complete, even though in the field there are still many who experience fines and SP2DK from the Tax Office even though they have submitted their tax affairs to the Consultant. This condition is also greatly influenced when the taxpayers in carrying out their tax obligations with the Consultant are not open data or open so that the Consultant does not know about it. For this matter, it is time for Taxpayers to know and understand the various tax regulations that have been issued and their amendments so that this is the time for Taxpayers not to surrender to Consultants without knowing it. Taxpayers can also conduct Free Consultation with Tax officers, in this case, AR (Account Representative) which supervises it so that taxpayers can get a two-sided picture from both the consultant and the tax officer.

The above matters must make taxpayers improve themselves starting with having a good and correct understanding so that they can have awareness in carrying out their tax obligations as the responsibility of citizens of the Republic of Indonesia. Taxes must be understood as an act of NATIONAL DEFENSE, 8#, also because the existence of Taxes is very vital to support the running of the economy and the government of the Republic of Indonesia, this is the time for Taxpayers to become National Heroes by realizing in the form of obedience to pay taxes properly and correctly.

Finally, changes in Taxation regulations that make NIK NPWP must be addressed with administrative improvements that are more orderly and more concerned with existing Tax regulations, of course, this requires good cooperation from both parties, namely the Fiskus and Taxpayers. Welcome to the era of data openness.

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AUTHORS

First Author – Po Sing Hiong

Soccer Match Analysis of Sri Pahang Versus Sabah : The Initial 10 Minutes

Mohd Harridon^{1,2,3}, Jalalludin Abu Jaafar³, Mohamad Amirul Mustafa³, Norhadi Ubaidillah³, Shaikh Anuar Shaikh Abd Ghani³

¹Aviation Physical Fitness Cluster Universiti Kuala Lumpur Malaysian Institute of Aviation Technology,

²Malaysia Civil Defence Force,

³Sky Orbital Soccer Centre

mdharridon@unikl.edu.my

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Abstract. Soccer teams usually employ individuals to actuate match analyses upon their teams and opponents in order to gauge the efficiency of their teams and also to measure the credibility of the opponents. This shows the importance of match analyses and this paper analyze the match between Sri Pahang and Sabah with the intention of dissecting the high and low points of the two teams.

1. Introduction

Soccer remains a competitive field where numerous teams are seeking edges or any form of advantage in order to remain at the top. There are teams that focused more upon physical fitness in order to gain that edge and others are inclined to concentrate upon tactical plays such as altering formations throughout matches. In today's ecosystem and climate, most teams rely upon data that were collected during matches and training in order to fuel their decisions. Match Analysis is actuated by analyzing data collected during matches and usually data of the team and opposition are collected in order to make comparison and also to unearth trends or patterns that exist.

According to Sarmiento and et al, there are various ways in actuating match analyses and 2 of them are the utilization of video and the other one is the usage of Computerized Match Analysis System [1]. Sarmiento and et al further added that numerous categories were analyzed in matches such as low speed running, high speed running, path changes, and others [1].

Harridon agreed with the above assessments and further stated that in details observation of matches could reveal the threats of the opponents [2]. Harridon also stated that passing lanes in matches can be identified and their frequency can be numerically counted to show the intensity of possessions of the team and opponent [2].

In Malaysia, at the top league, several teams play each other to win the league title. Two teams from this league are Sri Pahang and Sabah. Both played exceptionally well in the league but with mixed results. In this paper, the match between Sri Pahang and Sabah was analyzed but only within the first 10 minutes as we were interested in the initial performance of both teams. The match was played on 16th March 2021 at Darul Makmur Stadium, at the city of Kuantan in Malaysia.

We had analyzed 12 parameters of the match between Sri Pahang and Sabah and we also made comparison between these 2 teams based upon the 10 minutes range. We also made deductions of each team and we had also produced graphical representations of the numerical values that were collected from this match.

2. Literature Review

It is vital now days to actuate match analyses upon matches since the analyses would give pertinent information that are essential for teams. Li and et al stated that several prominent parameters existed that determine the propensity of the team to win [3]. This shows that match analyses could, in some ways, show the "rightful path" to gain winnings even though this is not seen as a concrete solution.

Match analysis could also extract information with regards to the productivity of the players. Harridon stated that productivity is correlated with the physical fitness of the individuals where there are number of factors, such as food consumption, frequency of

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physical training, and others, that affect the value of physical fitness of the individuals [4]. Teams are encouraged to utilize data collected during matches to evaluate the productivity of players where the assessment would lead to viable solutions.

In a team, it's imperative for the players to be able to communicate well with each other and move as one unit during attack or defend. The ability to gel well with each other is called synergy. Hertel indicated that team synergy is imperative for teams that desire to achieve commendable results but more studies are needed in order to define accurately the effect of this synergy [5]. Football teams are in an advantage position if the team has the ability to synergize well in stressful situations.

Physical fitness of players is essential in order to effectively carry out the correct techniques and tactics during matches. Running and sprinting at sporadic duration require players to have adequate level of fitness. Match analyses can capture the amount of running or sprinting done by players and this aids the coach in identifying players that are not contributing optimally during matches. Sever and Zorba measured the components of physical fitness of soccer players in order to quantify them and had related the measured parameters in relation to their defined positions (eg. defender, midfielder, striker, goalkeeper) [6]. This evidently showed the ingrained value of physical fitness and extracting them during matches is a worthwhile process.

Harridon indicated that physical fitness is vital not only for players but also vital for others in various industries such as aviation, security, and others [7]. Sacrificing physical fitness means sacrificing safety in aviation and also akin to sacrificing efficiency in soccer matches. Thus, it's important to integrate physical fitness programme in any soccer training programme and feedbacks with regards to the efficiency of the programme can be obtained by analyzing players performance via match analyses.

Another aspect that is usually captured by match analysis is the ball possessions of teams. Farias and et al had studied matches, all five seasons, and made a conclusion that teams that have significant amount of ball possession have higher chances to win matches [8]. This gives insights upon the importance of capturing ball possessions of teams in every match. Teams are also encouraged to pass more often as it creates more passing lanes and more opportunities to score.

Anzer and Bauer utilized data that were collected from match analyses to produce a model that predict the production of goals [9]. They also surmised that their approach or method is able to assess the performance of players more accurately and they extensively relied upon data that were collected in the league in Germany [9]. This, as we pointed out earlier, is a norm in modern football where data are compiled and used for the purpose of gaining an outright edge over opponents.

During match analyses, several parameters were collected and analyzed. The parameters are different from each other and according to Harridon this approach is called classification where data or information were classified [10]. Harridon stated that the classification of data is important in order to gain a comprehensive and orderly analyses and to unearth more significant views of the situations [10].

Strafford and et al mentioned that another primary aspect of match analysis is the set pieces component where Strafford and et al analyzed comprehensively the corner kicks of teams from the English Premier League [11]. They further elaborated the statistical values of goals generated from corner kicks and indicated the analyses could aid in the fabrication of optimum training related to corner kicks [11].

3. Methodology

The approach of our match analysis is shown in Figure 1 where we analyzed various parameters and made comparison between the two teams.

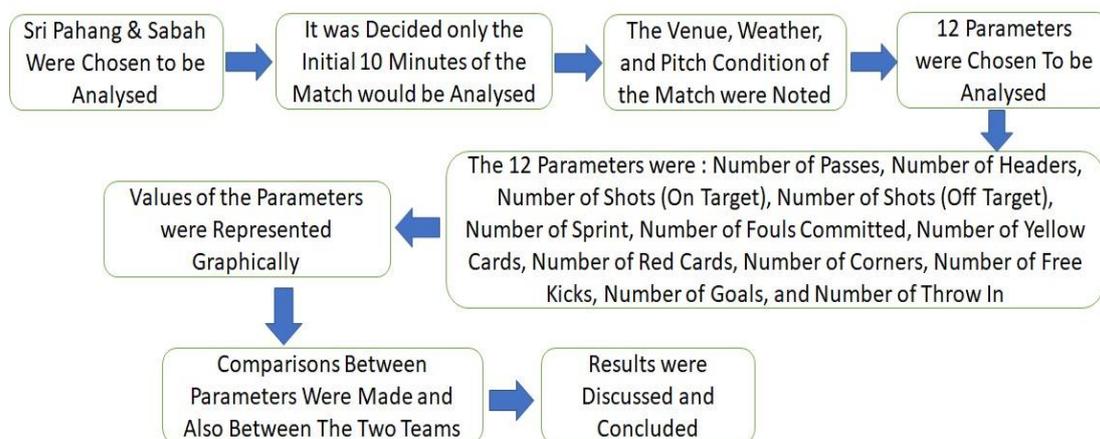


Figure 1. The Methodology of the Match Analysis

We had chosen Sri Pahang and Sabah to be our subjects of analysis. We arbitrarily decided only the initial 10 minutes of the match was to be analyzed as we were interested in the intensity of the teams and the approaches taken by each team at the start of the match. We took note of the venue, weather, and pitch condition of the match. Information regarding these is shown in the Results Section.

We had decided to collect 12 parameters of the match. Those 12 parameters are : Number of Passes, Number of Headers, Number of Shots (On Target), Number of Shots (Off Target), Number of Sprint, Number of Fouls Committed, Number of Yellow Cards, Number of Red Cards, Number of Corners, Number of Free Kicks, Number of Goals, and Number of Throw In.

The parameters or data were collected from a video of the match where the video was observed. This approach allowed us to pause and playback any scenes or plays and thus had given us latitudes to confirm the data we had collected. The data or results collected were tabulated and were also represented graphically to ease analyses. Several parameters were compared and comparisons between the two teams were made. The comparisons and results were then discussed and concluded.

4. Results

The information and data collected pertaining to the match between Sri Pahang and Sabah are shown in this section.

Venue : Darul Makmur Stadium, Kuantan, Pahang, Malaysia

Date : 16th March 2021

Start Time : 9.00pm

Weather : Not Raining

Pitch Condition : Dry

Table 1. 0th till 5th Minute

Parameters	Sri Pahang	Sabah	Total
Number of Passes	24	30	54
Number of Headers	3	5	8
Number of Shots (On Target)	1	1	2
Number of Shots (Off Target)	0	0	0
Number of Sprint	1	1	2
Number of Fouls Committed by	2	0	2
Number of Yellow Cards	0	0	0
Number of Red Cards	0	0	0
Number of Corners	0	0	0
Number of Free Kicks	0	2	2
Number of Goals	0	0	0
Number of Throw In	2	1	3

Table 2. 5th till 10th Minute

Parameters	Sri Pahang	Sabah	Total
Number of Passes	43	17	60
Number of Headers	3	0	3
Number of Shots (On Target)	2	0	2
Number of Shots (Off Target)	0	0	0
Number of Sprint	2	2	4
Number of Fouls Committed by	2	0	2
Number of Yellow Cards	1	0	1
Number of Red Cards	0	0	0
Number of Corners	0	0	0
Number of Free Kicks	0	2	2
Number of Goals	0	0	0
Number of Throw In	2	0	2

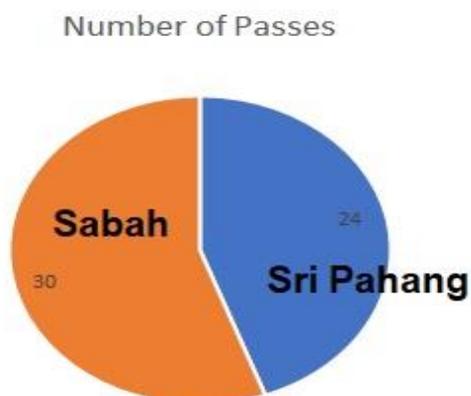


Figure 2. Number of Passes for Sabah and Sri Pahang for 0th till 5th Minute



Figure 3. Number of Passes for Sabah and Sri Pahang for 5th till 10th Minute



Figure 4. Number of Passes for Sabah and It's Trend

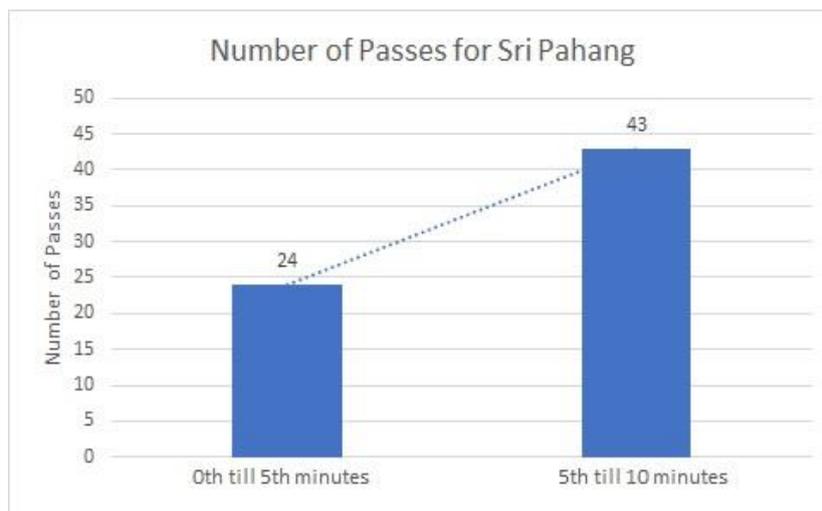


Figure 5. Number of Passes for Sri Pahang and It's Trend

5. Discussion

From 0th till 5th minute, Sabah edged Sri Pahang with the number of passes but Sabah's prominence is minuscule with only 6 extra passes. Total passes of both teams were 54 passes for this period of time. However, from the 5th till 10th minute, Sri Pahang was superior in the number of passes with 26 extra passes than Sabah. In this period, Sri Pahang had improved tremendously from only 24 passes in the 0th till 5th minute to 43 passes in the 5th till 10th minute. This is an improvement of 19 passes which showed Sri Pahang had increased their tempo and perhaps their commitment towards the match.

Sabah however was seen to not be in possession as the match progressed as their passes had drooped from 30 passes to 17 passes. This subsequently had affected their number of shots (on target) where they did not garner any shots in the 5th till 10th minute. In contrast, Sri Pahang had 2 shots on target at this period. This led us to believe that if a team is in control or in possession of the match, the team has more chances to take shots at the goal.

In the 0th till 5th minute, Sri Pahang had committed 2 fouls in contrast to zero fouls by Sabah. In the 5th till 10th minute, this pattern continued where Sri Pahang committed another 2 fouls and Sabah committed zero fouls. In total, from 0th till 10th minute, Sri Pahang committed 4 fouls. This perhaps indicated that Sri Pahang was committed to win the ball or committed to retain possession.

Fouls committed were in correlation with the number of free kicks given. In the 0th till 5th minute, Sabah were given 2 free kicks while in the 5th till 10th minute Sabah were given 2 free kicks as well. This might aid the attack of Sabah but not that much. Peering at the statistics of sprints, it seems both teams have the same number of sprints which is 1 per each team in the 0th till 5th minute while in the 5th till 10th minute both teams had actuated 2 sprints each.

We can possibly say that in the initial play of the match both teams were not urgent in their play as the pace of the play is not fast as evidently shown by the low number of sprints. Some may say that the players were conserving energy or perhaps opportunities were not there to warrant sprints. Harridon indicated the importance of physical fitness in any tasks in order to produce acceptable results [12]. This is similar in soccer where if the physical fitness of players is optimum, they could be actuating sprinting more frequently as thus creating matches that are fast pace and exciting.

But we can observe that early on in the match Sri Pahang seems aggressive with one player from Sri Pahang obtaining one yellow card. Sabah players were precarious and did not obtain any form of cards. We can say Sabah's players were cautious in their actions during the early stage of the match. Playing in front of their home crowd, it's understandable that Sri Pahang is eager to appease their supporters and hence their aggressiveness and commendable possession play throughout the early stage of the match.

It can be seen that numerous information were unearthed from match analysis that could aid in the alleviation of the teams. According to Castells and et al, match analysis can provide valuable information upon the workloads of players [13]. They stated that match analysis is a tool which adds benefits to team prying for edges [13]. We concurred with this and evidently the data we had collected did indeed provided insights of the players.

On another note, looking back at our data, it seems that with regards to aerial duels, both teams were almost equal in terms of number of headers. Pertaining to the first 10 minutes of the match, Sri Pahang produced 6 headers while Sabah produced 5 headers. Only one header separated them. We can say both teams are prepared to go the extra mile to win balls in the air.

6. Conclusions

The match between Sri Pahang and Sabah were analyzed. From the match, 12 parameters were extracted and provided data and insights that were useful for both teams. Possession wise, Sri Pahang showed more percentage of possession early in the match through its superior number of passes. This subsequently led to 3 shooting opportunities which were numerically superior than Sabah which managed only 1 shot. The match analysis also gave us insights upon the tempo of the game and also the level of aggressiveness of both teams. Overall, as also indicated by literature review, match analysis is a tool which is beneficial for teams that are seeking to push the limit.

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La communication humanitaire du gouvernement camerounais dans la gestion de la crise anglophone depuis 2016 : fondements, instruments et pratiques

Marthe Aurellie Ngono Zintchem

Université de Yaoundé II
Institut des Relations Internationales du Cameroun
martheaurelliez@gmail.com

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Résumé

Depuis 2016, le Cameroun tente de contenir et de gérer une profonde crise politique et sécuritaire dans ses Régions du Nord-ouest et du Sud-ouest. Cette crise est fondée sur des revendications d'un autonomisme identitaire porté par des groupuscules armés, disséminés dans les forêts et se réclamant d'un état sous le label de la République d'Ambazonie, avec pour chef de file Sissiku AYUK TABE. Sa traduction matérielle est souvent faite de kidnappings, de destruction de biens et édifices publics, d'attentats ou encore d'assassinats de civils et militaires. Les conséquences humanitaires se déclinent entre autres, en déplacements forcés des populations, exactions diverses, destruction d'infrastructures hospitalières, destruction de marchés, rupture des services publics. Notre réflexion a porté sur la gestion de cette crise humanitaire par le gouvernement camerounais à travers un questionnement qui vise à expliciter la philosophie globale qui guide l'action publique humanitaire du Cameroun, d'en interpréter les logiques et d'en dégager les implications dans la gestion des rapports de force sur le terrain. Il en ressort que la crise anglophone a résolument engagé les autorités à « changer » leur logiciel d'action publique, en remettant en avant les volets humanitaires et sociaux de leurs interventions. Dans le même temps, le discours humanitaire du Cameroun, en utilisant les supports habituellement dédiés à la propagande gouvernementale et à la campagne politique du chef de l'État, a permis aux gouvernés de « redevenir » la finitude de l'action publique. À travers une stratégie de communication qui a mêlé médias classiques et nouveaux utilisant les technologies du numérique, l'humanitaire a permis de flexibiliser sa centralité communicationnelle pour rejoindre les espaces de communication plus usités du grand public comme les réseaux socio-numériques. Le cas camerounais suscite une réflexion théorique plus sérieuse sur les dynamiques de l'action humanitaire aujourd'hui. Un travail de déconstruction permettrait d'enrichir la réflexion sur les pratiques humanitaires, et de mieux objectiver les notions de l'humanitaire gouvernemental, la diplomatie humanitaire et la souveraineté humanitaire.

Mots-clés : Communication humanitaire, gestion, crise anglophone, Cameroun

Abstract

Since 2016, Cameroon has been trying to contain and manage a deep political and security crisis in its Northwest and Southwest Regions. This crisis is based on the claims of an autonomous identity carried by armed groups, scattered in the forests and claiming to be a state under the label of the Republic of Ambazonia, with Sissiku AYUK TABE as leader. The material consequences of this are often kidnappings, destruction of property and public buildings, attacks and assassinations of civilians and soldiers. The humanitarian consequences include forced displacement of populations, various exactions, destruction of hospital infrastructures, destruction of markets, and disruption of public services. Our reflection focused on the management of this humanitarian crisis by the Cameroonian government through a questioning process that aims to clarify the overall philosophy that guides Cameroon's public humanitarian action, to interpret its logic and to draw out its implications in the management of power relations on the ground. It shows that the Anglophone crisis has resolutely committed the authorities to "change" their public action software, by re-emphasizing the humanitarian and social aspects of their interventions. At the same time, Cameroon's humanitarian discourse, using the

media usually dedicated to government propaganda and the political campaign of the head of state, has allowed the governed to "reclaim" the finitude of public action. Through a communication strategy that mixed traditional and new media using digital technologies, humanitarianism has made its communicational centrality more flexible to reach the communication spaces more used by the general public, such as the social-digital networks. The case of Cameroon calls for a more serious theoretical reflection on the dynamics of humanitarian action today. The deconstruction of humanitarian practices would enrich the reflection on humanitarian practices and would allow for a better objectification of the notions of governmental humanitarianism, humanitarian diplomacy and humanitarian sovereignty.

Key words : Humanitarian communication, management, Anglophone crisis, Cameroon

L'État du Cameroun, depuis 2016, tente de contenir et de gérer une profonde crise politique et sécuritaire dans ses Régions du Nord-ouest et du Sud-ouest. Cette crise, autrement baptisée « crise anglophone »¹, est largement fondée sur des revendications d'un autonomisme identitaire porté par des groupuscules armés, disséminés dans les forêts, et fortement soutenus par des forces financières et idéologiques majoritairement établies en Occident. Sa traduction matérielle est souvent faite de *kidnappings*, de destruction de biens et édifices publics, d'attentats ou encore d'assassinats de civils et militaires. Initialement partie d'une série de revendications corporatistes [1], notamment des Avocats et Enseignants de culture anglophone², cette crise s'est lentement transformée en une opportunité de revendication sécessionniste, sous le label de la République d'*Ambazonie*, avec pour chef de file Sissiku AYUK TABE, qui sera rapidement arrêté, jugé et condamné pour « terrorisme » et « sécession » à la prison à vie, peine qu'il continue d'exécuter à Yaoundé.

Si son arrestation n'a véritablement pas permis de sortir de la crise, elle n'a pas non plus entamé la détermination du gouvernement à continuer d'être présent auprès des populations, désormais coincées dans les zones de crise, avec les conséquences humanitaires que cela entraîne : déplacements forcés des populations, exactions diverses, destruction d'infrastructures hospitalières, destruction de marchés, rupture des services publics, *etc.* L'on fait désormais face à une véritable crise humanitaire dont la gestion et la mise sur agenda public révèlent la difficulté pour l'État du Cameroun à en structurer une politique de gestion inclusive et efficace, surtout lorsque l'on l'insère le contexte de crispation politique qui a suivi les élections présidentielles d'octobre 2018.

De là, sans forcément s'attarder sur une analyse sociopolitiste de cette crise, notre réflexion choisit de s'intéresser davantage à la philosophie communicationnelle qui a guidé l'action « humanitaire » du gouvernement camerounais dans le management des effets de cette crise. Le questionnement est le suivant : quelle lecture peut-on faire du discours humanitaire du gouvernement camerounais dans sa gestion de la crise sécessionniste dans les Régions du Nord-ouest et Sud-ouest ? Quelle est la philosophie qui encadre l'élaboration du discours humanitaire du gouvernement et quels sont les outils et stratégies de communication

¹ Les deux régions sont sociologiquement connues comme des « régions anglophones », en raison de ce qu'elles sont le fruit culturel et territorial de ce qui était, pendant la tutelle internationale sur le Cameroun, le « *Southern British Cameroon* ». C'est l'explication du mot « crise anglophone » qu'on applique à cette situation.

² Les deux corps de métiers se sont regroupés sous une organisation appelée *Cameroon Anglophone Civil Society Consortium* (CASC).

utilisés pour la circonstance ? Ce questionnement vise à expliciter la philosophie globale qui guide l'action publique humanitaire du Cameroun, d'en interpréter les logiques et d'en dégager les implications dans la gestion des rapports de force sur le terrain.

Bien avant de traiter concrètement de notre questionnement, il semble utile de commencer par une analyse théorique sur la notion même de « communication humanitaire » lorsqu'on parle de l'action d'un gouvernement vis-à-vis de sa propre population, en rappelant que l'humanitaire a toujours été le fait d'acteurs privés. Ensuite, la réflexion visera à expliciter les piliers et principes qui structurent le discours humanitaire du gouvernement dans la gestion de cette crise. Enfin, nous terminerons par faire une lumière sur le dispositif et les outils utilisés par le gouvernement pour opérationnaliser sa stratégie de communication humanitaire dans ces deux régions.

I. Ce que la « communication humanitaire » veut dire en matière d'action publique

La communication et l'humanitaire sont des champs d'action très liés. En effet, la communication représente « un discours sur une action, une mise en scène et une narration de l'action et des acteurs » [2]. C'est à l'aide de la communication que l'on « rend compte » de l'action humanitaire sur le terrain. Son intérêt pour l'humanitaire est précisément de favoriser l'information et la sensibilisation sur les situations d'urgence humanitaire, de contribuer à la mobilisation de fonds et de tracer une perspective sur l'avenir des victimes [3]. La communication permet aussi d'informer les donateurs sur l'utilisation de leurs dons, et donne sens aux urgences à tenir. *In fine*, la communication humanitaire peut être envisagée comme un ensemble de techniques, stratégies et dispositifs mobilisés par des acteurs précis pour sensibiliser, alerter et informer un public-cible sur des situations d'urgence humanitaire qui nécessitent la mobilisation de secours d'urgence ou de la solidarité internationale. Elle met en rapport des acteurs de la solidarité internationale et des secours d'urgence (tels que les organisations non-gouvernementales-ONG), des situations de détresse et des bailleurs de fonds éventuellement sensibles aux causes humanitaires en jeu.

Prise dans ce sens, la communication humanitaire est fondamentalement une activité d'acteurs non étatiques, principalement les Organisations non-gouvernementales (ONG), dont la vocation première est le secours et la solidarité. Et pourtant, la situation sécuritaire dans les régions du Nord-ouest et Sud-ouest du Cameroun depuis octobre 2016 nous permet d'étendre l'usage de cette notion à l'action du gouvernement, puisque l'on y a noté une véritable mobilisation de stratégies et instruments destinés à alerter et à expliquer les modalités d'intervention du gouvernement en matière d'assistance des victimes de la crise sécessionniste. Ainsi, au-delà des débats sur la dimension privée de l'action humanitaire, il est important de se demander si un gouvernement est légitime à utiliser le registre de « l'humanitaire » pour qualifier son action en direction de sa propre population.

En répondant par l'affirmative dans le cas de l'action du gouvernement camerounais dans la crise sécessionniste dans les deux régions en étude ici, il nous semble pertinent de dire justement qu'en l'espèce, il s'agit d'une action publique à part entière. Pour cela, nous faisons le pari de considérer d'abord que la situation humanitaire dans ces deux régions a révélé une pratique spéciale de l'humanitaire [4], qui place au centre de l'action les autorités gouvernementales, en particulier le ministre de l'administration territoriale (MINAT), les gouverneurs, préfets et sous-préfets des deux régions concernées. Ces autorités se sont révélées être désormais les véritables relais d'un discours humanitaire entièrement pensé et élaboré depuis la capitale politique, Yaoundé, et destiné à pérenniser l'unité de l'État du Cameroun et sa disponibilité à porter secours aux populations civiles victimes des atrocités des terroristes sécessionnistes d'obédience *ambazonienne*. Cela a donc contribué à transformer la perception populaire de l'administration publique, désormais vue comme « acteur de l'humanitaire »³ en tant que tel, et non plus seulement comme porteuse d'une logique de « puissance publique » [5]⁴.

Contrairement à la lecture classique qui a souvent nié aux États, et même parfois aux agences publiques internationales toute immixtion dans « l'espace humanitaire » [6]⁵, l'État du Cameroun a réussi à forger un discours de conciliation entre son action souveraine de bien-être à sa population et l'action humanitaire, prise dans son sens strictement technique. Ce choix permet de remettre en cause l'exclusivité de la légitimité qui a souvent été reconnue aux organisations non gouvernementales en matière humanitaire, et qui a souvent opposé cette dernière à l'État [7]. Ainsi, dans le cas du Cameroun, l'évolution récente des enjeux humanitaires, et les interactions avec la souveraineté, ont amené le gouvernement à revendiquer des « politiques humanitaires »⁶ sur leurs propres territoires, en encadrant parfois cela d'une législation spéciale. L'enjeu est dès lors de déconstruire l'idée d'humanitaire, en tentant de la sortir de son assignation originelle et ONGiste, pour s'intéresser aux finalités de l'action portée par un acteur quelconque et les circonstances dans lesquelles il intervient [8]. Bien évidemment, la question habituelle des valeurs de l'humanitaire va se poser théoriquement, puisque le gouvernement est partie prenante au conflit et a des intérêts précis à défendre.

II. Piliers et principes de la communication humanitaire du gouvernement camerounais dans la crise sécessionniste dans les régions du Nord-ouest et du Sud-ouest

³ Le gouvernement a d'ailleurs adopté un plan d'intervention sur la crise qu'il a précisément nommé « Plan d'assistance humanitaire d'urgence pour les Régions du Nord-ouest et du Sud-ouest ». Voir le document complet en annexe de ce mémoire.

⁴ La notion de « puissance publique » est un concept du Droit administratif, objectivée par Maurice Hauriou, pour indiquer le caractère exorbitant de l'autorité étatique et gouvernementale, notamment dans la capacité à mobiliser les moyens de contrainte pour faire respecter les lois aux citoyens.

⁵ Par « espace humanitaire », il faut entendre « la reconnaissance aux acteurs de l'aide d'une dimension symbolique, déconnectée des enjeux du conflit (bien qu'en interaction avec lui), autonome, obéissant à un certain nombre de normes juridiques et de principes, afin d'assurer respect et protection aux victimes des crises réponses ? ».

⁶ Le gouvernement a élaboré un Plan d'assistance humanitaire spécialement appliqué à ces deux régions.

Le gouvernement camerounais s'est appuyé sur un nombre varié de piliers et d'instruments qui sont à la fois idéologiques, normatifs et opérationnels ; et qui servent de matrice idéologique d'orientation et de détermination de sa posture discursive en matière humanitaire. Leur croisement a permis de structurer une démarche communicationnelle qui fait la synthèse entre le positionnement politique des autorités en place, leur choix axiologique par rapport à la sécurité des citoyens victimes de la crise dans ces régions et les intérêts collectifs de l'ensemble des Camerounais.

II.1. Les piliers fondamentaux d'orientation de la communication humanitaire du gouvernement camerounais dans la gestion de la crise anglophone

Les piliers fondamentaux qui orientent la communication humanitaire du gouvernement camerounais dans la gestion de la crise anglophone peuvent se subdiviser en deux grandes catégories : les piliers idéologiques et les piliers axiologiques.

II.1.1. Le positionnement idéologique du gouvernement camerounais

Dans le premier cas, l'on fait référence à l'idée que la politique humanitaire de l'État du Cameroun est guidée par une doctrine politique qui irrigue l'ensemble de ses politiques publiques depuis l'indépendance [9]. Principalement, il s'agit des principes d'unité nationale et d'indivisibilité du territoire camerounais, et du principe d'un pilotage centraliste et hégémonique de la politique de sécurité publique.

En effet, les principes d'unité nationale et d'indivisibilité du territoire font partie des éléments d'orientation stratégique de l'action publique au Cameroun. Tous les deux sont la traduction d'une volonté politique de maintenir le Cameroun tel qu'il est apparu au moment de l'indépendance, et surtout de la Réunification de 1961, étant donné que sa situation territoriale actuelle avait fait l'objet de plusieurs cycles de négociations avant et après l'indépendance [10]. Ainsi, l'idée de maintenir l'unité nationale et l'indivisibilité du territoire faisait écho au principe de l'intangibilité des frontières héritées de la colonisation, tel que posé par l'Organisation de l'unité africaine (OUA) en 1963. Ces principes sont d'ailleurs repris par la constitution camerounaise de 1996, en son préambule.

Ainsi, lorsque les sécessionnistes engagent un projet de création de l'État qu'ils ont baptisé « République fédérale d'Ambazonie », ils servent un argument politique irréfutable à l'État du Cameroun, qui est celui de la défense de l'unité nationale contre la sécession. Dans ce sens, le discours politique camerounais va se servir de la tentative de division du territoire camerounais pour susciter une répulsion et un désaveu populaires du projet sécessionniste. La mobilisation des forces de défense et de sécurité camerounaises est à cet égard justifiée par un impératif républicain d'éviter une rupture dans la fourniture des biens sécuritaires à

la population, notamment en évitant que l'on aboutisse à un triomphe des groupes armés sécessionnistes dans la gestion de l'ordre et de la sécurité dans ces régions. C'est d'ailleurs ce que met en évidence le quotidien gouvernemental *Cameroon Tribune* dans sa publication que nous reprenons en image ici pour illustrer (voir image ci-dessous).



Image : Première de couverture de *Cameroon Tribune* du mardi 20 octobre 2020. Source : <https://www.cameroon-tribune.cm/bibliotheque2.html/601/fr.html/archives-ct#>.

Quant au pilotage centraliste et hégémonique de l'action humanitaire, il faut rappeler que dès son institutionnalisation en 1960, l'État du Cameroun a toujours fait du secteur de la sécurité et de la défense un domaine régalien, exclusivement réservé à la compétence du Chef de l'État. Le but a toujours été de « maximiser le centre politique sur la périphérie » [11]. Cela signifie que c'est de la capitale que toute la politique de sécurité et de défense est élaborée, programmée et pilotée, sans possibilité de décentralisation. Ainsi, dans des situations de crise sociopolitique comme celle que l'on vit dans les Régions du Nord-ouest et du Sud-ouest depuis 2016, c'est de Yaoundé qu'est définie la stratégie d'intervention de l'armée pour affronter les groupes armés sécessionnistes et rétablir l'ordre public. Celle-ci est élaboré au travers par des Conseils de

défense et Conseil National de Sécurité dont le Ministre actuel d'administration territoriale Mr ATANGA NJI est secrétaire et qui sont présidé par le Présidés par le Chef de l'Etat.

Dans ce sens, les victimes des affrontements entre les groupes armés et l'armée républicaine sont directement prises en charge par le ministère de la défense ou celui de l'Administration territoriale où il existe des services spécialisés sur les questions humanitaires⁷. L'idée centrale, comme l'a soutenu le ministre camerounais de la communication de l'époque, Issa Tchiroma Bakary, est de « mobiliser tous les moyens nécessaires pour maintenir la présence de l'État, et continuer à pourvoir aux besoins élémentaires des populations dans ces deux régions ». Il s'agit donc de tenir la situation sous contrôle, afin de maintenir la continuité de l'État là-bas, par un savant équilibre entre sa posture souverainiste et la réponse aux urgences humanitaires issues de cette crise. Le secteur de l'éducation nous a offert un bel exemple dans ce sens, comme le montre cette image d'un soldat du Bataillon d'intervention rapide (BIR) dispensant des enseignements dans un établissement secondaire du Nord-ouest, en remplacement d'enseignants absents du fait de la crise, question d'empêcher la rupture prolongée des enseignements dans la localité.



Image 3 : Un soldat

du BIR dispense des cours dans un établissement secondaire du Nord-ouest, janvier 2017

II.1.2. Le positionnement axiologique du gouvernement camerounais

La communication humanitaire du gouvernement est aussi portée par un positionnement axiologique et éthique bien déterminé. Il s'agit d'un attachement du gouvernement aux valeurs et principes qu'il estime être au fondement de sa gouvernance, et qui se retrouve clairement disposés dans la constitution et les lois subséquentes. On peut les regrouper sous l'appellation « valeurs démocratiques », avec la richesse du contenu qu'on peut y retrouver.

En premier lieu, l'État camerounais a mis en avant la défense des libertés politiques et économiques pour justifier sa démarche de soutien aux populations civiles des régions du Nord-ouest et du Sud-ouest. Cela

⁷ Il y a particulièrement la Direction de la protection civile du ministère de l'administration territoriale.

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faisait écho aux assassinats et au climat de terreur imposé par les groupes armés sécessionnistes dans ces régions. Par ailleurs, il était question pour le gouvernement camerounais de marquer son soutien au relèvement des entreprises privées et parapubliques détruites par ces mêmes rebelles, avec les nombreuses pertes d'emplois et pertes fiscales que cela a entraînées. La liberté de se mouvoir, le droit à la sécurité, la liberté d'entreprendre et le droit au travail ont donc permis à l'État de justifier son engagement à affronter les rebelles sécessionnistes et à limiter leur parcours de guerre et de soumission de la population. Raison pour laquelle le gouvernement a engagé un vaste programme de soutien aux entreprises affectées (à travers la défiscalisation et des remises d'impôts) par la crise, et à un déploiement massif d'enseignants et agents de maintien de l'ordre pour éviter toute discontinuité dans la fourniture des biens de première nécessité tels que l'école, la santé, les biens alimentaires et la possibilité d'aller et venir.

En deuxième lieu, le gouvernement a fondé son discours humanitaire sur le respect de l'État de droit. Ce recours à l'État de droit a été une astuce pour réinscrire la situation humanitaire dans le cadre de la vie ordinaire de l'État, de manière à soumettre les auteurs des atrocités à la justice étatique et reprendre la main sur la gestion de la situation. L'objectif de la mobilisation de la justice pour définir la communication humanitaire ici était d'agir sur la psychologie des masses, en maintenant l'idée que l'Etat du Cameroun a des institutions qui fonctionnent et que sa justice ne saurait tolérer des individus soupçonnés de crimes contre son territoire et sa population. D'ailleurs, les condamnations à vie ou à de lourdes peines d'emprisonnement des principaux *leaders* de la cause sécessionniste a validé l'hypothèse que l'Etat camerounais est peu disposé à « négocier » avec des personnes qui ne respectent pas les droits fondamentaux de ses citoyens et son intégrité territoriale. En cela, leur condamnation par la justice camerounaise, qui est « une bonne nouvelle pour le Cameroun »⁸, montre qu'ils sont tout autant soumis à la loi camerounaise que tous les autres citoyens camerounais, sans aucune particularité fondée ni sur l'histoire, ni sur la langue, encore moins sur la culture comme ils ont tenté d'expliquer et de justifier leur recours aux armes.

En troisième lieu, le gouvernement camerounais a fondé son discours humanitaire sur le privilège d'un monopole de violence légitime. En cela, il a tôt fait de ranger l'usage des armes par les sécessionnistes d'un acte de défiance républicaine et d'une provocation à l'endroit des autorités centrales de l'armée, seules habilitées à détenir et user des armes pour l'intérêt collectif. Ceci étant, la posture d'assistance humanitaire du Cameroun s'est alimentée d'un appel officiel de l'Etat camerounais à voir les sécessionnistes « déposer les armes et à retrouver le droit chemin »⁹, avec la possibilité de rejoindre un programme spécial de désarmement, démobilisation et réinsertion (DDR)¹⁰. C'est que, pour le gouvernement camerounais, la détention et l'usage

⁸ Extrait de l'intervention télévisuelle d'Abel Elimbi Lobe, le 20 août 2019 dans l'émission *Cartes sur Table* sur la chaîne de télévision STV.

⁹ Extrait du discours du président Paul Biya, à l'occasion de la prestation de serment pour son septième mandat le 06 novembre 2018.

¹⁰ C'est le 30 novembre 2018 que le président Biya a créé, par décret, le Comité national de désarmement, démobilisation et réintégration (CNDDR).

d'armes sont une exclusivité de ses compétences, et toute violation de cette exclusivité expose les auteurs à une répression armée et des poursuites judiciaires. Cette démarche était destinée à renforcer la légitimité de l'Etat et de son armée auprès des populations civiles. Elle s'est d'ailleurs accompagnée de nombreux programmes et projets d'assistance humanitaire (voir exemple avec les images ci-après) et de soutien aux populations victimes des actes de violence commis par les rebelles sécessionnistes d'obédience *amazonienne*.



Image : La ministre de l'administration territoriale, Paul Atanga Nji. Distribution de l'assistance humanitaire du gouvernement à Bamenda, mars 2020. **Source** : <https://actucameroun.com/2020/03/15/crise-anglophone-laide-humanitaire-du-gouvernement-attendue/>.



Image : Photo d'un stock de matériels de l'assistance humanitaire du gouvernement camerounais en direction des déplacés de la crise anglophone. **Source** : <https://actucameroun.com/2020/03/15/crise-anglophone-laide-humanitaire-du-gouvernement-attendue/>.

III. Dispositifs et instruments d'action mobilisés

Pour matérialiser sa politique de communication humanitaire, le gouvernement camerounais a eu recours à un dispositif normatif et institutionnel assez précis. De même, il a utilisé de nombreux instruments de communication, constitués essentiellement de médias, dans leur diversité, et de plateformes de communication digitale. La combinaison de ces deux catégories d'instruments a permis au gouvernement de mettre à profit les différents espaces d'information et de diffusion de messages de façon à atteindre le plus large public.

III.1. Le dispositif normatif et institutionnel

Notre analyse va distinguer le dispositif normatif de celui institutionnel pour comprendre l'opérationnalisation de la communication humanitaire de l'État camerounais dans la gestion de la crise anglophone.

Dans le premier cas, nous avons d'une part les règles juridiques internes au Cameroun, celles-là qui émanent du droit positif camerounais et qui assurent à la population civile protection et sécurité à tous égards. D'autre part, nous avons un ensemble d'autres règles qui ressortissent du droit international, et qui sont la résultante de l'adhésion du Cameroun à la civilité internationale et au droit humanitaire proprement dit. La conjugaison de ces deux niveaux de repères juridiques fonde la légitimité et la légalité de l'action du Cameroun en faveur des victimes des atrocités des rebelles terroristes et justifie la répression, par l'armée camerounaise, de ces derniers, dont l'action se retrouve à la fois socialement méprisée et juridiquement condamnée.

En interne, nous situons au sommet les dispositions de la constitution qui, en son préambule, dispose que l'État du Cameroun est une « République sociale »¹¹, qui garantit à tous ses citoyens la jouissance des droits fondamentaux, notamment le droit à la vie, à la sécurité, à l'éducation, à la santé et la liberté d'aller et de venir. Ces garanties constitutionnelles créent véritablement des obligations pour l'État, obligations dont le non-accomplissement pourrait constituer un motif de défiance populaire et de rupture de ce qu'Alice Sinzinger appelle « la crédibilité interne de l'État » [12]. Ainsi, une crise sociopolitique comme celle des régions du Nord-ouest et du Sud-ouest ne peut que galvaniser l'État à assumer véritablement ses fonctions de pourvoyeur principal des biens de première nécessité, et de garant en chef de l'ordre et de la sécurité. Autant le dire, « l'humanitaire » fait partie des compétences constitutionnelles de l'État camerounais, et son expression devient simplement plus spectaculaire en temps de crise¹².

¹¹ Cf. préambule de la constitution du Cameroun du 16 janvier 1996.

¹² La spectacularisation de l'humanitaire ici passe par la mise en avant de la figure du chef de l'Etat, à qui on attribue la totalité des actes de secours posés par le gouvernement, et dont l'image est travaillée dans les médias publics comme un être « magnanime », « à l'écoute du peuple », « très sensible à la souffrance des autres », etc.

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Outre la constitution, il existe deux textes réglementaires qui organisent l'action humanitaire et l'assistance d'urgence de l'Etat dans les régions du Nord-ouest et Sud-ouest. On a d'une part le décret n° 2020/136 du 23 mars 2020 *portant création, organisation et fonctionnement du Comité du suivi de la mise en œuvre des recommandations du Grand dialogue national* et d'autre part l'Arrêté n°31/CAB/PM du 03 avril 2020 *fixant le cadre organique de mise en œuvre du Plan Présidentiel de Reconstruction et de Développement des Régions du Nord-Ouest et du Sud-ouest, en abrégé « PPRD-NO/SO »*. Ces deux textes, qui sont en réalité les résultantes du Grand dialogue national¹³, viennent préciser les compétences et les engagements de l'Etat dans l'assistance aux personnes civiles victimes des atrocités des sécessionnistes dans ces deux régions. Globalement, l'objectif est de réaliser trois missions fondamentales :

- la réhabilitation et l'aménagement des infrastructures de base;
- la revitalisation économique;
- la promotion de la cohésion sociale.

À la lecture de ces objectifs, la leçon qu'on pourrait tirer est que dans la communication gouvernementale et l'affichage officiel du discours humanitaire en faveur de ces deux régions, le gouvernement utilise la crise comme « ressource » de développement, et non seulement comme une « crise », au sens politique du terme, c'est-à-dire une simple rupture des équilibres sociaux, souvent négativement prise comme un « moment de tension, mettant en jeu brutalement les intérêts fondamentaux (de l'État), puis donnant lieu après l'épreuve de force à un relâchement de la tension et à une forme d'accord entre acteurs impliqués » [13].

Dans le second cas, celui de l'ordre juridique international, il faut précisément indiquer que le Cameroun est État membre des conventions de Genève de 1949 et de ses protocoles additionnels de 1977. Or, justement, même s'il ne s'agit pas d'une situation de guerre ou conflit armé international, la crise sécessionniste dans les deux régions en cause fait voir des actes et un comportement de guerre à tous égards. Dans ce sens, la référence aux quatre conventions de Genève et leurs deux protocoles additionnels permet d'accentuer une certaine rigueur d'action chez les militaires camerounais et une certaine responsabilité chez les décideurs.

Ainsi, ces conventions et protocoles successifs ont ceci d'important qu'ils « organisent les modalités de secours en faveur des victimes » [14] de cette crise. Spécifiquement, il faut relever la référence au Protocole II de 1977 qui insiste sur la règle de non intervention dans les affaires internes d'un Etat et le respect de sa souveraineté en temps de guerre civile ou de différend interne. Cet impératif du respect de la souveraineté est d'ailleurs en cohérence avec certaines dispositions onusiennes sur l'assistance humanitaire, notamment les résolutions 43/131 du 8 décembre 1988 et 46/182 du 19 décembre 1992 de l'Assemblée générale.

¹³ Le Grand dialogue national est convoqué par le président Biya du 30 septembre au 04 octobre 2019. Il s'est déroulé au Palais des congrès de Yaoundé et a porté essentiellement sur la résolution de la crise anglophone.

Pour ce qui est du dispositif institutionnel, Le gouvernement camerounais a mobilisé un nombre varié d'institutions pour tenir sa stratégie de communication humanitaire dans la crise sécessionniste au Nord-ouest et au Sud-ouest depuis 2016. Outre les ministères de la défense et de l'Administration territoriale qui ont eu un rôle déterminant dans l'assistance humanitaire d'urgence et la reconstruction de certaines infrastructures de base, le gouvernement a reposé son action humanitaire sur divers organes définis dans son Plan présidentiel de reconstruction et de développement des régions du Nord-ouest et du Sud-ouest. Ce Plan est placé sous la supervision du premier ministre et comprend les organes suivants : le Comité de pilotage (COFIL), la Coordination Nationale, les Comités Régionaux de Suivi et le Partenaire d'Exécution.

Par ailleurs, le gouvernement travaille avec le Programme des Nations unies pour le développement (PNUD), en sa qualité de Partenaire d'Exécution, avec la collaboration de nombreuses organisations de développement sur place, notamment la *South West Development Authority* (SOWEDA), pour la Région du Sud-Ouest, et la *North West Development Authority* (MIDENO) pour la Région du Nord-Ouest. Cette collaboration est vouée à assurer une démarche inclusive dans l'exécution des missions assignées. Cette inclusion passe notamment par la collaboration avec les populations locales, à travers les deux organisations de développement précitées, dans le sens de l'identification des secteurs prioritaires à développer en urgence.

III.2. Les instruments mobilisés par le gouvernement pour dire l'humanitaire dans la crise anglophone

À ce niveau, le gouvernement a recouru à deux leviers principaux : les médias traditionnels et numériques d'un côté et le discours diplomatique de l'autre.

III.2.1. Les médias traditionnels

En commençant par les médias ordinaires, nous pourrions en distinguer deux catégories : la presse écrite et les médias audiovisuels. En effet, le gouvernement a su mobiliser les journalistes et communicateurs officiels des organes de presse gouvernementaux et progouvernementaux comme *Cameroon Tribune*, le *Journal l'Action* et le journal *l'Anecdote*. Le trait commun de ces organes est qu'ils sont globalement favorables à la ligne politique du gouvernement et ne portent rarement une critique à son action. Voici quelques-uns des titres sur la question pour s'en convaincre.



Image : Edition de *Cameroon Tribune*, au lendemain de l'assassinat d'enfants dans une école de Kumba, dans le Sud-ouest (27 octobre 2020)



Image : Edition de *Cameroon Tribune*, retour sur la riposte gouvernementale après l'assassinat d'enfants dans une école de Kumba, dans le Sud-ouest (27 octobre 2020)



Image : *L'Action*, premier numéro après la célébration de l'unité nationale le 20 main 2018

Pour ce qui est des médias audiovisuels, on note que le gouvernement a essentiellement mobilisé le groupe *Cameroon radio and television* (CRTV) pour communiquer sur la situation humanitaire dans ces deux régions. Ayant l'avantage d'être le groupe médiatique à capitaux publics, la CRTV a offert ses espaces radio et télé à l'ensemble des responsables gouvernementaux qui souhaitaient porter un message sur l'évolution de la situation humanitaire dans les deux régions¹⁴. Elle l'a fait avec des formats diversifiés, tantôt des interviews, tantôt des reportages spéciaux, tantôt des magazines d'information ou même des émissions de débat spécialement dédiées à cette situation.

En outre, il n'est pas superflu de relever que la presse privée a, marginalement, été mobilisée pour diffuser la communication gouvernementale sur la crise humanitaire dans le contexte de guerre sécessionniste d'obédience *ambazonienne*. Bien qu'elle ait souvent été invitée à des conférences de presse gouvernementales, la presse privée a subi une relégation au second plan dans la diffusion du message humanitaire du gouvernement. Dans une certaine mesure, une partie d'elle a même été accusée de « complicité »¹⁵ avec les rebelles *ambazoniens* et d'intelligence criminelle avec les *leaders* de ces rebelles sur place au Cameroun ou à l'étranger. C'est le cas de journaux comme *La Nouvelle expression* et le journal *Le Jour*, ou encore d'une télévision comme *Equinoxe Tv*.

¹⁴ En dehors des éditions de son journal de 20h30, elle a mobilisé ses équipes sur cette situation, notamment dans des émissions comme *Scènes de presse* et *Actualités Hebdo*.

¹⁵ C'est le cas notamment du groupe *Equinoxe* qui a été mis en demeure par le ministre de la communication, René Sadi le 02 novembre 2020.

Dans un second plan, le gouvernement a su se déployer sur les plateformes numériques pour passer son message humanitaire. Bien que souvent désordonnée et très peu élaborées, les actions de communication du gouvernement dans les différentes pages de réseaux socio-numériques montrent qu'il y a eu une volonté d'être présents partout et d'atteindre un public plus large. Dans cet exercice, c'est l'armée camerounaise qui a le plus attiré notre attention, puisque c'est elle qui était au premier rang sur le terrain des opérations. Ainsi, elle a su se doter de pages d'influence et d'information sur *Facebook* qui ont pu donner régulièrement l'actualité de l'action du ministère de la défense sur le terrain. La principale de ces pages est dénommée « *Honneur et fidélité* »¹⁶. Elle recense toutes les actions de l'armée tant sur le théâtre des combats que sur l'action humanitaire d'urgence et de développement. C'est *via* elle que l'on sera informé de l'action du Bataillon d'intervention rapide (BIR), une unité spéciale de l'armée camerounaise en matière de reconstruction des ponts, écoles et hôpitaux détruits par les rebelles sécessionnistes. Cette même page nous a même renseigné que la BIR s'est substitué aux enseignants du secondaire dans certains cas pour éviter que les éléments des zones touchées par la crise vivent de longues périodes de déscolarisation.

III.2.2. Les médias numériques

Pour mieux discerner la communication dans les deux régions, le gouvernement camerounais a d'abord coupé puis réduit l'accès à Internet en 2017. Le retour de l'accès aux réseaux sociaux a permis à l'état d'utiliser cette voie pour mettre en œuvre des actions humanitaires (Sébastien SEIBT, France 24).

Ainsi, l'Agence Nationale des Technologies de l'Information et de la Communication (ANTIC) assure pour le compte de l'État « la promotion et le suivi de l'action des pouvoirs publics en matière de Technologies de l'Information et de la Communication [ainsi que] la régulation, le contrôle et le suivi des activités liées à la sécurité des systèmes d'information et des réseaux de communications électroniques. L'agence de régulation des télécommunications (ART) est créée en 1998 est chargée de la régulation des moyens de communication. Il existe 4 principaux fournisseurs de télécommunications : MTN, Orange, Viettel/ Nexttel et l'entreprise nationale Camtel.

Selon AEDH, ritimo, Tournons La Page , DUVAL Virginie, POURCHIER Mathieu dans ritimo (décembre 2021) Pour une population de 26,5 Millions d'habitants avec une connexion mobile de 23,62 millions (90 %), 7,87 millions d'internaute (30 %) et 3,70 millions d'utilisation active des réseaux sociaux (14 % de pénétration).

¹⁶ Lien de la page : <https://www.facebook.com/search/top?q=honneur%20et%20fid%C3%A9lit%C3%A9%20arm%C3%A9e%20camerounaise>.

Par ailleurs, le chef de l'État a mis sur pied un organisme : la Commission nationale pour la promotion du bilinguisme et du multiculturalisme (CNPBM) dans l'optique de maintenir la paix, de consolider l'unité nationale du pays et de renforcer la volonté et la pratique quotidienne du vivre ensemble de ses populations.

- Le discours diplomatique

En dehors des instruments précités, le gouvernement camerounais a eu recours au discours diplomatique pour expliquer son action humanitaire dans la gestion de la crise sécessionniste dans les régions du Nord-ouest et Sud-ouest. En effet, il faut noter que le contexte de mondialisation fait qu'aucun État ne saurait vivre en autarcie, et ses problèmes, manifestement internes, subissent une internationalisation du fait de nombreux réseaux d'acteurs qui se mobilisent suivant leurs intérêts précis. Ainsi, la question humanitaire a pu être exploitée par les réseaux diasporiques¹⁷, les ONGs internationales et des personnalités¹⁸ célèbres pour questionner la capacité d'action du Cameroun et sa disponibilité à apporter des réponses adéquates aux défis humanitaires soulevés par la crise.

La mobilisation des couloirs diplomatiques a donc permis au gouvernement camerounais de compléter sa stratégie militaire par une stratégie verbale et discursive, vouée à influencer les positions et le regard international sur la crise. Cela a été le cas notamment au niveau de l'Union africaine (UA), de la Francophonie (OIF) et des Nations unies. Dans ces différents cercles de haute importance diplomatique pour le Cameroun, le gouvernement a instruit et défini un certain langage diplomatique à porter auprès des partenaires internationaux afin de les rassurer sur les capacités du Cameroun à soutenir et à relever les défis humanitaires nés de la crise sécessionniste dans ces deux régions. On se rappellera opportunément du discours très offensif de l'Ambassadeur représentant du Cameroun auprès des Nations unies, Tommo Monthe, qui, après avoir réitéré l'intransigeance du gouvernement camerounais dans la gestion de la crise en cause, a rappelé que le Cameroun « fait face à la sécession, au terrorisme, à l'insurrection, et il y fera face ! » [15] Cette ligne diplomatique a d'ailleurs été largement suivie par les amis et partenaires du Cameroun, notamment l'Afrique du Sud, le Gabon et la Côte d'Ivoire qui étaient tous membres non permanents du Conseil en 2019 où la question s'est posée à l'ONU¹⁹.

¹⁷ On pourrait mentionner à ce titre la *Brigade anti-sardinards* (BAS), qui est une association de ressortissants camerounais ouvertement opposés au régime en place au Cameroun, et agit dans une dynamique internationale dans les pays les plus importants d'occident (France, États-Unis, Belgique, Canada, Allemagne, Grande Bretagne notamment).

¹⁸ Le Cardinal émérite Christian Tumi par exemple.

¹⁹ « Au Cameroun, une situation humanitaire urgente, souligne l'ONU », Journal *Le Monde*, 14 mai 2019. Disponible sur https://www.lemonde.fr/afrique/article/2019/05/14/au-cameroun-une-situation-humanitaire-urgente-souligne-l-onu_5461851_3212.html.



Image : Cameroon Tribune du 12 octobre 2020 : le gouvernement fustige la désinformation sur le Cameroun

Conclusion

Au terme de notre réflexion, il faut retenir que la crise anglophone est révélatrice d'une transformation pratique et axiologique de la communication politique au Cameroun. Elle a résolument engagé les autorités à « changer » leur logiciel d'action publique, en remettant en avant les volets humanitaires et sociaux de leurs interventions. Cela montre que la question humanitaire au Cameroun intègre un schéma plus global de gestion de l'État, et constitue un paramètre de redéfinition de l'usage de la souveraineté interne. Dans le même temps, le discours humanitaire du Cameroun, en utilisant les supports habituellement dédiés à la propagande gouvernementale et à la campagne politique du chef de l'État, a permis aux gouvernés de « redevenir » la finitude de l'action publique. À travers une stratégie de communication qui a mêlé médias classiques et nouveaux, l'humanitaire a permis de flexibiliser sa centralité communicationnelle pour rejoindre les espaces de communication plus usités du grand public comme les réseaux socio-numériques.

En tout état de cause, nous en arrivons à comprendre que le cas camerounais suscite une réflexion théorique plus sérieuse sur les dynamiques de l'action humanitaire aujourd'hui. Un travail de déconstruction permettrait certainement d'enrichir la réflexion sur les pratiques humanitaires, et de mieux objectiver les notions de l'« humanitaire gouvernemental », la « diplomatie humanitaire » et la « souveraineté humanitaire ». En effet, cette analyse démontre la difficulté à laquelle se heurte le mouvement humanitaire dans des États qui cherchent encore à structurer et solidifier leur souveraineté et leur projection territoriale. Ici, la pratique de la communication s'affiche être un paravent non négligeable dans la relégation programmatique des urgences humanitaires par le gouvernement, avec le risque de « laisser » ce gouvernement pratiquer une « politique humanitaire » qui échappe aux principes fondamentaux de l'action humanitaire.

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The Association Between Uric Acid Levels and GRACE Score in Acute Coronary Syndrome Patients at H. Adam Malik Medan Central General Hospital

Tengku Muhammad Ridho Anhar¹, Refli Hasan¹, Rahmad Isnanta¹

*Division of Cardiology, Department of Internal Medicine, Faculty of Medicine, University of North Sumatra

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ABSTRACT

Background: Acute coronary syndrome (ACS) is a combination of clinical symptoms that indicate acute myocardial ischemia, consisting of unstable angina pectoris (unstable angina pectoris = UAP), ST-Segment Elevation Myocardial Infarction (STEMI), and Non-ST-Segment Elevation Myocardial Infarction (NSTEMI). Various factors are considered to be related to the incidence of ACS, one of the predisposing factors which is still being debated about its effect on ACS, namely uric acid levels. A previous study showed that adding serum uric acid values to the GRACE score may be better at identifying patients in the low-risk group.

Objective: To determine the relationship between uric acid levels and GRACE scores in ACS patients at H. Adam Malik Hospital, Medan.

Methods: This study is a retrospective analytic study. The study population was patients with acute coronary syndrome who were treated at H. Adam Malik Hospital Medan and the research subjects were 65 people who met the inclusion and exclusion criteria. Data analysis was performed using univariate and bivariate analysis. The correlation test was carried out using the Spearman correlation test to see the relationship between uric acid levels and the GRACE score in ACS patients.

Results: There were 65 samples who participated in this study. There was a significant difference ($p = 0.008$) in the mean uric acid levels in subjects with UAP, NSTEMI, and STEMI, while the GRACE score did not show a significant difference between the three ACS diagnoses. For the relationship between uric acid levels and GRACE scores for all subjects, the Spearman correlation test showed that there was a significant correlation between uric acid levels and GRACE scores ($p < 0.001$) with a correlation value (r) of 0,634.

Conclusion: From the results of this study, it can be concluded that there is a significant relationship between serum uric acid levels and the GRACE score and the higher the uric acid level, the higher the GRACE score will be.

Keywords: Acute coronary syndrome, GRACE score, Gout

INTRODUCTION

Cardiovascular disease (CVD) is the most common cause of death worldwide, resulting in more than 17 million deaths each year. This disease shows various manifestations such as coronary heart disease, heart failure, hypertension, stroke, and coronary artery disease (CAD). Coronary artery disease, which can cause acute coronary syndrome (ACS), is responsible for nearly half of the total deaths worldwide due to CVD.¹

Acute coronary syndrome (ACS) is a combination of clinical symptoms that indicate acute myocardial ischemia, consisting of unstable angina pectoris (UAP), ST-Segment Elevation Myocardial Infarction (STEMI), and Non-ST-Segment Elevation Myocardial Infarction (NSTEMI). The typical presentation of chest pain in ACS is a feeling of pressure or heaviness in the retrosternal area (angina) that radiates to the left arm, neck, or jaw, may occur intermittently or persist. These complaints can also be accompanied by diaphoresis, nausea, abdominal pain, dyspnoea and fainting (Lefrandt et al., 2016). UAP is defined by the presence of ischemic symptoms without elevated biomarkers and typically transient, also may be accompanied by ECG changes. The term myocardial infarction

(MI) is used when there is evidence of myocardial necrosis in acute myocardial ischemia. STEMI is distinguished from NSTEMI by the ECG, which is characterized by persistent ST-segment elevation.^{2,3}

Various factors are related to the incidence of ACS, one of the predisposing factors which is still being debated about its effect on ACS, is patient's uric acid levels. According to a study by it was found that about 33.3% of patients with ACS also had hyperuricemia. High uric acid levels are also associated with metabolic syndrome and the risk of cardiovascular disease. Hyperuricemia is found in about 39% of all deaths from cardiovascular disease. Uric acid serum is produced by the enzymatic activity of xanthine oxidase and is the main end

product of purine metabolism, most of which comes from food, biosynthesis, and breakdown of nucleic acids. Uric acid serum levels reflect the degree of xanthine oxidase activation. During uric acid production, oxygen free radicals are generated and therefore uric acid is a simple and useful clinical indicator of excessive oxidative stress. In humans, one of the tissues with the highest xanthine oxidase activity is the capillary endothelium and small arterial endothelium, important sources of oxygen free radical production in the endothelium. One of the main factors responsible for impaired regulation of vascular tone is increased oxidative stress. Nitric oxide synthesis is impaired, and its degradation is accelerated by excessive free radical activity leading to endothelial dysfunction. Thus, increased levels of uric acid can lead to the formation of oxygen free radicals and indirectly can cause endothelial dysfunction.⁴

High serum uric acid levels also promotes LDL-C oxidation and lipid peroxidation. It also increases the formation of oxygen radicals in inflammatory reactions. In addition, high levels of serum uric acid also increase platelet aggregation and formation of uric acid crystals. The deposition of uric acid in the arterial walls can damage the tunica intima of arteries, promoting coronary thrombosis. Based on the above description, we can conclude that uric acid serum level can be used as a variable for cardiovascular disease risk stratification and risk stratification system for patients with MI. One such scoring system is the Global Registry of Acute Coronary Events (GRACE) risk score.⁵

A study showed that adding serum uric acid values to the GRACE score may be better at identifying patients in the low-risk group. In patients with the entire spectrum of ACS, elevated uric acid scores were an independent factor associated with all other causes of death at short-term patient follow-up and adding uric acid values had a predictive value above the GRACE risk score where for each increase in uric acid 1 mg/dL, the risk of 1-year mortality increased by 26%. There are two categories of GRACE scores, GRACE scores less than or equal to one hundred (≤ 100) and GRACE scores greater than one hundred (>100). The GRACE score was associated with prediction of early and late death in ACS patients. Therefore, this study aims to explain the relationship between uric acid levels and GRACE scores in ACS patients. Thus, it is expected to be one of the considerations in determining the prognosis in ACS patients.⁴

ACUTE CORONARY SYNDROME

Definition

Acute coronary syndrome is a group of clinical symptoms caused by acute myocardial ischemia and includes Unstable

Angina Pectoris (UAP), Non-ST-Segment Elevation Myocard Infarction (NSTEMI), and ST-Segment Elevation Myocard Infarction (STEMI). UAP is defined as angina pectoris or ischemic-type chest discomfort that (1) occurs at rest and lasts more than 20 minutes; (2) the pain is severe and usually clear; (3) the pain is getting heavier or more frequent than before. STEAM and NSTEMI are basically almost the same based on the pathophysiology and clinical symptoms but differ in severity. In NSTEMI there has been necrosis or myocardial damage, whereas in UAP there has been no myocardial damage. STEMI is a clinical syndrome characterized by electrocardiography (ECG) in the form of persistent ST elevation and the release of biomarkers of myocardial necrosis. STEMI and NSTEMI differ in terms of the ECG appearance and are both accompanied by the release of biomarkers of myocardial necrosis.⁶

Epidemiology

Acute coronary syndrome is the cause of 7.7 deaths worldwide each year. There are 1.1 million hospital patients in America who are diagnosed with acute coronary syndrome and 74% of them have acute myocardial infarction. The incidence of acute coronary syndrome almost always persists every year, although currently the management of risk factors for acute coronary syndrome has been improved drastically. ACS is currently the leading cause of death in the Asia Pacific region.⁷

Based on the study of the Global Registry of Acute Coronary Events (GRACE) in a patient population in the United States, it was found that 38% of patients diagnosed with ACS had STEMI. Based on data from Jakarta Acute Coronary Syndrome (JAC) in 2008–2009 there were 2013 people diagnosed with acute coronary syndrome, and 654 of them experienced STEMI.⁸

Risk Factors

Risk factors for ACS include modifiable and non-modifiable risk factors. Modifiable risk factors are hypertension, cholesterol, smoking, obesity, diabetes mellitus, hyperuricemia, lifestyle, lack of physical activity, and stress levels. While the non-modifiable risk factors are age, gender, and family history of disease.⁹

Patophysiology

The myocardial ischemia and angina symptoms occur due to an imbalance between oxygen supply and myocardial oxygen demand. Normally for every oxygen demand, myocardial cells can control the amount of oxygen supply to prevent hypoperfusion and myocardial ischemia. Adequate oxygen supply is determined by coronary blood flow, amount of oxygen, lung function, and hemoglobin count. Coronary blood flow is controlled by the ability of the coronary blood vessel walls to dilate and constrict in accordance with the demand for oxygen by myocardial cells. One of the causes of disruption of the ability to dilate and constrict coronary blood vessels is atherosclerotic plaque.¹⁰

The process of atherosclerosis is a process that underlies the occurrence of ACS. It is a multifactorial process with interrelated mechanisms (Figure 1). Atherosclerosis is initially characterized by early abnormalities in the endothelial layer, formation of foam cells and fatty streaks, formation of fibrous plaque (connective tissue lesions) and unstable atherosclerotic plaque rupture process. Atherosclerosis is a chronic inflammatory process. Inflammation plays an important role in every stage of atherosclerosis, from the early development of plaque-to-plaque rupture which can lead to thrombosis. Endothelial dysfunction is caused by traditional risk factors such as dyslipidemia, hypertension, diabetes mellitus, obesity, smoking and other risk factors such as homocysteine and hemostatic disorders.¹¹

Diagnosis

ACS patient main complaints is discomfort in the chest that is difficult to locate, dull, and usually radiates to the left arm, jaw, or neck. This pain lasts >20 minutes, does not go away with rest or nitroglycerin. If the patient has previously experienced complaints of chest pain or stable angina, the patient will feel the chest pain more severe than before. The pain also which radiates to the two upper extremities or to the right arm was more specific for ACS than pain radiating to the left arm alone with a specificity rate of 96%. The presence of risk factors for ACS from the patient's previous history, such as hypertension, diabetes mellitus, hyperlipidemia, and smoking habits can also help direct the diagnosis of ACS. From several studies, it was also found that 12% of patients with ACS diagnosis did not have ACS risk factors. On physical examination, we will find ACS patients will have cold sweats, wet and cold acral, S3 or S4 heart sounds, systolic murmurs at the apex, wet crackles due to pulmonary edema, and if the patient have severe condition, cardiogenic shock will occur.¹²

The first examination that can be done on a suspect of ACS is an ECG. In UAP and NSTEMI there will be ST segment depression and T wave inversion. T wave inversion is considered significant if the T wave first appears and has an amplitude > 0.2 mV. It is advisable to repeat the ECG every 20 – 30 minutes until the angina symptoms disappear or the ACS diagnosis can be established or ruled out. This is because ischemia can occur in the myocardium that is not detected by a 12-lead ECG. We can also do an ECG examination with the addition of leads V7–V9 to see ischemia in the posterior or V3R-V4R to see ischemia in the right ventricle. In STEMI, an ST segment elevation of 0.2 mV will be found in male patients aged ≥40 years and an ST segment elevation of 0.25 mV in male patients aged <40 years. Meanwhile,

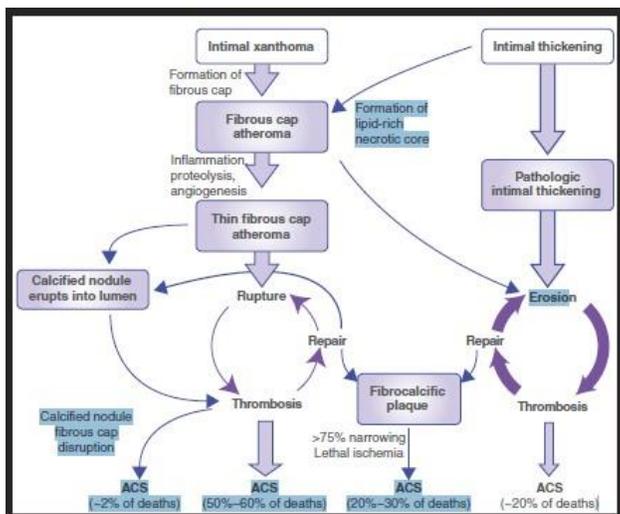


Figure 1. Atherosclerosis formation mechanism

female patients are diagnosed with STEMI if the ST segment elevation is 0.15 mV in leads V2 – V3 and the ST segment elevation is 0.1 Mv in the other leads.¹³

Biomarker examination as a marker of myocardial necrosis can be done by checking troponin and creatinine kinase-MB (CK-MB) levels. Cardiac troponin is a biomarker that is recommended because of its higher sensitivity and specificity compared to CK-MB. The prevalence rate of myocardial infarction increases from 30% to 80% when troponin testing is performed to establish the diagnosis of myocardial infarction. Troponins are detectable in serum 4-10 hours after the onset of angina. Troponin will reach peak levels 12-48 hours after onset and then remain in the serum for 4-10 days. Sensitivity for detecting troponin in serum is almost 100% if serum samples are taken 6-12 hours after onset. Therefore, the troponin test should be repeated 6-12 hours after the first examination to establish the diagnosis of acute myocardial infarction.¹⁴

Echocardiography can also be performed to assess the presence of left ventricular systolic and diastolic dysfunction, left atrial dilatation, mitral valve regurgitation and TAPSE (Tricuspid Annular Plane Systolic Excursion). If this condition is found, it is usually associated with a poor prognosis. CT angiography with contrast can be performed in patients with suspected ACS to (1) help establish the diagnosis or rule out the presence of epicardial coronary artery occlusion, (2) identify which arteries are atherosclerotic blocked, (3) assist in the assessment of risk stratification and prognosis of ACS patients.¹⁴

Risk Stratification

After the diagnosis of ACS is established, each ACS patient must be assessed for risk. Several risk stratification systems have been developed that assess several parameters during the acute phase. The Global Registry of Acute Coronary Events (GRACE) Score is recommended for risk assessment of ACS patients. The goal of risk stratification is to determine the next treatment strategy (conservative or immediate intervention) for a person with NSTEMI.¹⁵

GRACE classification consists of several variables, such age, Killip class, systolic blood pressure, ST segment deviation, cardiac arrest on arrival at the emergency room, serum creatinine, positive heart markers and heart rate (Figure 2). This classification is intended to predict mortality during hospitalization and within 6 months after discharge. For the prediction of in-hospital mortality, patients with a GRACE risk score 108 were considered to have low risk, and score of >140 had medium (1-3%) and high (>3%) mortality risk. For prediction of mortality within 6 months after discharge from hospital, In the hospital, patients with a GRACE risk score 88 were considered to have low risk and score of >118 have medium (3-8%) and high (>8%) mortality risk. Risk stratification based on the Killip class is a risk classification based on clinical indicators of heart failure as a complication of acute myocardial infarction and is intended to estimate the mortality rate within 30 days (Figure 3).¹⁵

Prediktor	Skor
Usia dalam tahun	
<40	0
40-49	18
50-59	36
60-69	55
70-79	73
80	91
Laju denyut jantung (kali per menit)	
<70	0
70-89	7
90-109	13
110-149	23
150-199	36
>200	46
Tekanan darah sistolik (mmHg)	
<80	63
80-99	58
100-119	47
120-139	37
140-159	26
160-199	11
>200	0
Kreatinin (µmol/L)	
0-34	2
35-70	5
71-105	8
106-140	11
141-176	14
177-353	23
≥354	31
Gagal jantung berdasarkan klasifikasi Killip	
I	0
II	21
III	43
IV	64
Henti jantung saat tiba di RS	43
Peningkatan marka jantung	15
Deviasi segmen ST	30

Figure 2. GRACE Score

Kelas Killip	Temuan Klinis	Mortalitas
I	Tidak terdapat gagal jantung (tidak terdapat ronkhi maupun S3)	6%
II	Terdapat gagal jantung ditandai dengan S3 dan ronkhi basah pada setengah lapangan paru	17%
III	Terdapat edema paru ditandai oleh ronkhi basah di seluruh lapangan paru	38%
IV	Terdapat syok kardiogenik ditandai oleh tekanan darah sistolik <90 mmHg dan tanda hipoperfusi jaringan	81%

Figure 3. Killip Score

HYPERURICEMIA

Definition

Hyperuricemia is a condition in which there is an increase in blood uric acid (UA) levels above normal. Hyperuricemia can occur due to increased metabolism of UA (overproduction), decreased urinary UA output (underexcretion), or a combination of both. There are many limits for diagnosing hyperuricemia, in general, AU levels above 2SD of laboratory results in the normal population are said to be hyperuricemia. The pragmatic limit that is often used for hyperuricemia is a condition where there is an increase in UA levels which can reflect pathological abnormalities. From the data, it was found that only 5-10% of normal men had UA levels above 7 mg% and a few of gout had

UA levels below these levels. So UA levels above 7 mg% in men and 6 mg% in women are used as limits for hyperuricemia.¹⁶

Epidemiology

Globally, the prevalence of gout has doubled between 1990-2010. In adults in the United States, gout is on the rise and affects 8.3 million (4%) Americans. Meanwhile, the prevalence of hyperuricemia is also increasing and affects 43.3 million (21%) adults in the United States.¹⁶

According to the Riset Kesehatan Dasar (RISKESDAS) in 2013, the prevalence of joint disease in Indonesia based on the diagnosis of medical professional is 11.9% and based on the area, the highest was in Bali (19.3%), followed by Aceh (18.3%), West Java (17.5%) and Papua (15.4%).¹⁷

Uric Acid Biosynthesis

Abnormalities in the enzyme system that regulates purine metabolism can lead to overproduction of uric acid. Increased activity of Phosphoribosyl Pyrophosphate Synthase (PRPP) causes an increase in the concentration of PRPP, an enzyme that determines purine synthesis and causes uric acid production. Hypoxanthine-Guanine Phosphoribosyl Transferase (HGPRT) deficiency can also cause uric acid overproduction. HGPRT is responsible for the conversion of guanine to guanylic acid and hypoxanthine to inosinic acid. These two changes require PRPP as a co-substrate and are important utilization reactions involved in nucleic acid synthesis. Deficiency of the HGPRT enzyme results in increased metabolism of guanine and hypoxanthine to uric acid and more PRPP interacting with glutamine in the early stages of the purine pathway. Decreased excretion of uric acid through the urine to be lower than the rate of production causes hyperuricemia and increased sodium urate level.¹⁸

Free urate crystals can activate several proinflammatory mediators, including Tumor Necrosis Factor α (TNF- α), Interleukin 1 (IL-1), and Interleukin 8 (IL-8). Activation of this mediator signals the chemotactic movement of neutrophils into the joint space, engulfing Monosodium Urate (MSU) crystals by phagocytosis. Neutrophils will lyse and release proteolytic enzymes that trigger acute gout attacks such as pain and swelling. This inflammatory mechanism in gout, especially in untreated disease, can lead to cartilage and joint damage.¹⁸

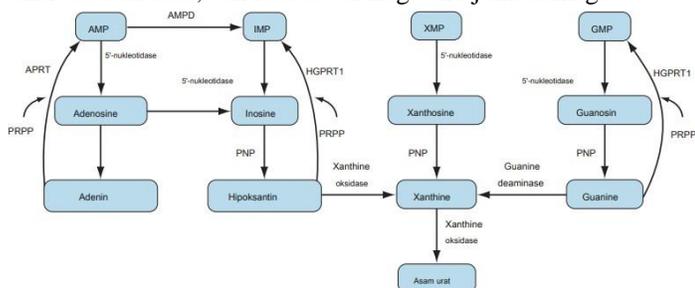


Figure 3. Uric acid biosynthesis

Inflammation and ACS

Research over the last few decades has shown that inflammation is a key factor in the development of CAD and other manifestations of atherosclerosis. Various factors play a

role in the pathogenesis of atherosclerosis including endothelial dysfunction, dyslipidemia, inflammatory and immunologic factors, plaque rupture, and smoking. In the process of atherosclerosis, there are key factors involved in the development of endothelial dysfunction, namely oxidation of Low-Density Lipoprotein (ox-LDL) and activation of various cell types and chemoattractant agents. Immune cells predominate in early atherosclerotic lesions, their effector molecules can accelerate the progression of atherosclerotic lesions, and inflammatory activation can lead to ACS.¹¹

Hyperuricemia and Endothelial Dysfunction

Vascular endothelium has a function as a biological barrier to the flow of blood cells and various solutions derived from Vascular Smooth Muscle Cells (VSMC). The endothelium regulates vascular muscle tone and permeability and maintains a balance between coagulation and fibrinolysis. The endothelium is also known to regulate the release of various vascular mediators such as Nitric Oxide (NO), Von Willebrand Factor, Endothelin-1 (ET-1), Angiotensin II (Ang-II), Adhesion Molecules and Cytokines. Nitric oxide is the main mediator produced by the endothelium which is formed from larginine with the help of the Endothelial Nitric Oxide Synthase (eNOS) enzyme. Nitric oxide has vasodilator, anti-platelet, anti-proliferative, anti-atherogenic, anti-inflammatory properties, and also can reduce vascular permeability.¹⁹

Vascular Endothelial Dysfunction (VED) is a chronic pathological condition in which NO formation and bioavailability are reduced and lead to reduced expression and activation of eNOS. Endothelial dysfunction caused by the production of Reactive Oxygen Species (ROS) and uncoupled eNOS causes a decrease in NO production. Oxidative stress plays an important role in the pathogenesis of VED. Furthermore, there is an increase in the expression of P-selectin, Vascular Cell Adhesion Molecule-1 (VCAM-1), and Monocyte Chemotactic Protein-1 (MCP-1) which results in the attachment of circulating monocytes and lymphocytes, and induces cell death apoptosis, which then together with macrophages and platelets, initiates smooth muscle cell migration and proliferation.²⁰

Vascular endothelial dysfunction increases Asymmetric Dimethyl Arginine (ADMA), an endogenous inhibitor of eNOS that decreases NO formation and bioavailability. ADMA can be inactivated by Dimethyl Arginine Dimethylaminohydrolase (DDAH). Decreased DDAH activity leads to accumulation of ADMA, which may be the key to VED, which can inhibit eNOS and trigger the release of proatherogenic mediators. Increased uric acid increases proinflammatory mediators in VSMC. Hyperuricemia can also cause oxygenation of LDL and trigger the formation of lipid peroxidation, which can cause intimal thickening which eventually triggers the formation of atherosclerosis. Several studies have shown a significant role of hyperuricemia in the occurrence of VED which will lead to the formation of atherosclerotic plaques and ultimately lead to AMI compared to individuals with normal uric acid levels.²¹

Inflammation and MI

The relationship between increased uric acid levels with atherosclerosis is endothelial dysfunction and the inflammatory

process. Hyperuricemia causes the formation of platelet

aggregation in blood vessels, which ultimately triggers cardiovascular disease. The value of triglycerides, apolipoprotein B and apolipoprotein E increases and the value of High-Density Lipoprotein (HDL) decreases in hyperuricemia causing atherosclerosis. In fact, hyperuricemia provides the formation of free radicals, which stimulate lipid peroxidation thereby increasing intima thickness. Furthermore, oxidized LDL influences the inhibition of transcription and expression of eNOS. ROS induce lipid peroxidation which can disrupt the structure and viscosity of biological membranes, thereby affecting vascular function.²²

Hyperuricemia induces arteriopathy in the preglomerular vessels, which impairs the autoregulatory response of the afferent arteriole, causing glomerular hypertension. Hyperuricemia increases plasma renin values and causes the formation of Angiotensin II, subsequent activation of macrophages and increased production of cytokines resulting in inflammation and increased ROS and lipid peroxidase, which trigger atherosclerosis.²³

Acceleration of the atherosclerotic process, with increased oxidative stress and underlying ROS, coupled with uncoupled endothelial eNOS and decreased production of naturally occurring local antioxidants lead to the formation of brittle plaques, acidic vascular intima, loss of local antioxidant effects, and endothelial dysfunction occurs. This shows that the increase in uric acid that occurs is an antioxidant response to oxidative stress in patients with traditional risk factors and CAD. Activation of Xanthine Oxidase (XO) will further increase oxidative stress, and with a reduced capacity of serum uric acid as an antioxidant, oxidative stress leads to vascular injury.²³

The Multiple Risk Factors Intervention Trial (MRFIT) study found that hyperuricemia is an independent risk factor for acute myocardial infarction (AMI). The Apolipoprotein Mortality Risk Study (AMORIS) found that an increase in serum uric acid levels was associated with an increased incidence of AMI in adult patients without a previous history of cardiovascular disease. Other studies, in a systematic review and meta-analysis, have shown that hyperuricemia can marginally increase the incidence of CHD and is independent of other traditional risk factors.²⁴

Uric acid can also be used to identify patients in the ACS group. A study showed that adding serum uric acid values to the GRACE risk score may be better at identifying patients in the low-risk group. In patients with the entire spectrum of ACS, elevated uric acid scores were an independent factor associated with all other causes of death at short-term patient follow-up and adding uric acid values had a predictive value above the GRACE risk score where for each increase in uric acid 1 mg/dL, 1-year mortality risk increased by 26%.²⁵

MATERIAL AND METHODS

The research design used in this research is descriptive retrospective where data collection is done through medical records. The study was conducted at the Cardiology Division of the Department of Internal Medicine at H. Adam Malik Hospital Medan from November 2020 to March 2021. The target population of the study was patients with acute coronary syndrome, while the reachable population were patients with

No	31 (47,7)
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Hospital, Medan. The subjects of this study were taken from the population of patients with acute coronary syndrome who met the inclusion and exclusion criteria, and in writing were willing to participate in this study by signing an informed consent form.

Research subjects with acute coronary syndrome and met the inclusion and exclusion criteria, were given informed consent and filled out a letter of consent to participate in the study. The research subjects then took a history of disease history and risk factors for CAD such as hypertension, diabetes mellitus, dyslipidemia, smoking history and family history of CAD. Then carried out laboratory examinations such as complete blood count, liver function test, kidney function test, lipid profile, blood glucose level, Troponin T, CK-MB, and uric acid level. Each patient was then calculated with a GRACE score based on the results of the physical examination, ECG, and pre-existing supporting laboratory tests. Furthermore, uric acid levels are associated with the GRACE score.

All basic data such as age, sex, risk factors, routine blood, kidney function, uric acid, Troponin T, GRACE score, were tabulated and described. In this study, univariate analysis was carried out to obtain the distribution of the basic characteristics of the research subjects on the independent and dependent variables. Bivariate analysis was conducted to see the relationship between the independent and dependent variables. To see the relationship between uric acid levels and GRACE scores in ACS patients, the Spearman correlation test was used. Data analysis using SPSS with $p < 0.05$ was considered statistically significant.

RESULT

This study was done on 65 people with acute coronary syndrome (ACS) who were treated at H. Adam Malik Hospital Medan who had met the inclusion criteria. 43 (66.2%) subjects are male, with a mean age of 53.74 years and 22 (33.8%) subjects are female with a mean age of 50.14 years. Subjects who have a smoking habit are 37 people (56.9%). Subjects with a family history of heart diseases are 29 people (44.6%). Hypertension occurred in 34 subjects (52.3%). Subjects with a history of Diabetes Mellitus are 34 people (52.3%). Hyperlipidemia was present in 36 people (55.4%). From the results of cardiac examination, it was found that 29 people (44.6%) had STEMI, 26 people (40%) had NSTEMI and 10 people (15.4%) had UAP.

Subject Characteristics	N = 65 (%)
Gender, n (%)	
Male	43 (66,2)
Female	22 (33,8)
Age (years)	52,52 (12,96)
Smoker, n (%)	
Yes	37 (56,9)
No	28 (43,1)
Family History of ACS, n (%)	
Yes	29 (44,6)
No	36 (55,4)
Hypertension, n (%)	
Yes	34 (52,3)
No	31 (47,7)
Diabetes Mellitus, n (%)	
Yes	34 (52,3)

Hyperlipidemia, n (%)	
Yes	36 (55,4)
No	29 (44,6)
ACS Diagnosis, n (%)	
UAP	10 (15,4)
NSTEMI	26 (40)
STEMI	29 (44,6)
Killip	
I	20 (30,8)
II	42 (64,6)
III	2 (4,6)
Cardiac Arrest	
Yes	
No	10 (15,4)
ST Segment Deviation	
Yes	55 (84,6)
No	57 (87,7)
GRACE score (Median, Min-Max)	
	8 (12,3)
	101 (55-163)

Table 1. Subject characteristics

Table 2 shows the results of blood tests of the subjects which includes complete blood counts, cardiac enzymes, lipid profiles, ad random blood glucose level, and kidney function of 65 research subjects.

Laboratory Findings	
Complete Blood Count	
Haemoglobin (gr/dl)	13,90 ± 1,51
Leukocyte (/µl)	8932 (4209-15000)
Thrombocyte (µl)	298 (103-424)
Carbohydrate Metabolism	
Ad random blood glucose level (mg/dl)	175 (80-361)
Renal Function	
Ureum (mg/dl)	41,80 (13 – 184,9)
Ureum (mg/dl)	0,7258 ± 0,13102
Creatinine (mg/dl)	
Lipid Profile	
Total Cholesterol (mg/dl)	209 (111 - 284)
LDL (mg/dl)	140 (44 – 220)
LDL (mg/dl)	41 (20 – 70)
HDL (mg/dl)	151,63 ± 44,751
Triglyceride (mg/dl)	
Cardiac Enzyme	
Troponin I (ng/ml)	4,50 (0,02 – 27,50)
CKMB (U/L)	56 (15 – 531)

Table 2. Subject laboratory findings

Table 3 shows the mean and median of all laboratory characteristics based on the diagnosis of ACS. There were significant differences in mean creatinine levels in subjects with UAP, NSTEMI, and STEMI. The same thing was also found in

hemoglobin and triglyceride levels, there were significant differences in the mean levels of troponin I and CKMB in subjects with STE, NSTEMI, and STEMI.

Laboratory Findings	UAP	NSTEMI	STEMI	P
Complete Blood Count				
Haemoglobin (gr/dL)	13,89 ± 1,26	14,31 ± 1,48	13,55 ± 1,58	0,200^
Leukocyte (/µl)	9476 (4674-12776)	8469 (5821-15000)	9340 (4209-11303)	0,022*
Thrombocyte (/µl)	311 (103-424)	264 (165-411)	266 (145-421)	0,006*
Carbohydrate Metabolism				
Ad random blood glucose level (mg/dL)	180 (87-298)	178 (80-361)	169 (89-283)	0,008*
Renal Function				
Ureum (mg/dL)	34,75 (20,5-184,9)	33,50 (13-172,5)	38,40 (13-112,6)	0,010*
Creatinine (mg/dL)	0,6870 ± 0,13022	0,7223 ± 0,10305	0,7424 ± 0,15320	0,200^
Lipid Profile				
Total Cholesterol (mg/dL)	173,50 (124-272)	170 (111-265)	235 (142-284)	0,006*
LDL (mg/dL)	85,50 (44-205)	85,50 (54-201)	165 (49-220)	0,001*
HDL (mg/dL)	50,50 (33-70)	55 (22-70)	35 (20-70)	0,018*
Triglyceride (mg/dL)	151 ± 52,60	126,04 ± 39,36	174,79 ± 33,76	0,200^
Cardiac Enzyme				
Troponin I (ng/mL)	1,77 (0,02-7,40)	6,26 (0,02-19,32)	0,04 (0,02-27,50)	0,000*

CKMB (U/L)	43 (19-79)	59,50 (15-531)	61 (16-125)	0,000*
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Table 3. Subject laboratory findings based on ACS diagnosis

The median uric acid level was 6.1 mg/dL with the lowest level of 2.7 mg/dL and the highest level of 17.1 mg/dL. The results of the GRACE score assessment showed an average of 100.43 (SD = 28.973).

Table 4 shows the characteristics of uric acid and the GRACE score based on the diagnosis of ACS. There was a significant difference in the mean uric acid levels in subjects with UAP, NSTEMI, and STEMI, while the GRACE score did not show a significant difference between the three ACS diagnoses. Based on the ROC curve plot, the cutoff value for the GRACE score is 118.5 with a sensitivity (80%) and specificity (97%).

	UAP	NSTEMI	STEMI	P
Uric Acid (mg/dL)	6 (3,9 – 9,8)	5,9 (2,7 – 17,1)	6,2 (3,8 – 12,6)	0,008
GRACE score	98,90 ± 24,32	97,08 ± 30,48	103,97 ± 29,57	0,200

Table 4. Subject uric acid level based on ACS diagnosis

Table 5 shows the correlation of uric acid and GRACE scores in all subjects, then stratified by gender and type of diagnosis of ACS.

		N	GRACE Score	
			r	P
Uric Acid	Whole subject	65	0,634	<0,001
	Male	43	0,606	<0,001
	Female	22	0,750	<0,001
	UAP	10	0,733	0,002
	NSTEMI	26	0,603	<0,001
	STEMI	29	0,712	<0,001

Table 5. Spearman correlation of uric acid level and Grace score

The correlation analysis for all subjects using the Spearman Correlation test showed that there was a significant correlation between uric acid levels and the GRACE score ($p < 0.001$) with a correlation value (r) of 0.634. The correlation value shows that there is a strong and positive correlation between uric acid levels and the GRACE score.

The correlation analysis for male subjects, totaling 43 subjects, also showed that there was a significant correlation between uric acid levels and the GRACE score ($p < 0.001$) with a correlation value (r) of 0.606 while for female subjects in total of 22 subjects. also showed a significant correlation between uric acid levels and the GRACE score ($p < 0.001$) with a correlation value (r) of 0.750. The two correlation values indicate that there is a strong and positive correlation between uric acid levels and GRACE scores in male and female subjects.

A significant correlation was found between uric acid levels and the GRACE score in 22 female subjects ($p = <0.001$) and 43 male subjects ($p = <0.001$), with 26 NSTEMI diagnoses ($p = <0.001$), 29 people diagnosed with STEMI ($p = <0.001$) and 10 people diagnosed with UAP ($p = 0.002$). The correlation analysis for subjects with STEMI, NSTEMI and UAP showed a significant correlation between uric acid levels and the GRACE score with a correlation value (r) of 0.712, 0.603 and 0.733,

respectively. The correlation value shows that there is a strong and positive correlation between uric acid levels and GRACE scores in all ACS diagnoses.

Therefore it can be concluded that the higher the uric acid level, the higher the GRACE score will be.

DISCUSSION

Acute coronary syndrome (ACS) describes a wide range of myocardial ischemia characterized by the presence of atherosclerotic plaques and their rupture. Atherosclerosis is a multifactorial process with interrelated mechanisms. Hyperuricemia often occurs in patients with symptomatic heart failure, acute coronary syndromes, hypertensive arterial disease, and atrial fibrillation. It has been suggested that serum uric acid plays an important role in the pathogenesis of cardiovascular disease affecting the xanthine oxidase pathway that contributes to the production of reactive oxygen species with cell membrane damage. Several previous studies have found that there is a large amount of uric acid in atherosclerotic plaques, which can increase platelet adhesion and promote thrombus formation, thereby affecting patient prognosis and increasing all-cause mortality.²

In this study, it was found that most of the subjects with ACS were male, 43 people (66.2%), with an average age of 53.74 years. One of the factors such as smoking can be the reason for ACS in men. It is said that the male sex is more susceptible to the process of atherosclerosis, presumably due to the role of the hormone estrogen which can prevent the formation of atherosclerotic plaques. Estrogen also plays a role in the stabilization of atherosclerotic plaques, so that atherosclerotic plaques in women are less prone to rupture than men. It is also said that atherosclerotic plaques in women experience erosion more often than rupture, so that the clinical symptoms of ACS are felt more slowly.²⁶

Based on the risk factors for ACS, this study found 37 (56.9%) subjects is a smoker, 34 (52.3%) subjects with a history of Diabetes Mellitus, 34 (52.3%) subjects with a history of hypertension, 36 (55, 4%) subjects with a history of hyperlipidemia, and 29 (44.6%) subjects with a family history of ACS. Smoking, hypertension, DM, history of hyperlipidemia, and family history of ACS are risk factors for ACS.²⁷

In this study, there were 29 (44.6%) subjects with STEMI, 26 (40%) subjects with NSTEMI and 10 (15.4%) subjects with UAP. The ACCESS research group reported that 46% of ACS that occurred in developing countries were STEMI and 54% were NSTEMI/UAP.²⁸

Based on laboratory results, the median of Troponin I was 4.5 ng/mL and the median of CKMB was 56 U/L. In this study, the average cholesterol level was 202.31 mg/dl, the mean LDL level was 126.97 mg/dl, the median HDL level was 41 mg/dl, and the median triglyceride level was 145 mg/dl. Another study also reported the results of lipid profiles in ACS patients, where the mean total cholesterol results were 4.96 mmol/l, LDL 3.18 mmol/l, and triglycerides 1.3 mmol/l while the mean HDL was 1.16 mmol/l.²⁹

From this study, the mean GRACE score was 100.43 and the mean uric acid level was 6.59 mg/dL. Another study reported results that were not much different from this study, where the mean GRACE score was 133. Another study also reported the

mean uric acid level was 5.7 mg/dL and in a cohort study
found

that uric acid was an independent predictor of all other causes of death at short-term patient follow-up and that adding uric acid values had a predictive value above the GRACE risk score where for every 1 mg/dL increase in uric acid, the 1-year mortality risk increased 26%.³⁰

Based on the correlation analysis, there was a significant correlation between uric acid levels and the GRACE score ($p < 0.001$) with the correlation value ($r = 0.634$) indicating that there was a strong and positive correlation between uric acid levels and the GRACE score. This indicates that the higher the uric acid level, the higher the GRACE score will be. These results are in accordance with previous studies which showed a correlation between uric acid and the GRACE score with a correlation value (r) of 0.6054 which indicated an excess of oxidative stress production, assessed based on the increase in uric acid levels which would be more severe in patients with high GRACE scores.⁴

CONCLUSION

From the results of this study the following conclusions can be drawn:

1. There is a significant relationship between uric acid levels and the GRACE score.
2. The higher the uric acid level, the higher the GRACE score will be.

Further research is needed with a prospective study design on uric acid levels and GRACE scores to assess the prognosis of ACS patients and recurrent cardiovascular events after percutaneous coronary intervention.

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Death by Sharp Object Trauma to Neck (Forensic Pathology Case Report)

Zulfia Retnanti Marissa, Mistar Ritonga, Reza Priatna

Department of Forensic and Medicolegal
Faculty of Medicine University of North Sumatera

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Abstract- Traumatology is the study of anything that is related to trauma to the tissue in living person. Mechanical trauma can be caused by sharp object trauma, blunt object trauma, and gun shot. The type of the weapon or tools used and how it is used will affect the type of wound formed. The type of wound caused by sharp object trauma can be categorized into incised wound, stab wound and chop wound. Most of the death victim were due to a blunt trauma in an accident, while in criminal cases sharp object was more often used in murdering the victims. In this case report, the victim was a 16-year-old male murdered by an unknown person. There was an incised wound in the neck, chest, and abdomen, lower right arm and right thigh and chop wound in the neck. Right carotid artery was severed along with broken trachea in the thyroid cartilage. The cause of death was chop wound that severed right carotid artery and trachea which was a sharp object trauma which causes massive bleeding. The estimated time of death was 12-24 hours. The motif of death was thought to be a murder. The culprit can be charged with Indonesia' KUHP chapter 338 and 389 about murder.

Index Terms- Sharp object trauma, Carotid Artery, Murder.

I. INTRODUCTION

The percentage of murder using sharp object in the world was 24%. Murder cases in Europe were most often using sharp object compared to firearms in United States. In a study in Dallas, United States, it was found that from 630 cases of death by sharp object, 90% were a murder case, 7.5% were suicide, and 3.5% were accidents. In German, from 376 cases of death by sharp object, it was found that 80% of the cases were murder cases, 17% were suicide, and 3% were accidents. In the southeast Asia, sharp object trauma was the highest mechanism found in murder cases which was 38% followed by 26% by gun shot, and 36% by other mechanism. In 20123, the prevalence of an injury in West Sumatera was 6.8% and the most common cause of injury were motorcycle (49.5%), fall (33.2%), other land transportation (5.4%), sharp or blunt object trauma (7.4%) and the least was fall (3.0%)

At the present, there were so many cases of injury that happened around us, especially trauma from sharp object. This was promoted by the worsening of economic condition that raises

criminal cases especially violence using sharp object. These cases cause mild injury and sometimes sever injury. Most of the patients that were administered into the emergency department in many hospitals in Indonesia is patients suffering injury from sharp object trauma, that needs and immediate treatment, which if not may cause tissue damage and even organ damage. Sharp object as a tool of murdering in Jakarta was found in about 30-40% from all of the tools used for murder and on the contrary, was very rare found in suicide (2 cases per year).

II. CASE REPORT

Chronology

A case was reported for a corpse, identified, with initials AP, based on Visum et Repertum document dated to 17th December 2021, with document number: B/283/XII/2021/Reskrim, Investigator was L M, Ranked police commissioer, NRP 67100XXX, which by this explained that in 18th December 2021, at 08.00 West Indonesia Time, in the forensic department of Bhayangkara TK II General Hospital in Medan, post-mortem examination was performed, which was then continued by an internal examination of the corpse.

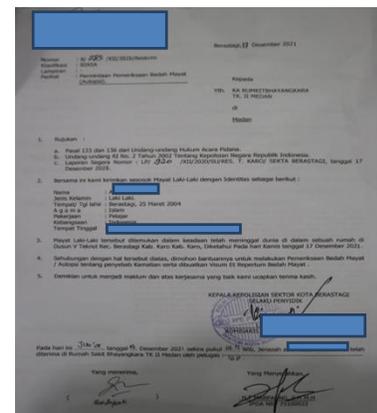


Image 1. Visum et Repertum Document

The victim was found unconscious by his father in his house covered in blood on 17th December 2021 at 14.30 West Indonesia Time. Around the crime scene, a machete was found.

The victim's father immediately took the victim to the hospital. An emergency treatment was performed, but the victim could not be saved. The parent's father reported the incidence to the Police. The victim was administered to general hospital at 06.00 west Indonesia time in the next day for an autopsy.

Examination Result

Covering the corpse there was two red blankets and two cloth, blue and brown each. Signs of death: Livor mortis around the neck, back and thigh, purplish-red discoloration, and fixed even when pressure was applied. Rigor mortis was found in the jaw area, upper extremities, and lower extremities. Decomposition was not found.

Image 2. Livor Mortis of the Victim



The corpse was a male, identified, circumcised, 16-year-old, yellowish skin, moderate nutritional status, hair was black, short, and straight, body length 164 cm, body weight 51 kg, and was an Indonesian citizen. From eye examination, both eyelids were pale.

Nose size was moderate, oval-shaped ear. Mouth opening was 2 centimeters, tongue not sticking out and not bitten. There was blood coming out from nostrils and ear.

Image 3. The Victim's Lips Was Pale



Injury found in the body were:

a. In the front right neck, there was a plaster and gauze stuck to the neck. When

the gauze was opened on the front neck, right at the midline, 10 cm inferior to the chin, there was an open wound with clear wound edge, sharp wound corner, no tissue bridging, wound base was muscle and throat, with the size of wound (when closed) was 11 cm in length and 1 cm in depth. Around the wound, there was 4 open wounds, with sharp corner, no tissue bridging, with the highest length was 5 cm and depth 0.1 cm deep. Distance from heels was 130 cm. There was a bruise around the wound, with red discoloration, 4x1 cm in size.

Image 4. Chop Wound in the Victim's Neck



b. On the chest, right at the midline, 5 cm under the



horizontal line that crossed nipples, there were 7 open wounds with smooth wound edge, sharp wound corner, and no tissue bridging, with the highest length was 5 cm and depth was 0.6 cm. distance from heels was 110 cm.

Image 5. Chop Wound on the Victim's Abdomen



c. On the abdomen, there was a gauze and plaster. After the plaster and gauze was opened, right at the midline, 11 cm under the horizontal line that crossed nipples, there was an open wound with smooth edge, sharp wound corner, no tissue bridging, wound base was muscle, with the size of the wound (when closed) was 9 cm in length and 3 cm deep. Distance from heel was 107 cm. also in the abdomen, right at the midline, 19 cm under the horizontal line that crossed nipples, there was an abrasion 25 cm in length.

d. In the right lower arm, in the front area, 2.5 above the wrist, there was an open wound with smooth edge, sharp wound corner, no tissue bridging, with the highest length was 5 cm and 0.1 cm deep, covering an area of 6 cm x 5 cm.

Image 6. Multiple Cuts in the Right Wrist of the Victim



e. In the upper left arm, 9 cm from the elbow, there was an open wound with smooth edge, sharp corner, no tissue bridging, wound base was skin with the size (when closed)



was 7 cm in length and 3 cm deep.

Image 7. Chop Wound in the Upper Left Arm



- f. In the front side of the right upper limb, 14 cm above the knee, there was an open wound.

Image 8. Incision Wound in Victim's Thigh

Lips tissue looked pale, skin tissue under hand fingernails looked pale, skin tissue under foot fingernails looked pale.

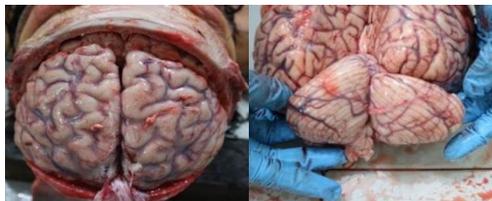
Image 9. Victim's Finger Looked Pale

Examination of Internal Organs

Head:

- a. Inner scalp:
 - No signs of violence
- b. Skull: No signs of violence
- c. Dura mater was intact.
- d. Pia mater was intact.
- e. Cerebrum: Springy on touch, there was a dilatation of blood vessels on the brain's surface, gyrus was flat, sulcus was shallow.
- f. Cerebellum: Springy on touch, on there was a dilatation of blood vessels on the brain's surface, gyrus was flat, sulcus was flat.
- g. Brain stem: Dilatation of blood vessels was observed.
- h. Brain chamber: No signs of bleeding.
- i. The weight of the brain was one thousand three hundred seventy-eight grams.

Image 10. Cerebral Tissue of the Victim



Opening of the chest skin: Width of the chest fat was 0.5 cm. Connective tissues under the skin on the neck. There was a blood absorbance on the skin of the anterior neck with the size of 8 x 5 cm. on the right carotid artery, there was a blood absorbance and a tear. The trachea was cut at the thyroid level.

Image 11. Severed Right Carotid Artery



Heart Examination: The weight of the Heart was 260 grams. The diameter of the tricuspid valve was 11 cm. the width of the muscles on the right ventricle was 0.5 cm. The diameter of the pulmonary valve was 7 cm. The diameter of the bicuspid valve was 9 cm. The width of the left ventricle was 1.5 cm. The diameter of the aortic valve was 5 cm. The vessels were not clotted. Heart looked pale. On the pulmonary examination: right lung looked pale, surface was smooth, springy on touch, three hundred seventy-five grams in weight. On all parts of the posterior lung, there were blood absorbance. Left lung looked pale, surface was smooth, springy on touch, three hundred eight grams in weight. On all parts of the posterior lung, there were blood absorbance

Image 11. Victim's Lungs



Duodenum: There was a yellowish mucus, the mucus layer was shining with greyish and yellow color.

Liver: Brownish red color, edgy corner (right and left), some parts were solid during palpation, and some parts were spongy like a jelly, the ligament was brownish red, the weight was 1502 grams.

Image 12. Macroscopic Examination of the Liver



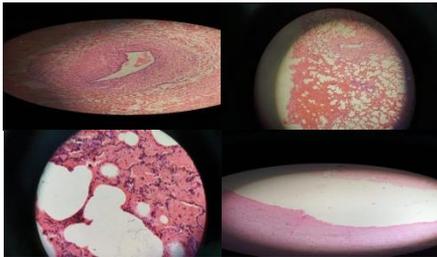
For anatomical pathology examination, heart, right lung, right carotid artery, liver, cerebellum, cerebrum, neck skin and thyroid bone was taken:

- Heart tissue sample from showed a striated muscle fiber with the core morphology within normal range, no necrosis or bleeding was found, there was a fattening.
- Cerebrum tissue sample showed glial cells focus within normal range, no signs of interstitial bleeding.
- Cerebellum tissue sample showed no signs of interstitial bleeding.

- Right carotid artery tissue sample showed the distribution of the PMN and MN cells, interstitial bleeding was observed.
- For the neck skin tissue, from epidermis, dermis and stratified squamous epithelial cell were observed, there were also sebaceous gland, lipid, and hair follicles.
- From the liver tissue, hepatocyte was within normal range, portal vein was also observed.
- From the thyroid bone tissue, there were thyroid glands with a ground glass core along with muscle cells and lipid cells, shown on the cartilage.

With the conclusion of the anatomical pathology examination was that the cause of death was circulatory failure.

Image 13. Microscopic Examination of the Tissues.



III. DISCUSSION

The legal basis for Visum et Repertum was the Indonesia' KUHAP chapter 133, which stated that if the examined was human, who is a victim or a suspected victim of a crime, either alive or dead.

KUHAP Chapter 133.

KUHAP Chapter 133.

1. In a case of an investigator prior to the court, investigating a victim, either wound, poisoning or dead which was a suspected crime, he/she has the right to propose for an expertise from an expert forensic & medicolegal doctor or doctor with another expertise.
2. A proposal for an expertise from an expert, as stated in verse (1) is done in written document, which clearly included the aim either to perform wound examination, dead body examination, or autopsy.
3. Dead body delivered to a doctor with forensic and medicolegal expertise or a doctor in a hospital must be treated well with dignity and must be given a label that includes an identity, stuck and stamped and labeled in their toe thumb or other part of the body.

According to KUHAP chapter 133 verse 2, an expertise request must be in a written document by the investigator either for wound examination, dead body examination or an autopsy. In this case, the visum proposal was from the police sector of Brastagi city with the document number B/283/XII/2021/Reskrim which request for external and internal post-mortem examination of for the corpse of Azizi Pratama.

KUHAP Chapter 133 stated that legal officer who can propose for a visum et repertum is an investigator. Afterwards, because visum et repertum was performed for a crime in physical and mental health, which is concluded as general crime, then the

investigator is a police officer from (and military police officer). Afterwards, the regulation for the rank requirement for an investigator or investigator assistant according to the constitution is regulated in the Government Order No. 27 year 1983 chapter 2 that said: Investigator is Indonesia Police Officer which is at least in the rank of lieutenant II.

To simplify the authentication of the visum et repertum proposal, the writing of the visum et repertum letter by Indonesia Police always written on behalf of the head of the local police station, which according to Government Order No 27-year 1983 stated above, is always an investigator. Due to this regulation, the one who will be in charge is the attribute officer, which is the commander (as an investigator), while the officer that signed the document or the mandatory officer is only responsible to the commander.¹⁰ In the Visum et Repertum document no. B/283/XII/2021/Reskrim the investigator was a police ranked police commissioner who was the Chief police of the Brastagi City, which means that he was legal to be an investigator.

There was a livor mortis, which does not disappear upon touch and rigor mortis that was not easy to move. From this result we can conclude that the estimated time of death was around 12-24 hours before an external postmortem examination was performed, in which the postmortem examination was performed on 08.00 of west Indonesia time on 18th December 2021, do the estimated time of death of the victims was 08.00 west Indonesia time (17th December 2021) up to 20.00 west Indonesia time (17th December 2021). During death, body will naturally produce livor mortis at the lowest part of the body (the direction of the gravity), livor mortis appeared during 30 minutes to 1 hour of death but can then still disappear with touch. After 6-12 hours, the blood vessels that contains red blood cells will undergo a cell lysis and will leak into the tissue depending on the position of the corpse, in this can be measured with a fixed livor mortis which may not disappear when a pressure is applied. During death there will also be a rigidity of the muscle depending on the level of glycogen in the muscle. Rigor mortis happened because of muscle contraction at death because of undergoing cellular metabolism which was the breaking of glycogen → Energy → ADP → ATP. When there was still an energy → actin and myosin is still relaxed. If all the glycogen was used and there was no more energy, then ADP cannot be converted into ATP → ADP is piled up → actin and myosin is frozen → rigidity. Start: 1-3 hours post-mortem (average is 2 hours), rigid 6-24 hours, starting from smaller muscle: lower jaw, upper extremities, chest, abdomen, lower extremities, and then total rigidity of the body. The muscle will be relaxed after 24 hours (secondary relaxation), and then decomposition of the corpse will start. In this case report, there was no decomposition on the corpse.

Wound is an abruption of the normal skin (Taylor, 1997). Wound is the disruption of the continuity of the skin, mucous membrane and bone or other organ (Kozier, 1995). In performing an examination of a patients with a wound from violence, a doctor is obliged to be able to give an explanation about the type of wound, type of violence that may cause the wound, and the qualification of the wound.

Wound caused by sharp object can be differentiated from wound caused by other objects, by looking at the normal condition of the tissue surrounding the wound, smooth wound edge, and

wound corner – total sharp corner or partly sharp corner and also with the absence of bridging tissue.

Sharp object wound is a disruption of the body caused by a contact with a sharp tools and/or pointed object, or even a pointed object that is not sharp. Sharp object can incise, pointed object can stab or tear. Examples: Knife, shattered glass, razor, sword, keris, sickle, axe, dagger, bayonet, etc.

Characteristic of wound caused by sharp objects:

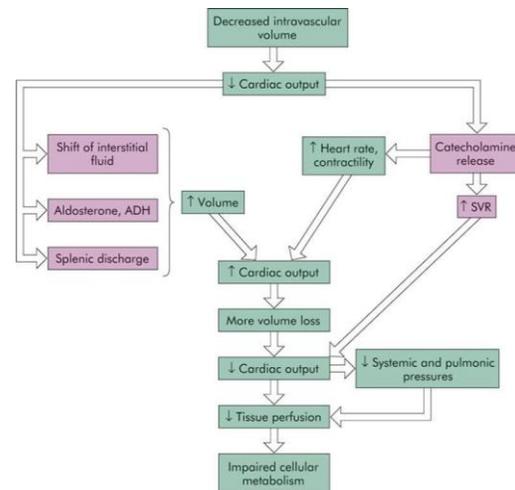
- a. Smooth wound edge
- b. Sharp wound corner
- c. Hair was cut
- d. Absence of bridging tissue
- e. Absences of bruise or abrasion around the wound.

There was an incision wound on the neck, chest, abdomen, upper extremities, and lower extremities of the corpse, in which incised wound was a wound caused by sharp object with the direction of the force is parallel to the skin, shaped like a line with the depth of the wound is smaller than the length of the wound. Both corner of a wound by a knife is always sharp.

Chop wound at the neck, chest, and abdomen of the corpse, in which this chop wound was caused by sharp object trauma relatively perpendicular to the skin. If one of the corners of the skin was blunt, then the wound was caused by a one-edged weapon because the blunt corner was formed by the back of the weapon. Stab wound which has a dull corner for both wound corners usually was caused by weapon with two dull corner such as chisel or axe. However, if both corner of the wound was sharp, the wound may be caused by a double-edged weapon or a one-edged weapon from several angle. Sharp weapon stabbed with an angle tilted to the blade will form a wound with one corner formed by the blade and one corner formed by the end of the knife, which resulted in both corners of the wound to be sharp. The length of the wound can explain the maximum width of the weapon. Withdrawing the weapon while twisting it will form a wound that is no more shaped like a line. The depth of the wound does not guarantee the length of the weapon, because weapon is not always stabbed to its base, on the contrary, even if it was stabbed to its base, the skin can still be pushed inwards.

Chop wound that caused a tear to the artery of the neck, which was the carotid artery and cut the base of the trachea. Bleeding occurred after laceration, fracture, and compression. Losing 1/10 of the blood volume is not clinically significant. Losing ¼ of blood volume may cause faint, even when laying position. Losing ½ volume of blood rapidly will cause shock and anemia due to a decrease of Hb which will cause anoxic anemia. This was marked by pale lips and tissue under fingernails of both hands and feet. Due to massive bleeding the loss of red blood cells from someone in an accidents or murder in which there was a massive acute bleeding, which was called external bleeding. Hb is a protein rich in iron, has a high affinity to oxygen which will form an oxyhemoglobin in the red blood cells. By this function, oxygen will be transported to the lungs and to all parts of the body.

Image 14. Pathophysiology of Hypovolemic Shock



Chop wound is a wound with the depth of the wound more or less is similar with the length of the wound due to the force applied was oblique from the skin. Chop wound is a wound caused by a weapon or tools which is heavy, with a sharp edge or a little bit blunt, applied with one swing with a huge force.¹¹

As an example, several weapons that may cause a chop wound are sword, sickle, axe, ship turbine. There are 6 characteristics of chop wound as follows:

1. The size of chop wound is large
2. The edge of chop wound depends on the edge of the weapon
3. The corner of chop wound depends on the edge of the weapon
4. Almost always causes injury to the bone
5. Sometimes severe parts of the body that was hit
6. Contusion or abrasion can be observed around the wound.

The cause of death of the people in chop wound are⁹:

1. Bleeding
2. Vital organ injury
3. Pulmonary emboly

IV. LEGAL REVIEW

The suspect for this murder was not yet known however several chapter from the KUHP can be charged to the suspect/culprit such as:

About murder and premeditated murder. KUHP Chapter 388, whoever purposely took another person's live, will be charged because of murder with an imprisonment for a maximum of fifteen years. KUHP Chapter 339, murder followed by, along with, or preceded with a crime, which was done to prepare or to ease the execution, or to release oneself or other person from crime if caught, or that ensure the ownership of an item he/she received illegally, will be charged with lifetime imprisonment, or imprisonment for up to twenty years. KUHP chapter 340, whoever purposely and with preceded planning took another person's life, will be charged on murder with plan, with dead sentence, or lifetime imprisonment, or for an imprisonment maximum of twenty years.

V. CONCLUSION

Based on all this literature review, case report and discussion above, we can conclude that:

- a. Estimated time of death was between 12 hours - 24 hours before postmortem examination;
- b. The victim died of an unnatural cause.
- c. The cause of death was chop wound at the base of the neck which severed the carotid artery and cut the trachea, which resulted in death by massive bleeding and suffocation.

AUTHORS

First Author – Zulfia Retnanti Marissa, Department of Forensic and Medicolegal, Faculty of Medicine University of North Sumatera

Second Author – Mistar Ritonga, Department of Forensic and Medicolegal, Faculty of Medicine University of North Sumatera

Third Author – Reza Priatna, Department of Forensic and Medicolegal, Faculty of Medicine University of North Sumatera

Sexual Violence in Women (Clinical Forensic Case Report)

Zulfia Retnanti Marissa, Adriansyah Lubis, Reza Priatna

Departemen of Forensic and Medicolegal, Faculty of Medicine University of North Sumatera

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Abstract- There was around 736 millions of woman documented to have experience physical violence or sexual violence by their spouse or sexual violence from other people. This was an updated data collected from 2000 to 2018. In the recent data from WHO, it was stated that every 1 of 3 woman had experienced violence. sexual violence is any kind of act by a person to another person which resulted in sexual pleasure to the doer and offend the other person's dignity. Investigation of sexual intercourse is the sign of penetration /violence and sign of ejaculation. In this case report, the victim is a 19-year-old woman which plead to have been raped by a man. The victim had experienced a threat and violence. During physical examination, a laceration in lips and bloody gum was found. There was a hymen tear and bruise in the labia minora. Microscopic examination of vaginal swab showed spermatozoa. From the result of the examination, it can be concluded that there was a sexual intercourse and violence to the victim. The culprit can be charged with Indonesia' KUHP chapter 285 about rape under threat and violence.

Index Terms- Sexual crime, Rape, Violence.

I. INTRODUCTION

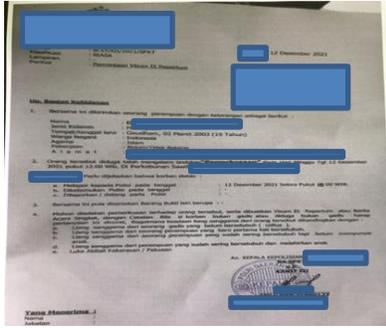
There was approximately 736 millions of woman who had been documented with sexual violence either from their spouse or not from their spouse. This data was collected from 2000 to 2018. In the recent data from WHO, it was stated that every 1 of 3 woman had experienced violence. This number has not been changing during the last decade. The incidence of violence has also been found even in younger women. The incidence was 1 from 4 young women, within 15 to 24 years old, which was in a relationship and experience violence by their spouse in their middle twenties. Violence in women is more prone to happen in middle to low-income countries. WHO stated that 37 percent of woman living in poor country had experienced violence. They experienced physical and sexual violence from their spouse. Several countries even have a prevalence of 1 from 2 women who had experienced violence. The prevalence of violence in women was categorized based on its location, which were: Oseania area, around Melanesia 51 percent, Micronesia 41 percent, and Polinesia 39 percent, South Asia 35 percent, sub-saharan Africa

33 percent, North Africa 30 percent, West Afrika 39 percent, North America 25 percent, Australia and New Zealand 23 percent, Latin America and Caribbean 25 percent, North Europe 23 percent, Southeast Asia 21 percent, West Europe 21 percent, East Asia 20 percent, East Europe 20 percent, Middle Asia 18 percent, South Europe 16 percent. From the data above, the women who had spouse has the highest rate of violence incidence which was 16 percent in the last 12 months. This number was found in woman within 15 to 24 years old¹.

In a national study prior to violence on women, published in 2000 and sponsored by Institute of National Justice and the Center for Disease Control in the United States of America, which uses a sampling strategy which was very contextual with the national demography, they found that²:

- 14.8% women had experience sexual abuse and rape.
- 2.8% women had been an attempted rape victim.
- 0.3% women was rape victim in the last 12 months, with the incidence of 8.7 per 1,000 incidences.

In Indonesia, the National Commission of Anti Violence Against Women reported 2,363 cases of sexual violence women in personal area which was documented in 2021. Most of the cases were rape. It was documented that there were 597 cases of rape in women or 25% of the total cases. Rape in marriage was the second highest with 591 number of cases. There were 433 cases of incest. Incest is a sexual intercourse between people that share a close blood relation or close family relatives which was against the existing customs, law and religion. Also, there as 374 cases of sexual abuse. Sexual intercourse and digital cases were each 164 cases and 108 cases. 63 cases were molestation. There were also 17 sex slavery cases, 14 sex exploitation cases, and 2 attempted rape cases.³



II. CASE REPORT

Chronology

A 19-year-old woman was reported for being raped by an unknown man. According to the victim's report, on Sunday, 12th December 2021 around 12.00 WIB, the culprit is raping the victim in the PTPN field of Palm plantation. At first, the victim and her spouse were together on their way to her spouse' house around 11.00 WIB. On their way, the victim and her spouse were intercepted by the culprit (unknown man) and her spouse was tied, the culprit asked for money and phone from both the victim and her spouse, and the victim was then taken to the palm plantation and then raped. The victim tried to resist and shouting, asking for help. On this incidence, the victim filed a report to the police. On 12th December 2021, at 17.00 WIB in Forensic and Medicolegal Department in General Hospital, the victim came with investigator to be examined.

Examination Report

Based on an anamnesis with the victim, several information was acquired:

- The Victim has never been pregnant
- Menstruation: Menarche in 11 years old, menstrual period 5 days, menstrual period occurs regularly, first day of last menstruation is on 5/12/21.
- History of previous disease and drug consumption: None.
- The Victim plead of getting raped.
- There was a total penetration of the culprit's penis to the victim's genital organ and ejaculate inside the victim's genital organ.
- The Victim plead of getting smothered and slapped by the culprit.
- From the time of the incidence until the time of the examination, the victim has not changed her cloth, and has not washed her genital organ.
- The victim has not fainted or unconscious.
- The victim plead that she has not done a sexual intercourse during a period in which she was apart from her husband.

The Victim came consciously, with blood pressure 120/80 mmHg, pulse 84 x/m, respiratory rate 16 x/m, and body temperature 36.3°C. During physical examination, a laceration

was found in the right lower lips with the size of 0.5 cm length and 0.2 cm depth with soft tissue base.

Image 2. Laceration Wound in Lower Lips and bleeding gums.

the in



examination of genital organ:

- a. External genital organ: erythematous abrasions in labia minora with size 0.8 cm x 0.5 cm.

Hymen:

- i. Old tear reaching the base in three and four o clock direction.
 - ii. New tear reaching the base in six, seven and nine o clock direction.
- b. Copulation Hole: Examined as one finger loose.
 - c. Anal: No signs of violence, normal anal contraction.

Image 3. Examination of Genital Organ.



Additional examination: Vaginal discharge examination was performed using vaginal swab and examined under microscope. Spermatozoa was found.

Image 4. Spermatozoa found in Microscope Examination

III. DISCUSSION

The legal basis of visum et repertum is in Indonesian KUHAP chapter 133, which stated that human is to be examined as a victim or suspected victim of a crime, either alive or dead.

KUHAP chapter 133:

1. In a case of an investigator prior to the court, investigating a victim, either wound, poisoning or dead which was a suspected crime, he/she has the right to



propose for an expertise from an expert forensic & medicolegal doctor or doctor with another expertise.

2. A proposal for an expertise from an expert, as stated in verse (1) is done in written document, which clearly included the aim either to perform wound examination, dead body examination, or autopsy.

3. Dead body delivered to a doctor with forensic and medicolegal expertise or a doctor in a hospital must be treated well with dignity and must be given a label that includes an identity, stuck and stamped and labeled in their toe thumb or other part of the body.

According to KUHAP chapter 133 verse 2, an expertise request must be in a written document by the investigator either for wound examination, dead body examination or an autopsy. In this case report, the Visum et Repertum document proposal was proposed from Police station in Langsa with the document number B/37/XI/2021/SPKT which proposed for a clinical examination of a patient identified as Ms. D.

KUHAP Chapter 133 stated that legal officer who can propose for a visum et repertum is an investigator. Afterwards, because visum et repertum was performed for a crime in physical and mental health, which is concluded as general crime, then the investigator is a police officer from (and military police officer). Afterwards, the regulation for the rank requirement for an investigator or investigator assistant according to the constitution is regulated in the Government Order No. 27 year 1983 chapter 2 that said: Investigator is Indonesia Police Officer which is at least in the rank of lieutenant II.

To simplify the authentication of the visum et repertum proposal, the writing of the visum et repertum letter by Indonesia Police always written on behalf of the head of the local police station, which according to Government Order No 27-year 1983 stated above, is always an investigator. Due to this regulation, the one who will be in charge is the attribute officer, which is the commander (as an investigator), while the officer that signed the document or the mandatory officer is only responsible to the commander. In the VeR document no B/37/XI/2021/SPKT the investigator proposing for the examination is a police officer ranked Police inspector II on behalf of the commander of the resort, which authenticate the document.

This was a case of a 19 years old is reported to be a rape victim of an unknown man in a palm field. The victim came with an investigator in a conscious state. During a physical examination, the patient was conscious, blood pressure was 120/80 mmHg, respiratory rate was 16 x/m, pulse rate was 84 x/m, body temperature was 36.3°C, the patient can explain the chronology clearly. During the examination an erythematous lacerated wound was found in the lower right region of the lips with 0.5 cm length and 0.2 cm depth and soft tissue was exposed in the base. A bloody gum was found in the 5th lower left teeth. The victim's wound in the lower lips and bloody gum was a caused by a blunt object, in which blunt object causes bruises, abrasion, laceration, and broken bone. These wounds were a sign of physical violence to force the victim to a sexual intercourse. The violence was to raise fear and to suppress the victim from fighting back.⁵

From the examination on the genital organ, there was an erythematous abrasion in the labia minora. In the hymen there were an old tear in the direction of 3 to 4 o'clock, and a new tear to the base in around the direction of 6, 7 and 9 o'clock. The copulation hole can be measured as one finger loose. There was no disorder in anal area, anal contraction is normal. During the additional examination on the victim, vaginal discharge examination was performed using swab and during microscopic examination, spermatozoa was found.

Sexual violence is any act performed by someone to another person which resulted in sexual satisfaction to the culprit and hindered someone's dignity. Sexual crimes is one of a crime that involves human body, health and life. Examination of the sign of sexual intercourse includes a sign of penetration/violence, and signs of ejaculation. Penetration was marked by hymen tear reaching the base in a marked direction, while sign of ejaculation were the existence of cement or spermatozoa or seminal fluid. Direct signs of sexual intercourse were hymen tear due to penetration, abrasion or bruises prior to rubbing of penis, and an existence of sperm from ejaculation. In proving a sexual intercourse, several factors must be considered; the size of the male genital organ, the degree of the penetration, the shape and elasticity of the hymen, ejaculate contains, sexual intercourse position, and the authenticity of the prove, and time of examination. Tear in the hymen reaching to the base only proved that there is a penetration into the vagina, however hymen tear not reaching to the base cannot be interpreted as a penetration/violence. On the contrary, no hymen tear does not guarantee that there was no penetration. There were 2 types of hymen tear, an old tear and new tear. New hymen tear is characterized by erythematous around the tear and sometimes there is an oedema, an old hymen tear is characterized by the homogenous color of tear without oedema, because hymen is a tissue with small number of vascularization, there is only a small amount of bleeding during hymen tear. Hymen tear recovery is around 7-10 days.^{5,6}

Ejaculation can be proved medically by identifying spermatozoa or sperm cell in the vagina, around the genital organ or at the patient's cloth. Spermatozoa is pathognomonic of sexual intercourse. Spermatozoa examination is very important not only to identify if a sexual intercourse happened or not, but also to identify the culprit through DNA and blood type examination. If Sexual intercourse can be defined, by identifying spermatozoa, then a sexual intercourse can be defined with several note as follows; spermatozoa in the vagina can move for around 4-5 hours post coital, spermatozoa can still be found after 24-36 hours post coital, but it doesn't move anymore.

A legal sexual intercourse (according to the law) is an intercourse performed with these principles:

- The woman is a legal wife (According to Indonesia's UU RI No. 16/2019 about the changes of Indonesia's UU RI No. 1/74 about marriage) and there is a consent from the woman.
- The woman is old enough, sane, and is not in a marriage with another person, and is not a close relative.

Sexual crime can occur inside or outside of marriage. Sexual intercourse in marriage which was considered a crime according to KUHP chapter 288, is when a husband is doing a sexual intercourse with an unprepared woman which resulted in wound, severe wound, or death. In the case of sexual intercourse occur outside of the marriage which was considered a crime, if it was agreed by the woman then it will be referred to KUHP chapter 284 (adultery or sexual intercourse) and KUHP chapter 287 (sex with underage woman), in these case if no charge is given but a complaint from the husband/wife which is defiled, except if the woman is under 12 years old, then it must be proven that there is a violence and an intercourse. In the case in which there is no

agreement from the woman, according to chapter 285 about rape, which was the case in this case report and KUHP chapter 286.

IV. CONCLUSION

Based on the discussion in this case report, we can conclude that the patient has been having a sexual intercourse and sexual violence. The culprit can be charged with chapter 285 or chapter 286 of Indonesia's KUHP.

AUTHORS

First Author – Zulfia Retnanti Marissa, Department of Forensic and Medicolegal, Faculty of Medicine University of North Sumatera

Second Author – Adriansyah Lubis, Department of Forensic and Medicolegal, Faculty of Medicine University of North Sumatera

Third Author – Reza Priatna, Department of Forensic and Medicolegal, Faculty of Medicine University of North Sumatera

Email: fia.marissa22@gmail.com

Characteristic Of Wound In Physical Violence In Children Based On Visum ET Repertum In Porsea General Hospital In Year 2020-2021

Zulfia Retnanti Marissa, Adriansyah Lubis, Panusunan Simatupang

Departement of Forensic and Medicolegal, Faculty of medicine, University of North Sumatera

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Abstract- Violence in children is an act persecution or mistreatment to children in the forms of hurting physically, emotionally, sexually and neglecting parenting. Violence in children is not easily recognized because children is not able to tell their condition to the doctor, in prior to a violence they experienced. The rate of violence in children in North Sumatera, especially in Toba District is increasing every year, but there has not been any study about the type of violence, the location of the violence in the patient's body, and the qualification of the wound degree. This is an observational study with descriptive design using a retrospective approach. This study was conducted in Porsea general hospital, samples were obtained from *Visum et Repertum* of patients under 18 years old who had experienced physical violence from 2020 to 2021. Violence in children is dominated in children from age 12 - < 18 years old (70%) in which mostly was male (67%). The violence in children were mostly in the findings of more than one wound (52%). Most of the wound was in the children's head (45%). The most type of violence were trauma caused by blunt trauma (100%) which is an abrasion (47%). Mild degree wound was higher in a small amount than moderate degree, while there was no severe degree wound found (non-lethal). This descriptive study concluded that based on the *Visum et Repertum* in Porsea General Hospital from 2020-2021 was characterized with blunt trauma, multiple wounds, mostly were in the children's head and non-lethal.

Index Terms- Characteristic of wound, Violence on Children, Porsea,

that contain physical violence either physical or non-physical, environmental permission, friends, or culture in the education or in the residential area. Factors from school environment and residential area is very susceptible, with an increasing number of bullying from seniors, friends, etc. Children who were physically weak and with less social awareness, are more susceptible to violence.^{2,3}

Violence in children is not easily recognized because children has not been able to inform the violence he/she experienced to the examiner. Doctor's sensitivity is crucial because during childhood, children is susceptible to wound and abrasion which happened accidentally during the children's activity. In this condition, clinical forensic aspects are very important. Doctor must be able to understand children's physical and psychological condition and must be able to determine if a wound is due to the children's activity or because of a violence.^{4,5}

The rate of violence in children in North Sumatera is also increasing. In January 2021, there were 1,547 children who were a victim of violence in North Sumatera. The types of violence documented were; 454 cases of physical violence, 352 cases of psychological violence, 605 cases of sexual violence, 158 cases of neglecting parenting and 5 cases of human trafficking. For Toba district in North Sumatera, according to the data from National Committee of Child Protection, in 2021 there were 52 cases of violence in children and women.⁶ However there has not been any study about the type of violence, location of the violence in the patient's body, and the qualification of the wound degree. This is the background for the author to conduct this study.^{6,7}

I. INTRODUCTION

Violence is both a problem of public health and law and social law. The problem of violence in children is not the sole problem, but it was affected by several contributing factors. Violence in children, also known as child maltreatment, is an act, which was done purposely by a parent or friends. The type of violence in children are physical violence, sexual violence, emotional violence and neglecting parenting.¹

There are several factors that contributes to violence that involves children, which is parenting method, TV show or games

II. METHOD

This was an observational study with descriptive design using retrospective design based on the data collected from *Visum et Repertum*. The study was conducted in March 2021 to April 2021 in Forensic department in Porsea General Hospital.

Samples in this study were the result of forensic examination (total sampling) in the form of *Visum et Repertum* for the victim of children violence in Porsea General Hospital in 2020 to 2021 using criteria of inclusion and exclusion. The criteria of inclusion in this study is all *Visum et Repertum* report of live

patients, children either male or female under 18 years old. The criteria of exclusion in this study were: Visum et Repertum of traffic accident and Visum et Repertum of sexual violence. The data collected from the Visum et Repertum were then categorized based on its variable and then analyzed using SPSS program. The data will be analyzed using univariate analysis to see the distribution of frequency and variables. The data will then be shown in the form of table and graphic based on its category.

III. RESULT AND DISCUSSION

The total number of Visum et Repertum for violence in Children in Porsea general hospital in year 2020 to 2021 were 75 reports, however only 40 were eligible to the criteria of inclusion. Thirty-five of the reports were not eligible because they had shown sign of violence (11 reports) and sexual violence (24 reports).

The characteristic of the samples in this study was shown based on the distribution of age and sex, as shown in **Table 1**.

Characteristic	Note	N	%
Age	0-5	0	0
	6-11	12	30
	12-18	28	70
Sex	Male	27	67
	Female	13	33

Table 1. Characteristic of Samples

From distribution by age, it was shown that the younger distribution was 6 years old and the oldest was 17 years old. The highest number of age group that experienced violence was in the age group of 12-18 years old, followed by the group of 6-11 years old and the least number was in the group of 0-5 years old. From the data above, it was shown that as the children age, they become more susceptible to violence. Younger children spent most of the time in their house with their parents, however, as they grew older, the behavior of the children is more affected by the social media they saw and the environment in which they spend their time such as their friends in the neighborhood and school. In this study we found that most of the violence were conducted as an abuse by their friends or other people, in compared to their parents, even though most of the violence in children happened in household. This may be due to the children are not able to report their own parents and propose a Visum et Repertum to the police.

From distribution by sex it was shown that boys (67%) were experiencing more violence compared to girls (33%). This result was similar with prior study by Alit et al⁸, in which the prevalence of physical violence in male was 29% and in female was 11%. This condition may be caused due to the culture in which male is more open to talk about their experience in comparison to woman. This result was different from prior study conducted by Janise CL et al⁹ in Manado in 2013, in which girls has a higher percentage for experiencing physical violence compared to boys.

Study about the characteristic of wound is divided into 4 categories, which were the amount of wound, location of wound, type of violence and the degree of wound, which can be seen in Table 2.

The result of the study about the characteristic of wound based on the amount of wound showed that violence in children caused more than one wound (21 children) compared to only one wound (19 children). This result showed that violence in children is prone to happen multiple times. The data from the Ministry of Health¹⁰ also showed the same result, in which violence in children in Indonesia was 40% in the age group of 13-15 years old, had experienced physical violence at least once before.

Variable		N	%
Amount of wound	One	19	48%
	More than one	21	52%
Location of wound	One	29	73%
	More than one	11	27%
Type of wound	Mechanical	40	100%
	Physical	0	0%
	Chemical	0	0%
	Multiple	0	0%
Degree of wound	Mild	3	60%
	Moderate	2	40%
	Severe	0	0%

Table 2. Characteristic of Wound in Violence Cases in Children.

From the result of this study, we can see that the wound from violence cases in children often occur in more than one location. The wound was found in several parts of body such as head, neck, chest, abdomen, back, gluteal, upper extremity and lower extremity.

This study showed that the most common location for wound is head, which was 34 cases, followed by upper extremities and lower extremities. This result was similar with prior study conducted by Affiandi¹¹ which found that head was the most common site to experience violence. Head is the most common location for violence because it was easy to reach by the culprit, while extremities was also commonly found, probably because when the culprit is doing violence, the victim is using their extremities for defense.



Image 1. Location of Wound in Violence Cases in Children.

In this study, the type of violence for all the cases were mechanical violence. Mechanical trauma was found 100% which were blunt trauma, there was no wound caused by sharp object or firearms.

The highest number of blunt traumas in this study was abrasion which were 24 cases, followed by bruises which were 23 cases and laceration which were 4 cases. These result was similar with prior study by Iswara et al in Semarang city which showed that wound in violence cases in children was mostly blunt trauma, compared to other types.



Image 2. The Type of Wound in Violence Cases in Children.

According to Indonesia' KUHP, degree of wound can be divided into 3 categories, which was mild, moderate, and severe degree. In this study, violence cases in children were dominated by mild and moderate degree while severe degree was not found in this study. There were 3 cases of mild degree wound, comparable to 2 cases with moderate degree wound. Most of the wound was non-lethal. This was similar with the previous reason that these wounds is non-lethal an only to give lesson to the victims.

IV. CONCLUSION AND SUGGESTION

Bases on the result of this study which was conducted in Porsea General Hospital about the characteristic of wound about violence cases in children, we can conclude that violence in children were dominated in male children in the age group of 12-18 years old, mostly were having more than one wound, and most of the wound were found in head with the type of wound were abrasion caused by blunt trauma, the degree of the wound in this study were comparable in mild degree and moderate degree (non-lethal).

There were 40 samples in this study in the period of 2 years. For the next study, the author hoped that a greater number of samples so that a better image of the real condition can be seen. Most of the visum in this study has not report the degree of the wound. As a recommendation so that the next visum can include the degree of the wound to give a clearer picture on the report.

AUTHORS

First Author – Zulfia Retnanti Marissa, Departement of Forensic and Medicolegal, Faculty of medicine, University of North Sumatera

Second Author – Adriansyah Lubis, Departement of Forensic and Medicolegal, Faculty of medicine, University of North Sumatera

Third Author – Panusunan Simatupang, Departement of Forensic and Medicolegal, Faculty of medicine, University of North Sumatera

Email: fia.marissa22@gmail.com

Determination of Mineral Content, Proximate Analysis and Composition in *Vernonia Amygdalina* Leaf Samples from Taraba North, Nigeria

U. J. Efi¹ Iliya Nuhu² Muhammad Kabiru³ Umar Abdul⁴

¹ National Biotechnology Development Agency, Abuja, Nigeria

² Department of Chemistry, Kaduna State College of Education, Gidan-Waya, Nigeria

³ Department of Chemistry, Kaduna State College of Education, Gida-Waya, Nigeria

⁴ Department of Chemistry, Kaduna State College of Education, Gidan-Waya, Nigeria

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Abstract- The determination of minerals elements and proximate analysis of *vernonia amygdalina* samples was taken from Sabon-gari area, Koffai area and Mile 6 areas, all in Taraba North with the view to evaluate the mineral content of the samples using standard methods. The mineral content of the sample shows; (Mn, K, Mg, Na, Ca, Cu, and Fe) Using atomic absorption spectroscopy (AAS). The results of the samples are: Mn (32.61±0.00), K (2.43±0.00), Mg (0.83±0.06), Na (21.38±0.06), Ca (35.43±0.01), Cu (1.39±0.01), and Fe (12.51±0.05) all measured in mg/100 g. The elements show that Ca, Mn and Na are the most abundant minerals, followed by Fe, K, Mg and Cu. The nutrient composition of the proximate concentrates revealed Moisture (8.16±0.26), Crude protein (18.58±0.14), fat (3.36±0.10) Crude fibre (12.45±0.11) Ash (6.80±0.15) Carbohydrate (37.83±0.0).

Index Terms- *Vernonia amygdalina*, minerals Element, concentrates.

I. INTRODUCTION

Vernonia amygdalina is scientifically classified as belonging to the kingdom *plantae*. It is an angiosperm, of order *Asterales* of the family *Asteraceae*, genus *vernonia*. a bitter leaf plant as the name implies whose leaves extracts, stems and bark are use for culinary, medical and curative purposes. The leaf contains unlimited benefits which shall be fully analyzed. There are many types of this plant, which include *Vernonia Arborea*, which specie distribution include: India, China, Malaysia and Thailand. *Vernonia Bamendea*, its distribution is found from Cameroun highland, Nigerian Mambilla Plateau. *Vernonia Blodgetti*, it is used and recommended for natural landscape and habitat restoration, its distribution includes Florida USA, Northern Bahamas. The predominant specie found in Nigeria is the *Vernonia amygdalina*, its distribution include Tropical Africa, e.g. Zimbabwe, Nigeria, Benin etc. The plant has structural adaptation tendency that enables it to survive in both areas of high rainfall

and average rainfall, making it readily available in all season. In southern part of Nigeria, the leaves are broader, fresher and can grow above 23ft. The roots are anchored strongly on the soil, while that of the northern part of Nigeria, its leaves are smaller, its growth is less or equal to 23feet, they are at times stunted as a result of low rainfall (Ayensu, 1978).

Consumption of *Vernonia amygdalina* leaf as well as its extracts can reduce high sugar level in blood; it does this by moderating glucose in the blood and thus repairs the pancreas as a result of its natural bitterness. It also regulates blood cholesterol level which is a risk factor to cardiovascular disease. There has not been enough analysis on its leaf mineral concentrates in Taraba North, hence, the purpose of this investigation of the mineral contents. (Nwaogu *et al.*, 2000).

II. MATERIALS AND METHODS

2.1 Study Setting and Design Three samples were collected in different location of Jalingo metropolitan areas which include Sabon-gari area in Jalingo metropolis, Koffai area in ATC, Ardo-kola local government and Mile 6 area of Jalingo local government, Taraba North, Nigeria.

2.2 Sample collection

A 20 g sample of bitter leaf each were collected from Sabon-gari area and marked as X, Koffai (ATC) area as Y and Z for Mile six (6) area respectively, all designated areas for samples collection were from Jalingo Local Government, Taraba North, Nigeria.

2.3 Sample preparation

Bitter leaf vegetable were cut off from the stem and washed with distilled water, then dried at room temperature 37 °C for about three days. The dried sample was blended using a local mortar and pestle, sieved using 2 mm mesh sieve to obtain fine particles.

III. RESULTS

The results of mineral content and proximate analysis of *vernonia amygdalina* in sample areas are below; Table one (1) Shows determination of mineral content of samples which were

denoted by X, Y and Z, which represents sample locations in Sabon-gari area, Koffai (ATC) area, and Mile six (6) areas, while Table 2 represents the proximate analysis mineral screening for the samples X Y and Z respectively.

Table1 Mineral content composition of samples in (mg/100 g)

Sample code	Mn	K	Mg	Na	Ca	Cu	Fe
X= (Sabon-gari)	33.19 ±0.00	2.32 ±0.00	0.80 ±0.00	21.19 ±0.00	36.06 ±0.01	1.33 ±0.02	12.31 ±0.09
Y=(Koffai, ATC)	32.53 ±0.01	2.40 ±0.01	1.38 ±0.01	21.54 ±0.02	35.13 ±0.02	1.40 ±0.00	12.06 ±0.02

Z= (Mile 6)	31.40 ±0.00	2.60 ±0.00	1.04 ±0.01	21.41 ±0.00	35.10 ±0.01	1.43 ±0.02	13.16 ±0.03
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X = Samples in Sabon-gari area
Y= Samples in Koffai area
Z= Samples in Mile six (6) area

Table 2: Proximate composition of the samples (%)±

Proximate Composition	X	Y	Z
Moisture	8.10±0.35	8.22±0.01	8.18±0.43
Crude Protein	18.60±0.26	18.84±0.01	18.30±0.16
Fat	3.30±0.15	3.45±0.013	3.32±0.16
Crude Fibre	12.93±0.30	12.41±0.01	12.02±0.32
Ash	6.10 ±0.43	7.50±0.01	6.80±0.01
Carbohydrate	37.81±0.00	38.55±0.02	37.14±0.01

± means the standard deviation for 3 replicate determination; % crude protein= N × 6.25

X = Samples in Sabon-gari area
Y= Samples in Koffai area
Z= Samples in Mile six (6) area

IV. DISCUSSION

This manuscript was designed to quantify the mineral content in *vernonia amygdalina* in three areas in Taraba North which include; Sabon-gari area, koffai (ATC) area and Mile six (6) all in Jalingo metropolis, Taraba North, Nigeria. Thus, Manganese content in *Vernonia amygdalina* leaf was second in the order of concentrates in mineral analyzed with 33.19 mg/100 g, 32.53 mg/100 g and 31.40 mg/100g for the three samples respectively. Potassium was 2.30 mg/100 g, 2.40 mg/100 g and 2.60 mg/100 g, the mineral is the fifth in order of the concentrates analyzed. Magnesium content was 0.80 mg/100g, 1.38 mg/ 100 g and 1.04 mg/100g was found to be the lowest concentrates in the order of the analysis. Sodium content is 21.19 mg/100g, 21.54

mg/100g and 21.41 mg/100g. Sodium is the third mineral in the order of abundance. Calcium content were 36.06 mg/100g, 35.13mg/100g and 35.10 mg/100g was the highest concentrate in abundant in the analysis. Copper content were 1.33 mg/100g, 1.40 mg/100g and 1.43 mg/100g. Iron samples are 12.31 mg/100g, 12.06 mg/100g and 13.16 mg/100 g represents the fourth abundant in order of the mineral analyzed. The mineral content in a sequence of decreasing order are as follow; Ca>Mn>Na>Fe>K>Cu>Mg. Proximate analysis is in the order; Carbohydrate>Crude protein>Crude fibre>Moisture>Ash>Fat.

V. CONCLUSION

Vernonia amygdalina leaves are nutritional sources of dietary fibre, carbohydrates and crude protein but, low content in fat. Elemental analysis shows calcium to contain the highest concentration followed by Mn, K, Mg, Na, Cu and Fe. Some are essentially nutrients needed for proper functioning of the body. Hence, the leaf is safe for human consumption.

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AUTHORS

First Author – U. J. Efi, National Biotechnology Development Agency, Abuja, Nigeria
Second Author – Iliya Nuhu, Department of Chemistry, Kaduna State College of Education, Gidan-Waya, Nigeria
Third Author – Muhammad Kabiru, Department of Chemistry, Kaduna State College of Education, Gidan-Waya, Nigeria
Fourth Author – Umar Abdul, Department of Chemistry, Kaduna State College of Education, Gidan-Waya, Nigeria

Managing Emotional Intelligence- a key element for success

B. Gayatri

Asst. Professor, ICBM-SBE, Hyderabad

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Abstract- In the era of competitive, unstable and dynamic environment, the tasks of the employees of Indian banks has become demanding. This is also due to the fact with opening up of economy through globalization, liberalization and privatization and the natural drift towards information technology, challenges get multiplied when one has to work diversified working climate. Organizations need people who have both technical knowledge and emotional and social abilities which will facilitate them to delight the customers. The emotional intelligence interventions are partly a response to the problems that employees in corporate sector face today. Emotional intelligence competences can contribute in developing these abilities and skills that are linked with this desire or aspiration new line. The present study aims to compare the level of Emotional intelligence among managers and its impact on organizational commitment in the respective private and public sector banks.. The study also helped in finding out the relationship between emotional intelligence and organizational Climate.

Index Terms- Emotional Intelligence, Dynamic Environment, Interventions, Organizational Commitment, Organizational Climate.

I. INTRODUCTION

In today's highly competitive workplace, maintaining a highly motivated workforce is the most challenging task. organizations not only deal with material but also deal with people. Today in a globalization world, the Emotional Intelligence (EI) begins to get the attention from the public and seen as an important aspect in the organizational environment. effective living is determined by intelligence that is coupled with emotions of every human being. Scientific research reveals that Emotional Quotient (EQ) is more important than Intelligence Quotient (IQ). IQ may take any individual to the top position but the EQ makes the individual a top person. EI is one of the important behavioral constructs that contributes to the performance of an individual at the work place.

Many people have found themselves unsatisfied and under performing in a job at some point in their career, despite a fair salary and benefits package. Many organizational and management experts reveal that, salaries and benefits are no longer enough to motivate and attract employees and keep them satisfied.

Although traditional extrinsic rewards do work, the effects are temporary. The question for many organizations is "what turns on motivation in people?"

Every employee contributes to organizational effectiveness (OE). Taking into account skills, experience, motivation, and rank, some play a bigger role than others. Motivated employees are more productive. And a more productive team means a more profitable company.

Effectiveness of an organization can be judged from the way it deals with the Issues of leadership, interpersonal relations, communication and relations with other organizations. As companies endeavor to do more with less, seeming soft skills, based on emotions, are associated with leadership effectiveness and organizational success. Research during the last twenty five years has consistently pointed to a set of competencies -some purely cognitive but most emotional - such as self confidence, initiative and teamwork as making a significant difference in the performance of individuals. These competencies represent what is called emotional intelligence (EI) and are believed to be predictive of superior performance in work roles. Increasing attention has been given to the role of leader emotional intelligence in organizational effectiveness

A leader with high emotional intelligence has the ability to understand themselves and others and adapt behaviors to a given context. Leaders with high emotional intelligence and thus demonstrable personal and social competence may be oriented towards a transformational leadership style with emphasis on motivating and influencing others. Research shows that an organization that was characterized by emotional intelligence had increased cooperation, motivation, and productivity and increased profits, an association also reflected in transformational leadership literature.

In the contemporary perspective, employees can help or impede the success and effectiveness of managers and organization is profoundly influenced by the perception and relationship they have with their managers. Also, the level of emotional intelligence of the leaders in handling and motivating its human factors is going to be the deciding factor of the effectiveness of any organization. As the emotional intelligence of the mentor, boss, leader, or manager will influence the potential of a relationship with that person for helping organizational

members develop and use the talent that is crucial for organizational effectiveness.

Emotional intelligence (EI), emotional leadership (EL), emotional quotient (EQ) and emotional intelligence quotient (EIQ), is the capability of individuals to recognize their own emotions and those of others, discern between different feelings and label them appropriately, use emotional information to guide thinking and behavior, and manage and/or adjust emotions to adapt to environments or achieve goals.

Empathy is typically associated with EI, because it relates to an individual connecting their personal experiences with those of others. However, several models exist that aim to measure levels of (empathy) EI

Studies have shown that people with high EI have greater mental health, job performance, and leadership skills although no causal relationships have been shown and such findings are likely to be attributable to general intelligence and specific personality traits rather than emotional intelligence as a construct.

Before discussing the concept of Emotional Intelligence, it is necessary to understand the term involved in the concept that is emotion.

1.1 EMOTION.

Emotion is a disturbed condition of the organism resulting in an aimless or aimed attack. The English word 'emotion' is

derived from the French word Emouvoir, but this is also based on the Latin word emovere, which (variant of ex-) means 'out' and movere means 'move'. Emotion is a feeling that is private and subjective. In general, humans will experience a range emotional states. Emotion is a psychological state where it involves expression display of different somatic or autonomic responses. It is a complex psychological and physiological phenomenon involving an individual's state of mind and its interaction between that individual and her/his environment.

1.2 EMOTIONAL INTELLIGENCE

The word emotional intelligence may be a novel one, but its roots are aged more than 200 years ago, and which was described in the work of Plato. There by we can say that, Emotional Intelligence (EI) in the simple words, it refers to the ability to recognize and regulate emotions in ourselves and other. Emotional intelligence is defined as ability to understand, use and helps to manage emotions, which in turn support individuals to various aspects like stress relief, effective communication, being empathetic towards others, facing challenges, and defuse conflict. It helps in building strong relationships, and also to achieve career and personal goals.

- a) **Personal competence**
- b) **Social competence**



Emotional intelligence is the foundation for critical skills.

According to **Peter Salovey and John Mayer**, Emotional Intelligence is defined as “The ability to monitor one's own and other people's emotions, to discriminate between different

emotions and label them appropriately, and to use emotional information to guide thinking and behavior

1.3 Emotional intelligence defines as:



Self-management – It is defined as ability to control feelings and behaviors, managing the emotions in healthier ways, adaptability to the situations.

Self-awareness – It is defined as a stage of recognizing the emotions and its effectiveness in the behavior and in individual confidence levels.

Social awareness – It is defined as a stage of understanding the emotions, needs, and empathetic, and recognize the power dynamics in a group or organization.

Relationship management – If an individual able to communicate clearly, motivate others, team management, conflict management, will itself creates a management of relations.

1.4 There are numerous benefits to developing high levels of emotional intelligence and the good news is that anyone can increase their EI with some good training. Some of them are given below:

- **Physical Health.**
- **Mental Well-Being.**
- **Relationships.**
- **Conflict Resolution.**
- **Success.**
- **Leadership.**

1.5 EMOTIONAL INTELLIGENCE IN THE WORK PLACE:

The changing work environment resulted in raising complexity both in professional as well as in personal life. These variations has become challenges for the for the individuals as well as the organizations to compete and adapt themselves with the same which has created the need for people with high emotional intelligence level.

A more practical dimension of Emotional intelligence is that managing own emotions and also others. From the research it has found that, individuals with high EI, manage moods and emotions and strive for maintaining positive environment. Management of one's own moods and emotions also relies on knowledge and

consideration of the determinants, appropriateness and malleability of moods and emotions deviance and can come to influence how the world views the organization.

In the work environment, emotions generally play a very crucial role, because the emotional management itself reflects that how organization manage emotions within as well as within the world. Emotional balance show an impact on individual behavior, his attitude towards others. Managing the emotions constructively in the work place will help to attain achievement, job satisfaction, organizational commitment. Pessimistic emotions such as anger, fear sadness, hostility, and guilt can automatically lead to deviations and disturbances between the individuals as well as in the organization as whole.

An employee with high emotional intelligence can manage his or her own impulses, communicate with others effectively, manage change well, solve problems, and use hilarity to build rapport in edgy situations. This "lucidity in thinking will separates top performers from weak performers in the work environment, and which in turn could bring a differential in organizational commitment.

1.6 Literature review:

Jordan and Troth (2004) investigated the utility of emotional intelligence for predicting individual performance, team performance, and conflict resolution styles. Three-hundred-and-fifty respondents working in 108 teams were administered a measure of team member's emotional intelligence. Participants then completed a problem-solving task, individually and as a team member, and afterwards reflected on the conflict resolution tactics used to achieve the team outcome. It was observed that emotional intelligence indicators were positively linked with team performance and were differentially linked to conflict resolution methods.

Sinha and Jain (2004) examined the relationship of emotional intelligence with some of the organizationally relevant outcome variables based on the data collected from 250 middle-level male executives from six plants of two-wheeler automobile

manufacturing organizations belonging to public sector, located in five different cities of North India. The variables included were categorized in two categories of outcomes for organization: individual level outcomes and organizational level outcomes. The individual or personal level outcome variables were job satisfaction, personal effectiveness, organizational commitment, reputational effectiveness, general health, organizational trust, turnover intention. The organizational level outcomes variables were organizational effectiveness and organizational productivity. The results suggested that the different EI dimensions were found to be considerably associated with organizationally relevant variables in general.

Rosete and Ciarrochi (2005) established a link between emotional intelligence and workplace measures of leadership effectiveness, using an objective measure of performance and a 360 degree assessment tool. The research results showed that executives higher on emotional intelligence are more expected to attain organizational outcomes and be considered as effective leaders by their subordinates and direct manager.

One major study for empirically demonstrating the impact of emotional intelligence on occupational performance was conducted in the U.S. Air Force (USAF). Emotional Quotient Inventory (EQ-i) was used to assess EI and performance ratings based on individual productivity used for assessing occupational performance for 1,171 USAF recruiters. The EQ-i scores were compared with their performance as recruiters. The recruiters were categorized as high performing (those who met or exceeded 100% of their annual recruitment quotas), and low performing groups (those who meet less than 80% of their annual recruitment quotas). The results showed that the high performers had significantly higher EQs than low performers and vice versa. This indicates that high performers are more emotionally intelligent than low performers based on the population samples. The results also suggested that EI predicted 28% of the variance in the performance of these two groups which means EI is able to predict performance in the workplace. The findings clearly indicate that individuals who are more emotionally intelligent are expected to perform better in the workplace. This study could identify high and low performing recruiters with 72% accuracy rate.

Thereafter, USAF combined pre-employment EI screening with interviewing; the USAF increased its ability to predict successful recruiters by nearly threefold. The EQ-i correctly classified 81% of all successful and unsuccessful recruiters, which was more than anticipated (i.e., 72%). The selection of emotionally intelligent USAF recruiters proved financially advantageous by placing right recruits in right positions and hence, decreasing the cost incurred in hiring mismatched recruits (Bar-On, Handley, and Fund, 2006).

Carmeli and Josman (2006) empirically examined the effects of emotional intelligence on two aspects of work outcomes: task performance and organizational citizenship behaviors (altruism and compliance). A sample of 215 employees, employed in a diverse set of organizations in Israel, was requested to participate in this study. For the study purposes, data were collected on site from both the employees and their supervisors. EI was assessed by self-report measure, whereas work outcomes were assessed by the employee's supervisors. The findings of the study supported a positive relationship between EI and work outcomes.

Lenaghan, Buda, and Eisner (2007) in their empirical study investigated the impact of emotional intelligence in the work-family model. A total of 205 people participated in this study. This sample was drawn from a large university representing a large variety of jobs including unionized trade workers to executive managers. They found that EI acts as a protector variable of one's wellbeing in the face of work-family conflict. Also, higher EI positively influenced well-being. Specifically, those individuals in the sample who had high EI with low work-family conflict reported the highest well-being while those with low EI and high work-family conflict reported the lowest well-being.

Bal Subramanian, Ghatala and Nair (2008) conducted a study in Apollo Health City, Hyderabad to investigate the relationship of emotional intelligence with organizational leadership as well as the impact of emotional intelligence on leadership effectiveness. The findings recommended that management functions have destabilized the importance of individual development, at the price of technology and modernization. The study suggested that Apollo Hospital Group, Hyderabad, should particularly focus on improving the self-management and social awareness skills of the employees in order to maintain its position as the No. 1 health care provider in India.

Khokhar and Kush (2009) tried to explain the performance of executives on different levels of emotional intelligence and provided a link between EI and effective work performance. For this study, 20 Male executives (out of 200) from a public sector manufacturing company in Haridwar and a public sector power generation company in Rishikesh of Uttarakhand State (India) were selected on random basis. The findings of the study revealed that executives having higher emotional intelligence showed better quality of work performance as compared to their counterparts

Jadhav and Mulla (2010) studied the impact of emotional intelligence on job performance and the moderating role of job characteristics (i.e., interpersonal interaction) on the relationship between EI and job performance. The sample included 101 working executives in the manufacturing unit of a large pharmaceutical company in Mumbai, India. Analysis of the data showed no significant relationship between EI and job performance for the entire sample. However, for individuals having high interpersonal interaction on their jobs, EI was significantly related to job performance. On the hand, for individuals having low interpersonal interaction on their jobs, EI was not related to job performance.

Afolabi et al. (2010) in a study on Nigerian Police officers examined the effect of EI and gender on job performance. The results of the research showed that police officers with high EI are more satisfied and perform better than those with low EI

Feizi, Shahbahrami, and Azhandeh (2011) examined the relationship between manager's emotional intelligence and their conflict management strategies. This study comprised a population of 103 administrators in Iran university of Medical Sciences. The results revealed no correlation between emotional intelligence and control strategy. A positive correlation was found between EI and conflict resolution strategy while the correlation between EI and conflict avoidance strategy was negative. The findings suggest that manager's EI can be considered as an important factor in recognizing conflicts and adopting strategies for conflict management in organizations.

Lindebaum and Jordan (2012) disputed the notion that emotional intelligence improves all types of work performance and argued that there is a complex relationship between EI and work performance in which both task and context play a role. They collected data from a sample of 55 project managers in UK construction industry using a cross-sectional survey design. Findings suggested that project manager's levels of EI are linked to most relational performance dimensions. However, project manager's EI was not associated with cognitive task related performance dimensions. These findings significantly advance our understanding of how the constructs of EI and project manager performance relate in a given context. Managers who work in contexts that are person-oriented or those that deal with tasks that are interpersonal in nature potentially benefit from EI.

Muhammad Naim Bin Jurit and Mahmoud Khalid Almsafir (2013) studied the relationship between EI components and job performance. The study investigated the relationship between EI which consists of four components: self-emotional appraisal, others' emotional appraisal, regulation of emotion, use of emotion, and job performance on 100 respondents in Fibre comm Network (M) Sdn Bhd. Results showed that there is a strong significant relationship between EI components and job performance.

Deshmukh and Madhur (2014) examined the relationship between emotional intelligence and job performance of employees working in IT sector in Pune city, India, by focusing on the important aspects like attitude & behavior. The results suggested that emotional intelligence is significantly related with individual attitude and behavior and ultimately job performance.

Hopkins and Yonker (2015) investigated the critical relationship between emotional intelligence abilities and conflict management styles in the workplace. The study encompassing 126 participants indicated that the EI abilities of problem solving, social responsibility, and impulse control were the most directly related to how participants managed conflict at the workplace which has practical implications for management development purposes.

Shalini Srivastava et. al.(2016)examined the impact of demographic variables on the level of emotional intelligence and job burnout, among the employees of private sector organizations located in Delhi and NCR. It was found that there was no significant relationship between emotional intelligence and job burnout with respect to demographic variables, namely, age and gender

Akhtar W et. al., (2017) studied the moderating role of perceived organizational support in the relationship between EI and job performance among the bank employees in Islamabad. The result of the study revealed that the emotional intelligence has a positive impact on job performance and also reveals that the relationship between emotional intelligence and job performance will be stronger when Perceived Organizational Support is high.

Simarjeet Makkar and Sriparna Basu (2017)investigated the impact of EI on the workplace behavior of the employees in the Indian banking sector. The employees from six banks were selected for the study, three public sector and three private sector banks in Mumbai are included for the study. Their study aimed to analyze the impact of EI on work place behavior of the employees in the banks and also compared the behavior of the public sector bank employees with private sector bank employees. They found

that there is a strong relationship between emotional intelligence and workplace behavior of employees and also there is significant difference between the employees' behavior of public sector and private sector banks.

1.6 Research Amplifications:

Emotional Intelligence is one major element which is having its influence either in personal or in organizational life too.so to manage EI, it is required for everyone to concentrate on four attributes of EI. (Self management, self awareness, social awareness, and relationship management.) Especially here will define in the context of banking sector, which is a service industry. The concentration in service oriented organizations either it is a private sector or public sector bank, EI has its own strength. As the organizational climate, working nature, customer relationships all will play an important role in managing the organization. With LPG concept, every organization is being stressed and has become competitive to make themselves satisfied to reach customers.

For instance if you take an example of two banks(ICICI,BOB) from private sector, and public sector, in present era the two banks are almost in similar stage in its operations like customer relations, ,reachability satisfaction towards customers, Stress, concentrating in growth perspectives and so on.

1.7 Findings:

Based on a empirical research at a minimal level in a concentrative branches in Hyderabad region, which I have taken for understanding EI Levels in the above banks, it is shown that 78% of the employees in BOB are satisfied towards work environment, while it is shown that 65% of the employees in ICICI are at satisfied level towards work environment.

It is also observed that the EI levels of BOB Employees are at moderate level, and for the employees in ICICI are also at moderate level. To give more analyzation about this, many factors will come into picture. The factors considered are relation with superiors/subordinates, working abilities, correlation towards inter-departments, stress levels in the organization, growth and support, scope for improvement.

Based on the findings, it is clear that both the organizational employees are not having high EI levels, the reasons are highly varied from one to another, but its highly required to manage EI levels, because managing EI at organizational levels will provide many benefits not only for the employees for the organizations too.

II. CONCLUSION

To summarize the topic, EI management is highly required for managing the people and organization too. For the same, it is essential on their own parts they need to concentrate on essential attributes of EI. Concentration on the four essential areas will give a clarified picture of all the required areas for management of self and others too. To meet the expectations in 21st century, many factors need to be considered and need to be managed.one such a element which requires to be managed all the times is EI.

AUTHORS

First Author – B. Gayatri, Asst. Professor, ICBM-SBE,
Hyderabad, Email: gayathri.bodapati@gmail.com

Mitigation of Undervoltage in Distribution Networks Using an Automatic Load Shedding Scheme to Curtail Voltage Collapse

Kaigumba Paddy*, Dr.Bakkabulindi Geoffrey**, Proff.Okidi Lating Peter***

* Graduate Student, Department of Electrical and Computer Engineering College of Engineering, Design, Art and Technology Makerere University, Kampala Uganda.

** Senior Lecture, Department of Electrical and Computer Engineering College of Engineering, Design, Art and Technology Makerere University, Kampala Uganda.

*** Senior Lecture, Department of Electrical and Computer Engineering College of Engineering, Design, Art and Technology Makerere University, Kampala Uganda.

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Abstract- Undervoltage is still a power quality problem globally with several interventions like reactive power compensation in generation stations, transmission, and distribution lines. This issue still prevails in Uganda's power system network that has experienced five blackouts within five months in 2020. Most utility companies have resorted to automatic under voltage load shedding schemes as a safety net to mitigate undervoltage. This study purposely sought to develop and implement an automatic undervoltage load shedding relay in Physical Security Information Management (PSIM) software for mitigation of undervoltage in the distribution network. The study specifically was to design part of Uganda power system distribution network in DIgSILENT, develop an automatic undervoltage load shedding relay and lastly validate the undervoltage load shedding relay solution. The modelled network showed a percentage voltage deviation that was within the acceptable error margin.

The study results showed total distribution and transmission power output loss after network simulation with DIgSILENT software was 18.3% as compared with 21% loss from Umeme Limited (approx.17%) and Uganda Electricity Transmission Company Limited UETCL(approx.4%). It also shows a balance power system network after executing simulation that is load flow of active power 750.45MW, and reactive power 360.66 MVar is balanced with the simulated generation station power supply active power 769.46MW, and reactive power 246.28MVar. There is an excess of generation power to load demand of approximately 434.727MW. PSIM results showed that at a voltage below 118.8kV, 29.7kV, and 9.9kV for the voltage supply of 132kV, 33kV and 11kV respectively will shed off the lines/feeders. Validated PSIM results revealed 0.094% of total harmonic distortion (THD) compared to 3% (THD) for the 22kV to 400kV range according to Western Power Distribution. This is evident by

98% active power flow from the generation station to end-users. It implies that there is stability and good voltage regulation.

The study recommends the use of undervoltage load shedding relay in PSIM to improve the reliability of the power network. The technique Under Voltage Load Shedding Scheme (UVLS) is only activated as a final intervention/mitigation measure to shed offload after a sustained undervoltage for more than one minute.

Index Terms- Automatic Undervoltage Load Shedding Relay, Distribution Network, Mitigation, Undervoltage, and Voltage Collapse.

I. INTRODUCTION

Undervoltage is the phenomenon in the power network whereby the applied voltage drops to 90% of rated voltage, or less, for at least one minute [15]. It can be caused by several factors which can be categorized as power system overload and the equipment operations [5]. Therefore, an undervoltage load shedding plan can confine the voltage deficit in the generation or transmission within a certain allowable minimum geographical area [1]. Power system disturbances like undersized or overloaded utility and facility transformers, long distance electricity transmission, natural calamity, lighting, poor load balancing etc. [15] causes undervoltage as the load exceeds the supply thereby making the line voltage to drop, below the rated or generated value or level [19]. Considering sub-Saharan Africa, only approximately 28 percent of health facilities have access to reliable electricity and this is worsen by serious pandemic diseases like COVID-19 [20]. The electricity distribution requires a very robust, sensitive, coordinated, fast-acting, dependable, and selective advanced digital protection relay like automatic undervoltage load shedding relay for reliable power supply [22].

II. LITERATURE REVIEW

In Uganda, contemporary voltage control actions includes, an automatic voltage regulator (AVR) [16], Motor-Generator Set [21], shunt capacitor banks [8], [9], transmission line shielding [4], tap switching transformer[3].and uninterruptible power supply (UPS)[2]. The system frequency control and load shedding are done by the system operator [12]. The approach so far employed has not been able to mitigate many of the problems associated with undervoltage on the distribution power line. However many studies have demonstrated the successful application of undevoltage load shedding relay in mitigating this problem in distribution lines [7]. Undervoltage load shedding (UVLS) is based on the possibility of disconnecting some loads (or percentages of load) after a severe disturbance, in order to relocate the operating point far from the critical voltage value [14]. Many authors have proposed several UVLS scheme in literature reviews to load shed network lines when the voltage is completely out of operating range for our case $\pm 10\%$ for high voltage lines instituted by electricity regulatory authority of Uganda. A lot of classical strategies (constant amount or percentage of load are shedded off) have been explored [5]. However, these are not applicable for a complex system that is dynamic in nature. Several classical methods like use of centralized and decentralized load shedding and homogeneous load shedding were emphasize by authors [13]; [10]; [11]; [5]. Also other methods includes mathematical techniques such as linear programming (LP), nonlinear programming but the short fall is that, these algorithms require approximations of the power system model to reduce the calculation time [17]. Another optimization method used to improve load shedding automation was particle swarm optimization (PSO) quoted by Zomaya and Olariu, (2006); Kennedy and Eberhart, (1995), which were applied to improve load shedding automation [22]. A mixture or blended methods named heuristic technique (PSO and Generic Algorithm) by Amraee, et al (2007) was used to achieve an optimal load-shedding algorithm for ULVS scheme. These methods and techniques are good enough though its base on bus voltage magnitude. However, given the complex nature of modern network, it is really hard to attain power system operating conditions as contrasted by (Mozina, 2007).

III. METHODOLOGY

Research Design

The research design combined a mixture of both quantitative and qualitative designs. Largely the researcher interfaced with measurable and quantifiable data, which included; frequency, voltage, current, active & reactive power, impedances, Susceptance, GPS data, etcetera. This data formed a primary input which was used to describe the attribute of study.

Also the study utilized the case study method where only Kampala Industrial Business Park aka Namanve was considered for the study. Finally, modeling of the network using DiGSILENT and simulations of PSIM solution formed basis for experimental research.

Data Analysis and Presentation

The study used DiGSILENT (Digital Simulation of Electrical Networks) Software for modelling and simulating part of the Uganda power network system. Input data were from three-phase

synchronous generators, generation, transmission and load busbar data, transformers data, load data, and lines data. The input and output provided an insight into power load flow in the different generation, transmission, and load bus bars. The output from DiGSILENT was then passed to PSIM for the implementation of the required UVLS scheme to mitigate the undervoltage in the distribution network.

PSIM is an acronym for physical security information management developed by Powersim and used to model and simulate undervoltage load shedding relay. It is electronic circuit simulation software with applications in power electronics and motor drives. Data presented in form of tables, graphs, snapshot pictures.

Chronological Undervoltage Load Shedding Algorithm

In the scenario where the measure network voltage is less than the minimum set voltage value, then undervoltage load shedding relay is activated and shed off some block of load. The undervoltage load shedding relay continues to shed off more load under abnormal condition not until the network become stable again. In case the voltage value is optimal to the set point, the network status remain normal with no load shedding action.

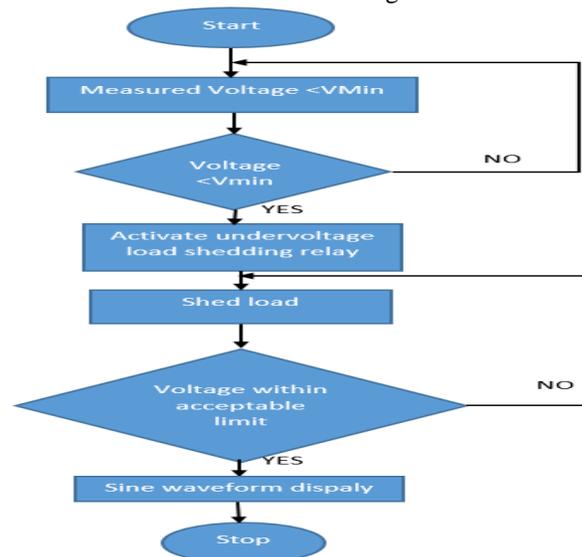


Fig.1. Shows undervoltage load shedding sequential algorithm

IV. PRESENTATION OF RESULTS

A. DATA COLLECTION.

Power system network modelling requires inputs data from generators, loads, step-up and step down transformers, generation and load busbars, and transmission and distribution lines data. Lots of data were collected to aid in modelling part of the Uganda network. These data were collected from Uganda Electricity Transmission Company Limited, Umeme Limited, the internet, and direct face-to-face interactions with the utility staff and workers in some industries within the Kampala Industrial Business Park aka Namanve.

Power Flow Analysis in DiGSILENT Power Factory

It is necessary to perform a load flow calculation to obtain voltage magnitude (V), voltage angle (J), active (P), and reactive (Q)

power flow on nodal/bus branches to inform the researcher how well the networks are performing.

B. NETWORK DIGSILENT SIMULATION SOFTWARE.

All the technical data of lines, busbar, generators, shunt, and transformers were input in the DIGSILENT software and simulated as shown in the graphic diagram Fig.6.

Isimba synchronous machine is connected at the top via a three-phase step-up transformer (11/132kV) in an overhead bare conductor line to Bujagali generator double busbar arrangement. Bujagali synchronous machine is at the extreme top right of the graphic window and connected to the same generator busbar via a three-phase step-up transformer from 11kV to 132kV. Nalubaale & Kira synchronous machines are connected to Bujagali generator double busbar system via 132kV overhead bare conductor line as well. Other sources of power (solar, thermal etc.) are connected at the Namanve (2) 33kV substation for purpose of this study.

At the extreme bottom, are the industrial load which includes Roofing rolling mill, Orion, Steel & Tube, Rwenzori, Coca-Cola and Century bottling company that were selected for this study. There is two independent power supply circuit to the Kampala Industrial and Business Park. The first one is 132kV overhead bare conductor lines right from Nalubaale & Kira HPP to GIS Namanve 132kV substation. The second is the 132kV overhead bare conductor line from Bujagali 132kV substation to Kawanda, Lugogo and lastly to Namanve 132kV substations.

The simulated Load Results

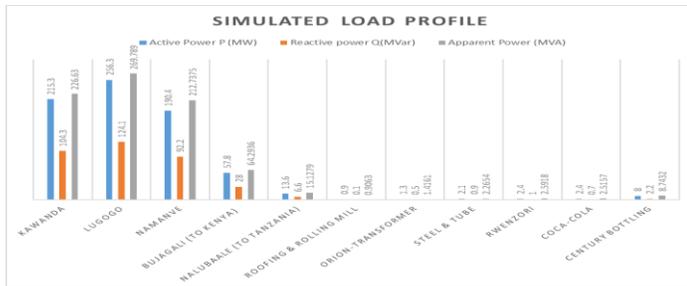


Fig.2. Bar graph showing the load active, reactive and apparent power at different busbars (extracted from DIGSILENT Simulation).

The bar graph indicates that the Lugogo busbar has the highest active load (269.789MW) and reactive load (124.1MVar) connected followed by Kawanda busbar reactive load (226.63MW) and reactive load (104.3MVar). The lowest load connection is at Roofing rolling mill with active load (0.9MW) and reactive load (0.1MVar).

Simulated Generation Power Flow Output

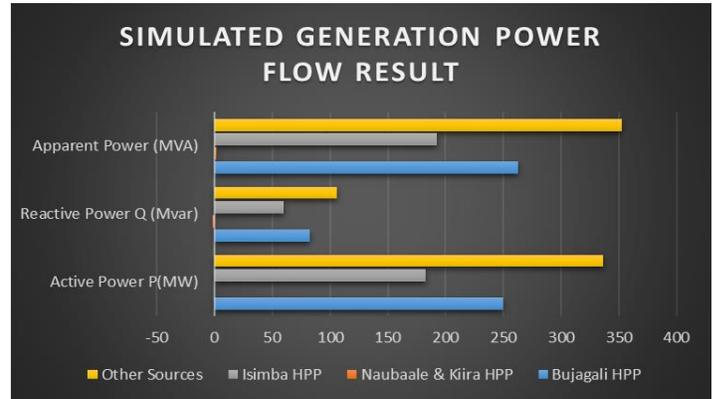


Fig.3. Bar graph showing generation stations active, reactive and apparent power in Uganda

The simulated generation results show that other sources (Solar, thermal, etc.) have the highest active power generation (336.46MW), reactive power (107.53 MVar) followed by Bujagali with active power (250MW), reactive power (82.2MVar). Isimba HPP active power (183MW), reactive power (60.1MVar) and lastly Nalubaale & Kira HPP not generating any active power but instead absorbing MegaVar of about (-1.55MVar).

Network under normal condition

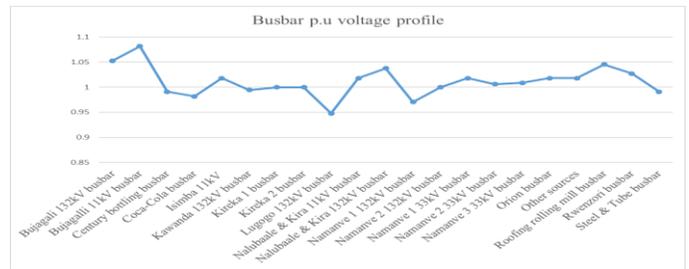


Fig. 4. The line graph shows a busbar p.u line to line voltage profile

The normal network condition line graph above indicates that Bujagali, Isimba, Nalubaale & Kira, Namanve, Orion, other sources (Solar, thermal etc.), Roofing rolling mill, Rwenzori, Century bottling and Coca-Cola line to line busbar voltage are higher than the design busbar line to line voltages of 132kV, 33kV and 11kV. The Kireka 1&2, Lugogo, Kawanda and Steel & Tube line to line busbar voltages are lower than the design busbar voltages and would be the best candidates for disconnection except that they still fall within the ±10% regulated value by the Electricity Regulatory Authority of Uganda

Network under abnormal condition

The network behavior under supply side contingency condition is shown in fig. 5. When the faults originated from the supply side say Bujagali hydropower station disconnected from the grid and run in island situation or out of service, the network changes as indicated by red curve contrasted to original blue curve. Therefore Bujagali 132kV, Century bottling, Coca-Cola, Isimba 11kV and 1132kV, Lugogo 132kV, Nalubaale 11kV and 132kV, Namanve 2 132kV, Namanve 2 33kV and Namanve 3 33kV are weak busbars and qualified candidates for disconnection since are below the required voltage range (0.9 p.u.). Load shedding the load connected at Bujagali 132kV busbar, the network condition improved as seen in dark blue curve. Finally, load shedding

Bujagli, Kawanda and Nalubaale 132kV connected loads altogether normalizes the network approximately close to the original network condition (operating point) because practically it is impossible for the network to attain its previous status before disturbance as seen in orange curve.

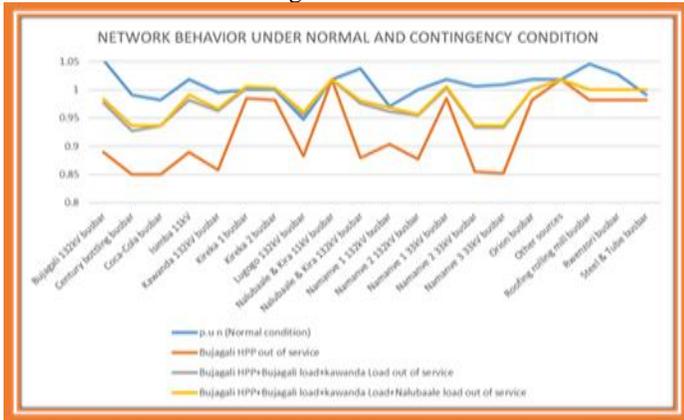


Fig.5. shows network behavior under normal and contingency condition

Experiment of Undervoltage Load

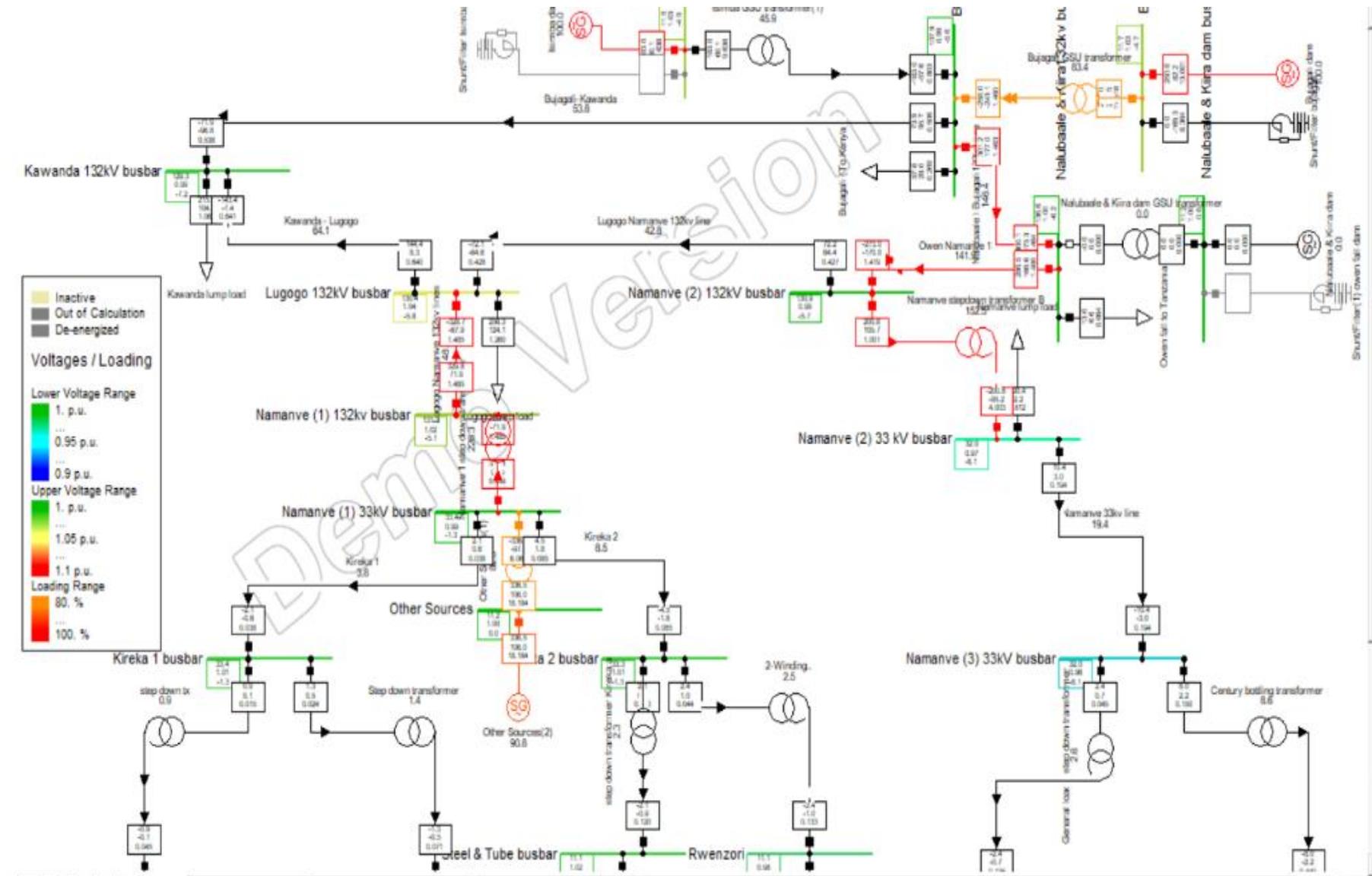


Fig. 6. DIgSILENT Simulation Results in Graphic Window

In a scenario where the faults originated from the demand side in Fig.7, below, say Rwenzori busbar fault, the network condition changes as seen in blue curve and Rwenzori busbar loads became the candidates for disconnection. So it's the same with the Century bottling company in the yellow curve and Roofing milling company busbar indicated by dark green curve since they all fall out of the required voltage range of (0.9p.u).

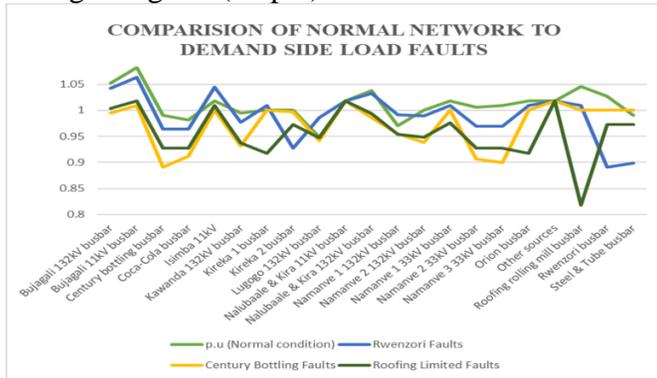


Fig.7. shows comparison of normal network to demand side load faults.

C. PHYSICAL SECURITY INFORMATION MANAGEMENT SOFTWARE (PSIM).

Development of an Automatic Undervoltage Load Shedding Relay

PSIM software was used to develop an automatic undervoltage load shedding relays are installed at decentralized and centralized locations in the network. The network parameters like voltage, current, active, reactive power and power factors served as the inputs to the UVLS relay settings. The behaviors of the UVLS relay is directly dependent on the network characteristics/condition at a certain instant. Under normal power network conditions, the UVLS relay is not expected to disconnect any lines and voltage and current waveform output displayed in Fig.9 & Fig.10, respectively. However, for contingency conditions weak busbars/lines according to set criteria and guidelines (0.9 p.u) as illustrated in Fig. 6 & Fig.7, are disconnected hence no potential across the affected lines.

Simulation of an Automated Undervoltage Load Shedding Relay under Normal Network Condition

Load voltage

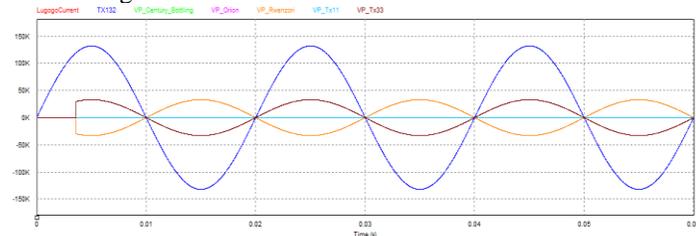


Fig. 8. Voltage Waveform under normal power network condition

Load current

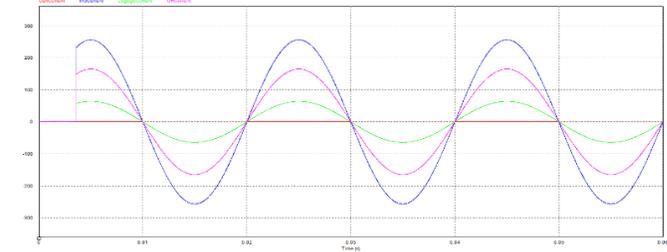


Fig.9.Current Waveform under a normal power network condition

Simulation of an Automatic Undervoltage Load Shedding Relay during Network Contingency

Network contingency means either the network cannot evacuate power from generating stations to the loads due to network disturbances or the quality of power delivered is not good. When the supply voltage to the primary side of transformers is less than the lower limit of the circuit voltage of 118.8kV, 29.7kV, and 9.9kV, that is the regulated -10% voltage range by the Electricity Regulatory Authority of Uganda, it falls in the undervoltage region. It then by default becomes a candidate for disconnection from the power network. Therefore, there will be no voltage potential and current flow in the network after the undervoltage load shedding relay is activated.

D. VAIDATION OF THE UNDERVOLTAGE LOAD SHEDDING RELAY SOLUTION.

Power Loss Analysis

TABLE 1. Simulated power load loss analysis

DIGSILENT		Project:	
PowerFactory		Date: 3/9/2021	
15.1.6			
Load Flow Calculation			
Complete System Report: Substations, Voltage Profiles, Grid Interchange			
AC Load Flow, balanced, positive sequence	Automatic Model Adaptation for Convergence	No	
Automatic Tap Adjust of Transformers	Max. Acceptable Load Flow Error for	1.00 kVA	
Consider Reactive Power Limits	Model Equations	0.10 %	
Total System Summary			
Study Case: Study Case		Annex: / 10	
Generation	Motor Load	Load	External
[MW]/	[MW]/	[MW]/	[MW]/
[Mvar]	[Mvar]	[Mvar]	[Mvar]
769.46	0.00	750.47	0.00
248.28	0.00	360.66	-169.30
Inter Area Flow		Total Losses	Load Losses
[MW]/		[MW]/	[MW]/
[Mvar]		[Mvar]	[Mvar]
0.00		18.99	18.99
0.00		56.93	78.97
			-22.05
Total:			
769.46	0.00	750.47	0.00
248.28	0.00	360.66	-169.30
		18.99	18.99
		56.93	78.97
			-22.05

Looking at the last row in the table above from DIGSILENT power loss analysis, no-load losses are (-22.05) MVar & 0MW and the load losses are 18.99 MW & 78.97MVar making total load losses of 18.99MW & 56.93 MVar.

The total Active power load loss = (18.99/750.47)*100%. Approx. =2.5%

The total reactive power load loss = (56.93/360.66)*100. Approx. =15.8%

Therefore the total load power loss =18.3%

Experiment of Undervoltage Load Shedding Relay Simulation in PSIM

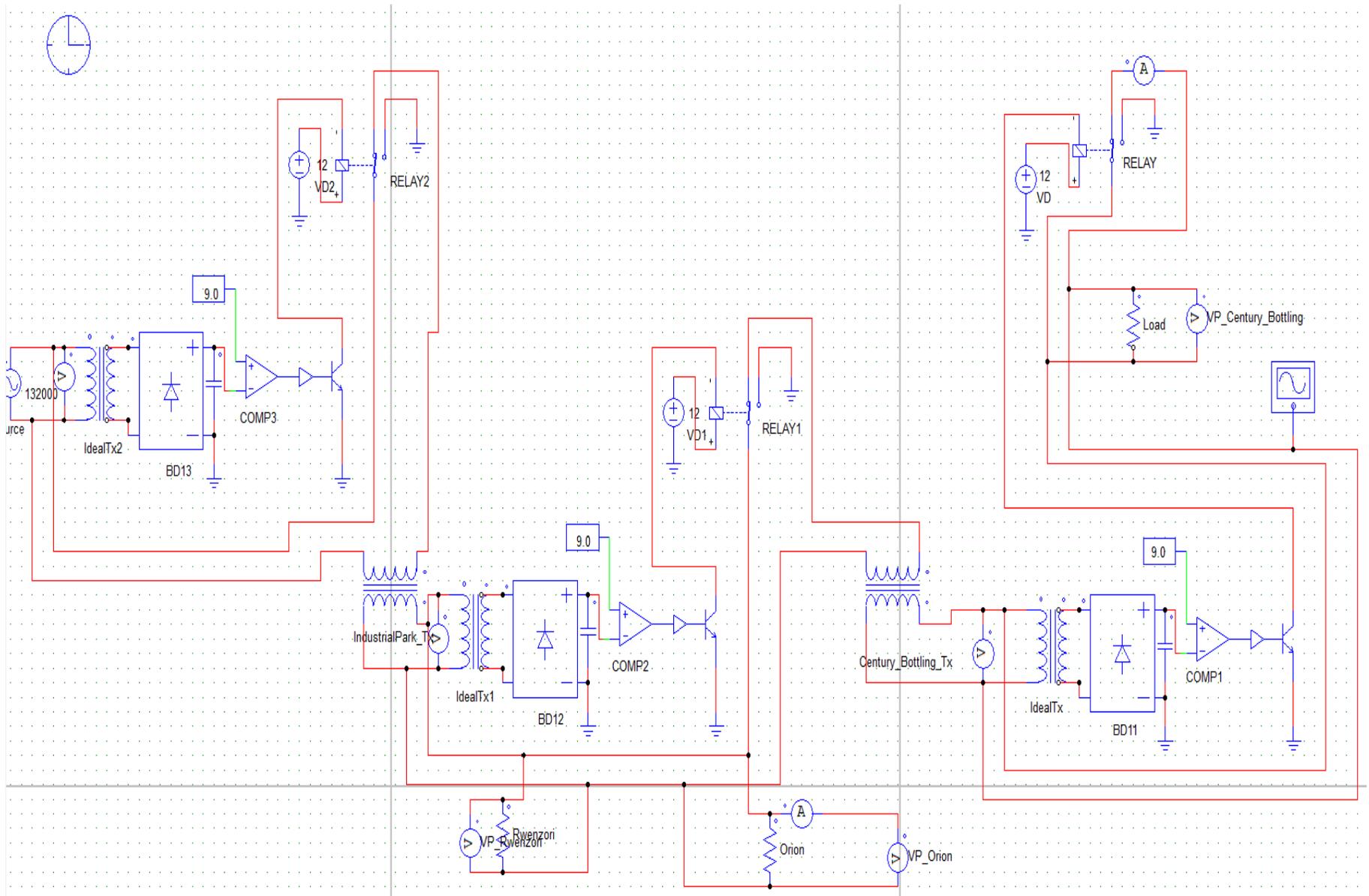


Fig.10. Undervoltage load shedding relay simulation diagram

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<http://dx.doi.org/10.29322/IJSRP.12.08.2022.p12828>

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Model Voltage Validation

The collected secondary data from Umeme Ltd & UETCL were compared with the simulated busbar data. The percentage voltage deviation was calculated. Line graph Fig.11, gives more representation of voltage deviation.

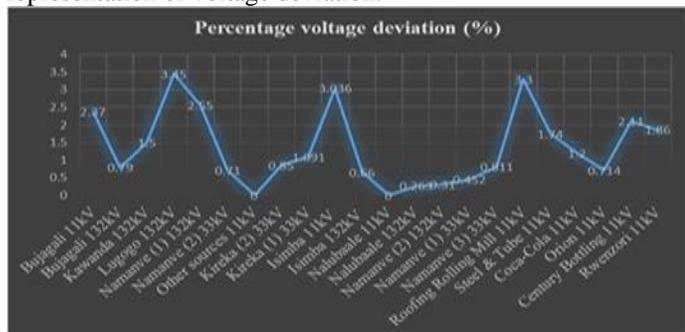


Fig.11.Line graph shows percentage voltage deviations

The line graph shows a percentage voltage deviation between actual Umeme Ltd & UETCL busbar and real DIGSILENT simulation busbar voltages. At Nalubaale 11kV busbar and other sources (Solar, Thermal etc.), the voltage difference gives zero percentage. Lugogo 132kV has the highest variation of 3.45% followed by the rolling mill busbar at 3.3%. The overall voltage variation range is (0-4) %.

Total Harmonic Distortion

Analyzing the total harmonic distortion (THD) in the voltage waveform in Fig.12, below, the voltage distortion of 0.00094114674 (0.094%) is output which is far much less than the THD for high voltage seen in table 2 below. The low THD imply that power quality is good with a low voltage drop in the PSIM simulation.

TABLE 2. Summary of THD planning level

System voltage at the point of connection	Design network application	THD Percentage limit
400V	LV	5%
6.6kV, 11kV & 20kV	6.6kV & 11kV (MV)	4%
22kV to 400kV	33kV, 66kV & 132kV(EHV)	3%

Secondary source: (Western power distribution: power quality, nd)

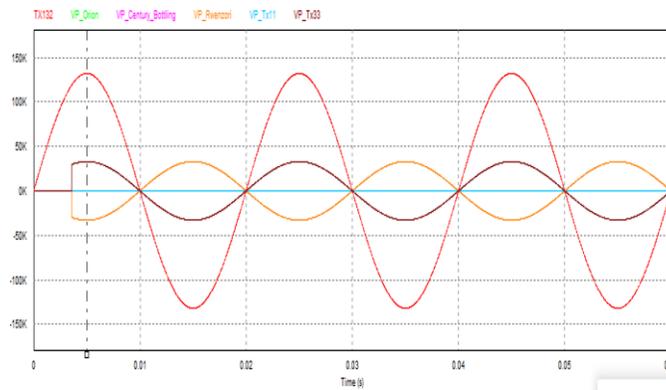


Fig. 12. Total Harmonic Distortion (THD) display

V. CONCLUSION

This research details a load shedding scheme that acts as a safety net (last intervention) for the power system network to curtail voltage collapse that would subsequently result in a power blackout. The network supplying power to Kampala Industrial and Business Park (KIBP) Namanve which doubles as an industrial hub and centre for economic development was modelled and simulated as a case study. This undervoltage load shedding solution can be applied to the whole Uganda network since it can easily be configured to work with any existing numerical relays in the network. Unlike the manual erroneous intervention by the system operator for load shedding, the undervoltage load shedding relays that are designed to be installed at decentralized and centralized locations in the network automatically disconnect the lines with faults prioritizing different networks according to the set criteria and UVLS guidelines. The restoration of the disconnected lines can only be possible after faults clearance by the protection team since this solution acts as a last resort.

The proposed use of undervoltage load shedding relay in PSIM technique is a good solution that optimally disconnects the weak busbars bringing back the network close to its operating point, and reduced total harmonic distortion thereby improving the voltage regulation of the distribution lines. However, it has issue of scalability because it cannot allow more than six electrical loads and it only considers the voltage as a base for load shedding. The automatic UVLS relay solution in PSIM can be used by the utility companies in Uganda to mitigate the undervoltage issues by knocking off weak busbars, reducing total harmonic distortion, improving voltage regulation, and increasing power grid efficient through improving the system power factor.

VI. ACKNOWLEDGMENT

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AUTHORS

Kaigumba Paddy, Graduate Student, Department of Electrical and Computer Engineering College of Engineering, Design, Art and Technology, Makerere University, Kampala Uganda.
Dr. Bakkabulindi Geoffrey, Senior Lecture, Department of Electrical and Computer Engineering College of Engineering, Design, Art and Technology, Makerere University, Kampala Uganda.
Proff. Okidi Lating Peter, Senior Lecture, Department of Electrical and Computer Engineering College of Engineering, Design, Art and Technology Makerere University, Kampala Uganda.

Architectural Design for Security and Safety in Nigeria: A case of Selected Institutions in South-West, Nigeria.

Adebowale FOLORUNSO, Teminijesu Isreal OKE, and Ifeoluwa AKANDE

Department of Architecture, Bells University of Technology, Ota, Ogun State, Nigeria.

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Abstract- More recently, the protection of the environment has received growing attention with the integration of different security measures considering the nature of the built environment, and a drive on the need to take responsibility for its design, construction, and operations. The aim of this study was to explore architectural design as a means to solve the safety and security challenges of the built environment towards surviving extreme antisocial behaviour in Nigeria. The study employed a qualitative research approach and combined, observations and content analysis. The result of the study showed that the institution under analysis used several elements considered in designing for safe living. From the analysis of findings, passive security measures were applied to deter potential threats around buildings. The passive security features which were employed include access control, perimeter fencing, adequate stand-off, hardened landscape elements, and barricades. All the studied facilities employed perimeter fencing to activate the first line of defence and define their boundaries, while the application of concrete planters as a hardened anti-intrusion element was not imminent. Conclusively, proper architecture design stands at the centre stage of responsibly thinking through design in addressing the security needs of the building and its occupants, depending on the scope and functionality.

Index Terms- Security, Safety, Architecture, Design and Design

I. INTRODUCTION

The fundamental principle of designing for safety and security in built form is to ensure that building occupiers are safe and secured either in case of emergency events or normal living conditions (Farzaneh, et al., 2021). Architecture in its real sense provides comfort, yet provides an integrated approach to improve the building design such that it is safer to construct and operate, thus providing a feeling of safety and security (Zahid, Elmansoury, & Yaagoubi, 2021). Security gaps and trials certainly do manifest and for a while have been a major concern in so many states in Nigeria. Public places or functions of large gatherings are often targeted, probably because they attract a lot of traffic and are easily accessible (Adedayo, Ailoyafen, & Adebayo, 2017). All manners of attacks ranging from insurgency and terror attacks, kidnappings and hostage-takings for monetary ransoms, and shooting among others have been observed to be a common occurrence in facilities with functions ranging from administrative to religious as well as commercial establishments. The first abduction involving the kidnap of school children in Nigeria took place in 2014 when 276 girls were taken from the Government Secondary School in Chibok. Ever since, similar attacks had spread across the northern part of the country, and abductions of students have grown in numbers (Kaalu, 2021).

According to Adedayo et al., (2017), building security takes into consideration the actions of people planning to cause an attack. This emphasizes the concept of security as it relates to the concept of safety and reliability. Building security protects the building, its facilities and users from potential threats that can cause any further damage to the building or its inhabitants (Sowemimo, Okon, Ugwoke, Oyewole, & Akande, 2021). To this end, the issue of security and the need to identify intruders goes beyond installing high-technology electronic systems in buildings, rather focus should be on the need to conceptualize the design stage to capture the process of planning and designing to wade off attack or at least delay possible occurrence (Pal, Zhang, & Siyal, 2021). Possibly, there might not be a well-structured preventive measure or a perfect solution when considering design for safety and security, but there are multi-disciplinary design approaches that could be employed to create a safer environment and improve quality of life.

Unarguably, we are living in a time where various threats exist all around us, and these must be accounted for without recourse. Critical thinking then becomes crucial to combat these threats as much as possible. This way, it becomes imperative to consider an inclusive architectural design at the forefront of an attempt to contain all aspects of spatial vulnerability and environmental security. Therefore, the objectives of this study are to:

- i. identify the parameters considered in designing for safety and security;
- ii. highlight building design and planning practices that are more proactive rather than reactive.

II. METHODOLOGY

This study employed the use of personal observation (in form of a physical survey) and scheduled interviews. The non-probability sampling method was used to select 3 private universities from 3 different states. The three states were picked at random out of the six states within the southwest geo-political zone of Nigeria. The state and bases of selection were on the condition that they share common characteristics with Nigerian states that have experienced (external/insurgent) attacks in time past or strictly because of their geographical, economic, and political importance. See table 1 for site justification.

Table 1: Justification for Site Selection

S/N	State	Justification for selection
1	Ogun	Border town, industrial zone and has a high number of higher institutions of learning
1.	Oyo	Political influence and has a lot of agrarian land supposedly under attack by
2.	Kwara	Geo-political location (North central)

Overview of Study Area

The study area will include three (3) states from the South Western part of Nigeria, namely; Oyo, Ogun, and Kwara state. Oyo state is a traditional city and has the premier University, Ogun state is a border town and industrial hub, and Kwara state because it exhibits and often identifies with Northern Nigeria.

Oyo State (Ibadan)

Oyo State is one of the fastest developing states, located southwest of Nigeria between latitude 6⁰45'N 7⁰15'N and longitude 2⁰30'E 4⁰30'E. Judging by its size, the state is ranked 14th in the country with a total land area of about 28,454km². The state is predominantly agrarian, complimented by other small businesses and commercial towns – with a population of 5,591,589 people according to the 2006 population census. It is characterized (by a predilection for living in high-density urban centres (Adegoke and Jegede, 2016). Oyo state is geographically located about 128 km from Lagos - a city attested to have birthed formal planning. Ibadan is the capital of Oyo state and was the colonial administrative headquarters for the south-western region (fig.1).

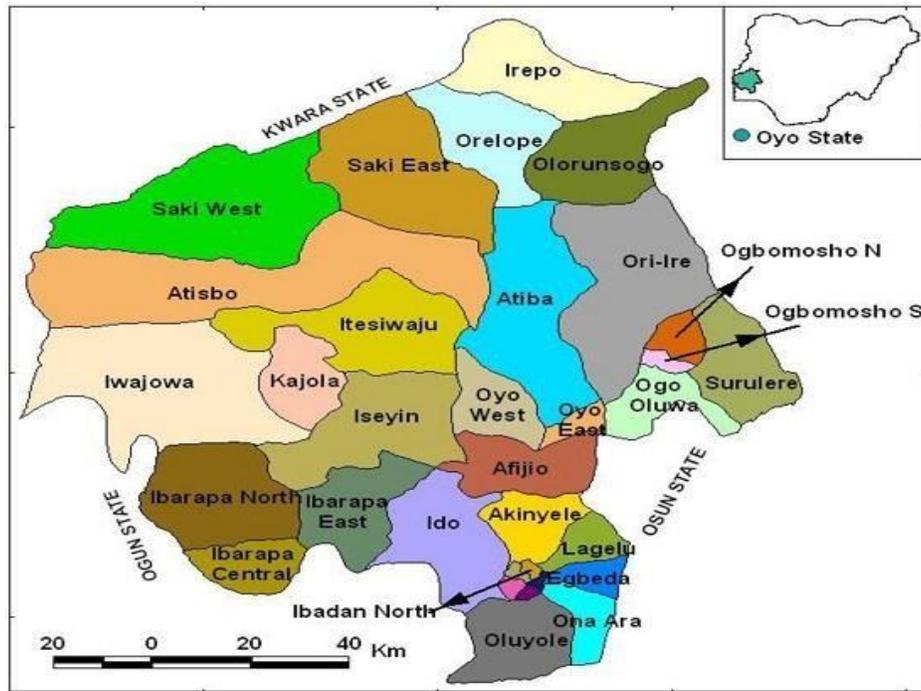


Figure 1: Map of Oyo State (Google images, 2021) Ogun State (Ota)

Ogun state also referred to as “the Gateway State”, is majorly considered a manufacturing hub because it has a high concentration of industrial estates; the largest industrial centre with significant industrial capacity in West Africa. Considering its land mass, the state covers an area of 16,409.26 km², which is 80% arable land suitable for agriculture, grazing, and industrialization. This provides a ground for partnership and cooperation with the private sector to cater to its population of 3.751million. However, the study focus of the study will be Ota (an industrial hub of Ogun State) which is the capital of the Ado-Odo Local Government Area. It covers an area of 878 square kilometers and lies between latitude 6°41'N, 6°68'N and longitude 3°41'E, 3°68'E (fig.2)

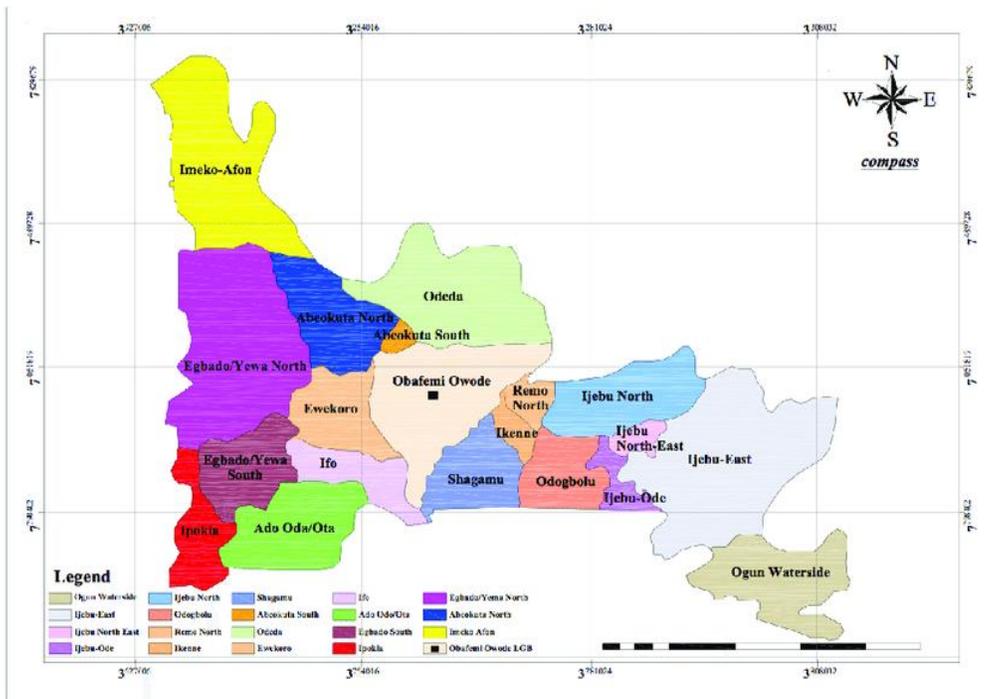


Figure 2: Regional settings of Ogun State showing the LGAs (Google images, 2021) Kwara State (Ilorin)

Ilorin performs the dual role of being the commercial and administrative capital of Kwara State. Ilorin city occupies an area of about 468 km² and it is located at latitudes 8°30', 8°50'N and longitude 4°20', 4°35'E (fig.3). The growth has been attributed to the centrality of Kwara state, which thus impacts commerce, industrialization, and other social aspects. Moreover, the state is sometimes regarded as Northcentral because of its geographical location which is about 300 km² away from Lagos and 500 km² away from Abuja the Federal Capital of Nigeria.



Figure 3: Regional map of Kwara State (Google images, 2021)

Sample Frame

The purposive sampling technique was used which gave access to selecting 3 private higher institutions, one from each state. The schools considered for the study are Bells University of Technology, Ota, Lead City University, Ibadan, and Al-Hikma University, and Ilorin.

Sample Population

The scheduled interview was conducted among postgraduate students of architecture from the selected higher institution of learning. Student perceptions of risk and safety, and violence were assessed. The interview which doubles as a dialogue session was used to assess active and passive design considerations and to quantify how well the physical elements of each school correspond to ideal Crime Prevention through Environmental Design (CPTED) principles.

III. RESULTS AND DISCUSSION

Data collected from the survey and observation schedule carried out in the course of the research are presented in tables. Table 2 shows the available security design in the case studies.

Table 2: Observable Security Elements

	Physical control		Standoff Zone			Natural surveillance		Site zoning	
	Security	Access control	Planter	Low-screen	Bollards	Landscape	Trees and Shrubs	Defined territory	Set-back
Bells Tech	√	√	-	√	√	√	√	√	√
Lead City	√	√	-	√	-	√	√	√	√
Al- hikma	√	√	√	√	-	√	√	√	√

Even though there are several urban design features that can be applied to mitigate security threats in public places, there are yet a considerable number of these elements that are absent based on the facts presented in table 2. All the schools sampled did not satisfy all the security elements that were assessed as concrete raised planter was missing in Bells University, likewise, Lead City University. This does not justify that they lack adequate security and safety measures, as there are other passive and active design measures to be considered. Assessments of these elements are done by following the CPTED principles, whilst addressing their level of usage.

Table 3: Elements of physical barrier

Observation	Features
	<p><u>Bells University</u></p> <ul style="list-style-type: none"> - Gated access/security post - Security personnel - Controlled access - Standoff distance - Perimeter fencing
	<p><u>Lead City University</u></p> <ul style="list-style-type: none"> - Reinforced gated entry point - Stand-by security - Setback/standoff zone - Pathway is well defined - Per
	<p><u>Al-Hikma University</u></p> <ul style="list-style-type: none"> - Gated entry point - Stand-by security guards - Setback/standoff zone - Pathway defined with bollards - Reinforced perimeter

The elements of physical barrier that were applied have been simplified and presented in table 3 which indicated that all the study sites employed similar physical control measures. Entry into the premises can only be possible through the pathways provisioned for vehicular and pedestrian movement through the gated entrance which is also manned by security personnel. The elements that were used to define the pathways are similar but yet different, but often between low-screen grasses and shrubs or bollards. It should be noted however that there is enough setback before the gate, which likewise serves as a standoff zone for intruders.

Table 4: Elements of safety control

Observation	Remark
	<p><u>Bells University</u></p> <ul style="list-style-type: none"> - Territorial reinforcements is obtainable - Nature defense strategy is visible - Pathway is well defined
	<p><u>Lead City University</u></p> <ul style="list-style-type: none"> - Defined territory and pathway - Nature defense strategy is visible
	<p><u>Al-Hikma University –</u></p> <ul style="list-style-type: none"> - The building perimeter is well defined - Pathway allows for easy entry and exit - Combines nature and passive defense mechanism

Table 4 highlights the elements of control obtainable and shows the extent to which it was applied in each case. It was observed that physical measures of security were present and the site defined through circulation paths, whilst serving as modalities to apply a level of control to the users. This informs the study that the security and safety design in these study sites responded well to nature design.

Building elements and safety concern

The result of the survey showed that different on-site security design elements were used at Bells University, Lead City University, and Al-Hikma University. It is also important to evaluate the effectiveness of these elements in relation to building design, the safety of the users, and security measures in case of an emergency. This was viewed from the positioning of openings, types of window, stairs design, use of smoke stop lobby, and also distinguishing between sensitive and non-sensitive areas to restrict movement, among other design possibilities.

Table 5: Safety concern for emergency considerations

	Entry		Openings		Circulation		Site zoning	
	Manned	Unmanned	Entry	Emergency exit	Lobby	Walkway	Defined Territory	Set- back
BellsTech	**	*	**	*	**	**	**	**
Lead city	*	-	**	*	**	**	**	**
Al-hikma	**	-	**	*	**	**	**	**

Key: ** very significant, and applicable in all buildings
* slightly applicable

Table 5 shows the degree how which many safety considerations were added to the building elements in all the site studies. It however indicated that most of the buildings do have entry points planned to allow ease of movement for building users. Most of these entry points are manned by security personnel as in the case of bells, while manned entries are very common to highly populated or sensitive zones (library, ICT centre, Senate building, for all the schools). The same situation is observable for building with an emergency exits.

Table 6: Assessing building emergency measures

S/N	Variable checklist	Level of application			Remark
		Bells	Lead city	Al-hikma	
1	Wayfinding	*	**	**	Fairly applied
2	Alarm system	*	*	*	Fairly applied
3	Emergency exit	*	*	*	Fairly applied
4	Mustard point	-	-	-	Not applied

Key: ** very significant, and applicable in all buildings
* slightly applicable

Table 6 expresses the degree of building responses to security concerns using a variable checklist including wayfinding, alarm system, provision of emergency exit, and allocation of mustard points. It was observed that wayfinding elements were not so significant in Bells University, while it is common practice to see inscriptions on the walls showing direction and exit signs in Lead city and Al-hikmah university. An alarm system and emergency exit are slightly applicable and only provisioned in the building of facilities that are used for administrative functions or fall within supposed sensitive zones – this is the case in all the study sites. Additionally, the mustard point was not visible at any of the sites.

IV. CONCLUSION AND RECOMMENDATION

Since security concern is considered an intentional measure, it is imminent to develop and incorporate key architectural considerations into crime prevention through environmental design theories. Concussively, the responsibility of ensuring a safe and secured environment should rather be a joint effort involving all allied professionals involved in environmental design and planning. In all, architecture stands at the centre stage of responsibly thinking through design in addressing the security needs of the building and its occupants, depending on the scope and functionality. Therefore, the study recommends all building development must comply with security standards, which can obviously be prepared to contain the security classifications of buildings, probably a case-by-case situation – private resident, educational building, office complex, or any other public building. There is also a need to balance the security variables base on the security needs of the building and its occupants.

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AUTHORS

First Author – Adebowale FOLORUNSO, Department of Architecture, Bells University of Technology, Ota, Ogun State, Nigeria.,
Email:folorunso.adebowale.oye@gmail.com

Second Author – Teminijesu Isreal OKE, Department of Architecture, Bells University of Technology, Ota, Ogun State, Nigeria.

Third Author – Ifeoluwa AKANDE, Department of Architecture, Bells University of Technology, Ota, Ogun State, Nigeria.

A review for a system to detect and notify phishing attacks in mobile phones.

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KKH Nethmini

*Department of Computer Science
General Sir John Kotelawala Defence
University*

Ratmalana, Sri Laanka.
36-cs-0020@kdu.ac.lk

NT Jayatilake

*Department of Computer Engineering
General Sir John Kotelawala Defence
University*

Ratmalana, Sri Laanka.
jayatilakan@kdu.ac.lk

Thushara Weerawardane

*Department of Computer Engineering
General Sir John Kotelawala Defence
University*

Ratmalana, Sri Laanka.
tlw@kdu.ac.lk

Abstract— Because of the advancement of technology, attackers have shifted their focus away from personal computers and onto smartphones, making mobile security a big concern these days. Furthermore, as technology advances, people are becoming more interested in cell phones. Smishing is a cyber security attack that uses the short message service to steal mobile users' personal information. Attackers have taken advantage of users' trust in their smart gadgets to carry out various mobile security exploits such as smishing. If there is a system or approach to identify these kinds of malicious attacks, it is very useful. This paper includes a survey conducted to get a clear idea on awareness of smishing attacks of people in society and identify the need for a system to detect smishing attacks. According to the survey, although a person with good experience with smishing attacks can detect a smishing attack by looking at the features, people who do not have proper knowledge and experience about smishing attacks may not recognize Smishing attacks properly. Moreover, the paper includes a literature survey along with summarized existing systems to detect smishing attacks. These systems have used algorithms and approaches. Some of them are machine learning algorithms, Random Forest algorithm, Feature-based technique, Optical Character Recognition, Tag & APK check, Rule-based approach, Naïve Bayes classifier, Heuristic approach, Support Vector Machine, Rank correlation algorithms, Decision tree, and Ada boost classifier. If a system or approach can work with high accuracy and efficiency that approach or system can be identified as a successful one.

Keywords— *Smishing, Algorithms, Optical Character Recognition (OCR), Machine learning, Mobile phones, Mobile security*

I. INTRODUCTION

Phishing is an online scam in which fraudulent e-mails, text messages, ads, and other methods are used to steal sensitive information. Phishing is a technology used by criminals to obtain sensitive information such as usernames or passwords. It's a social engineering technique. Malicious software such as ransomware, spyware, or a virus will be placed on your device if you open an attachment or click on a phishing link in these emails or messages that look to be from someone you know and trust. It normally takes place behind

the scenes, so the average individual is unaware. Phishing was the most common sort of cybercrime in 2020, according to the FBI, and phishing instances nearly doubled in frequency, from 114,702 in 2019 to 241,324 in 2020 [1]. The main types of phishing attacks are email phishing, spear phishing, Smishing, Vishing, HTTP phishing, etc.

Mobile phishing is a new danger that targets financial institutions, online retailers, and social networking sites mobile users. As Information Technology develops and grows, mobile phones have become an irreducible part of our daily lives. These devices are becoming more popular among consumers because of their extended battery life, tiny size, and portability. With the increased use of mobile cellphones, the security risk associated with these devices has also increased. Due to the small display of mobile phones, lack of understanding among mobile users, less secure user behaviors, and habits of users to enter their credentials frequently, mobile smartphones appear to be an easier target for attackers when compared to desktop devices.

Smishing is the type of phishing that can affect mobile phones. Smishing word comes by combining SMS and phishing words. Smishing is a popular phishing attack that sends text messages as it launches an attack on a cybersecurity unit in the company. Smishing is unknown to less than 35% of the population. It might be difficult for mobile users, particularly elderly users, to determine the legitimacy of a text message. One of the reasons SMS-based fraud is so successful is because of this [2]. The attacker sends a text message to the victim's phone, convincing them to click a link in the message. When the user clicks this link, one of two things happens: the user is taken to a phishing page where they are deceived into entering their login credentials, or the device is silently infected with surveillance malware. The attacker's ultimate goal is to get unauthorized access to the device's personal, sensitive, and corporate data stored and accessed. Because attackers may target a large number of users with a cheaper SMS subscription, text messages are chosen by attackers to target victims. In the case of text messages, smishers or attackers get a higher response rate from consumers than in the case of e-mails.

By 2021, smishing attacks have increased at a very high rate. Although the term "smishing" was coined in 2006, this type of assault was mostly unknown until recently. SMS- based scams increased by 328 percent in the middle of 2020, according to Proofpoint [3]. When the COVID-19 pandemic broke out, officials started sending out SMS messages regarding lockdowns, contact tracking, and vaccine alternatives. A flood of bogus SMS messages arose as a result of this. According to NextCaller, during the first two weeks of the nationwide quarantine period, 44 percent of US Americans reported a spike in scam phone calls and text messages [4].

This literature survey provides the methods which have been used by other researchers to detect these kinds of smishing attacks. Machine learning classification methods, Heuristic-based methods are used to extract the most efficient

features of smishing attacks using keywords inside a message. Algorithms like Backpropagation can be used to classify the messages. To analyze the malicious behavior of these kinds of attacks we can use tag check and APK download check. To find out whether an URL is phishing or not can use an algorithm based on heuristic anti-phishing technical approaches.

The remaining sections of this paper are as follows. The literature review includes what researchers have done so far to identify smishing attacks and what algorithms have been used for each system. The discussion section includes a survey done by using people in society to get an idea about their smishing awareness and collect their smishing attack experiences. Moreover, the discussion includes an experimental evaluation of algorithms and features used in existing systems. Finally, the paper includes a conclusion and further work.

II. LITERATURE REVIEW

This chapter includes a summary of some relevant research work done on detecting mobile phishing attacks, within the past 2 decades.

D. Soni and S. Mishra in 2019 have done research on a Content-Based Approach for detecting Smishing in Mobile Environment [5]. The authors proposed a system that has the ability to categorize text messages by using message contents and the behavior of the URL. They classified the message using a machine learning system based on malicious phrases in the message. They also implemented techniques like form tag check and APK download check to investigate the URL's harmful activity. Based on the results of the detection procedures, text messages will be categorized as malicious or non-malicious. Python is the language that is used to implement this system. Moreover, this system has the ability to identify a smishing attack when they receive to mobile phone and the message can be discarded if it is a smishing.

According to the research on Rule-based framework for Detection of Smishing Messages in Mobile Environment by A. K. Jain and B. B. Gupta in 2017 [6], it indicates that how the smishing attack impact the Short Message Service to steal personal details, bank credentials, login credentials, etc. As a solution authors have implemented a rule-based approach to identify smishing attacks. They used text normalization techniques to this system to convert SMS text messages to a standard form to get a better solution. After evaluating the performance of this system, they gained a 99% true negative rate for this system. Moreover, this system has the ability to detect zero-day attacks also. According to this evaluation, this system has a very efficient detection.

In 2014, L. Wu, X. Du, and J. Wu proposed a system named MobiFish [7] which is a lightweight anti-phishing scheme for mobile phones. By comparing the actual identification to the identity claimed by the web pages and Apps, MobiFish confirms the validity of web pages and apps. MobiFish solves this problem by employing optical character recognition (OCR), which can accurately extract text from a screenshot of a mobile login window, allowing the claimed identity to be validated. As the authors say MobiFish has been implemented in a Google Nexus 4 smartphone which has the Android 4.2 OS. Moreover, MobiFish can effectively identify phishing attacks and defend against them.

J. W. Joo, S. Y. Moon, S. Singh and J. H. Parkin 2017 proposed a system called S-detector [8], which describes an enhanced security model developed by authors for detecting smishing attacks for mobile computing. Naive Bayes classifier has been used for the smishing attack detection in smart devices part. This model has the ability to tell the difference between a regular text message and a Smishing message. And the statistical learning method is primarily used to filter. As a result, a text message may be analyzed and SMS phishing can be efficiently detected.

Feature-Based Approach for Detection of Smishing Messages in the Mobile Environment by A. K. Jain and B. B. Gupta in 2019 [9] proposed a method to detect phishing attack messages using a feature-based approach. This method has ten unique characteristics that detect false messages from real messages. These features were implemented on a benchmark database in this study and the performance of the proposed approach was assessed using various classification algorithms. According to the research results, the proposed approach has a true positive ratio of 94.20 percent and a smile message of 98.74 percent overall accuracy. Furthermore, the proposed method is highly effective in detecting zero-hour attacks.

In 2020, G. Sonowal on Detecting Phishing SMS Based on Multiple Correlation Algorithms. [10], states that because of the large number of features in Corpus, researchers have developed various anti-phishing methods and use correlation algorithms to investigate the relevance of features. As a result, this article uses a machine-learning method to compare four rank correlation algorithms, including Pearson rank correlation, Spearman's rank correlation, Kendall rank correlation, and point biserial rank correlation, to discover the optimum features set for detecting Smishing messages. The analysis found that the AdaBoost classifier had a higher level of accuracy. Further investigation reveals that the classifier with the ranking algorithm, Kendall rank correlation, outperformed the other correlation algorithms in terms of accuracy. According to the results of this experiment, the ranking algorithm was able to minimize the dimension of features by 61.53 percent while maintaining a 98.40 percent accuracy.

V. R. Hawanna & V. Y. Kulkarni. in 2016 did research based on the topic A Novel Algorithm to Detect Phishing URLs. [11] It gives a suggestion for an algorithm based on heuristic anti-phishing technical approaches to determine whether a URL is phishing or not in this work. This technique can be used to detect phishing URLs that are both old and new. In the case of known Phishing URLs, it can provide a very quick reaction. If the supplied URL is suspected of being phishing, this algorithm will display an alarm message. Otherwise, it will display a safe message. This algorithm allows users to acquire phishing results fast and easily by directly entering the URL as an input. This solution only works with HTTP URLs.

In 2018, Sonowal, G. & Kuppusamy suggested a model based on machine learning algorithms named "SmiDCA" for detecting smishing communications (Sonowal & Kuppusamy, 2018). Authors selected to extract the 39 most significant elements from smishing messages using correlation methods in their model. After that, they used four machine learning classifiers to assess their model's performance. Random Forest, Decision Tree, Support Vector Machine, and

AdaBoost were the four classifiers. With Random Forest Classifier, the experimental evaluation of this model revealed a 96.4 percent accuracy.

III. DISCUSSION

A. Analysis of Survey results

According to the above studies, there is a high probability that people will be affected by mobile phishing attacks. Therefore, a survey was conducted to get an idea of the awareness in the society about mobile phishing attacks. By using a group of 30 people between the ages of 20 and 50. The reason to choose that age limit is many people in that age limit are using smartphones nowadays. And also, they are using popular social media apps like Facebook, Messenger, and WhatsApp. Also, many people in that age limit regularly check their messages, emails to get in touch with updates in the world. So, their probability of getting affected by phishing attacks is high.

First, it was checked whether the selected people know about phishing attacks. For that question, 63.8% of people answered saying no. Only 36.7% of people have an idea about phishing attacks. Next, it was questioned to check whether they have received a message that pretended to be a mobile phishing attack. To those who don't have an idea about phishing attacks, it was provided an example message to identify. For this, 90% of people said that they have got a message like that at least once. Only 10% of people said they didn't receive that kind of message ever. From those who said yes, the survey asked about the media that they got that message. 93.3% of people answered as a text message, 56.7% answered by saying WhatsApp, 10% answered saying Instagram, 46.7% answered by saying Facebook messenger and 16.7% answered by saying email. So, the majority got mobile phishing attacks through text messages.

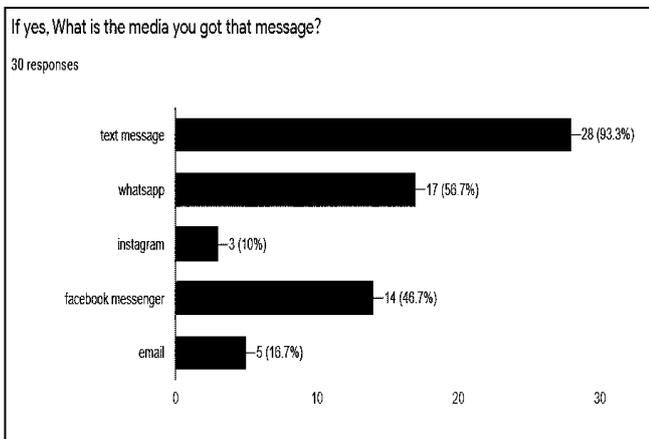


Figure 1: Mobile phishing attacks mostly coming ways

According to the data gathered from the survey, 90% of people have clicked a link in those phishing attack messages. Moreover, 66.7% of people have provided their private details which are asked through that link. Because of this thing they may get into trouble by proving private details to unauthorized parties. Then it was asked whether they have used a system or option which has the ability to identify a harmful phishing attack. 80% of the majority of people said no. Then finally, the survey asked whether it is useful and important to them if there is a system to detect and notify

mobile phishing attacks. So, the majority answered yes and it is 93.3%.

Question	Yes	No
Do you have an idea about phishing attack?	36.7% (11)	63.3% (19)
Have you ever received a message that seems to be an phishing attack? (Ex: Congratulations!! You won a brand new iphone. To purchase it go to the below link and provide your details. <link>)	90% (27)	10% (3)
Have you ever clicked that kind of messages?	90% (27)	10% (3)
Have you ever provided your private details to them?	66.7% (20)	33.3% (10)
Have you ever used a system or option to detect phishing attacks that prevents you by clicking those harmful links?	80% (24)	20% (6)
Do you think it's useful and important to have a system to detect and notify mobile phishing attacks?	93.3% (28)	6.7% (2)

Table 2: Survey questions and results

So according to information gathered through this survey, there is a huge need for a system to detect and notify mobile phishing attacks.

B. Analysis of the findings in the Literature Review

Table 2 shows the features applied in systems and approaches which were discussed in the literature review part. Existing research work has been done against machine learning algorithms, Random Forest algorithm, Feature-based technique, Optical Character Recognition, Tag & APK check, Rule-based approach, Naïve Bayes classifier, Heuristic approach, Support Vector Machine, Rank correlation algorithms, Decision tree, and Ada boost classifier.

Machine learning algorithms were used in many approaches. D. Soni and S. Mishra proposed a method using machine learning algorithms to detect mobile phishing attacks. Machine learning algorithms are used for the message classification part. Also, that approach includes tag check and APK check. Another approach was proposed by G. Sonowal which has machine learning algorithms along with correlational algorithms. A system named "SmiDCA" also includes machine learning algorithms with Random Forest, Decision tree algorithms, and ADA boost classifier. This Ada boost classifier is in another system along with the Heuristic approach proposed by Hawanna & Kulkarni. According to findings, another important classifier is the Ada boost Classifier. As the researchers show the AdaBoost classifier had a higher level of accuracy. Jain & Gupta implemented a system using rule-based algorithms. This classification algorithm was used to train nine outstanding rules which can identify mobile phishing attacks easily. J. W. Joo, S. Y. Moon, S. Singh and. J. H. Park proposed an approach with Naïve Bayes Classifier which has been used for the smishing attack detection in smart devices part. This model has the ability to tell the difference between a regular text message and a Smishing message.

Name of the paper	Tag & APK check	Machine learning algorithms	Rule based approach	Feature based technique	Optical Character Recognition	Naïve Bayes classifier	Heuristic approach	Random Forest	Rank correlation algorithms	Decision tree	Support Vector Machine	Ada boost classifier
(Soni & Mishra, 2019)	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
(Jain & Gupta, 2017)	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗
(Wu, et al., 2014)	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗
(Joo, et al., 2017)	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗
(Jain & Gupta, 2019)	✗	✗	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗
(Sonowal, 2020)	✗	✓	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗
(Hawanna & Kulkarni, 2016), 2016	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✓
SmiDCA (Sonowal & Kuppusamy, 2018)	✗	✓	✗	✗	✗	✗	✗	✓	✗	✓	✓	✓

Table 2: Algorithms and techniques used in each approach

Based on this analysis it can say that machine learning algorithms, random forest algorithms, and Ada boost classifiers are the techniques that were widely used in detecting smishing attacks. Moreover, these techniques have the ability to give results with more accuracy.

IV. CONCLUSION

Smartphones have become an attractive target for smishers due to a lack of information among mobile users regarding security measures and the users' less secure behavior. Smisher is a hacker who sends a text message to a victim with malicious URLs inserted in it. Smishing, often known as text-based phishing, is a common threat that targets mobile devices. Smishing attacks attempt to obtain private information from users by misleading and tricking them. This paper contains an overview of studies conducted by several researchers in order to detect mobile phishing attacks.

This research work includes the results of a survey conducted among individuals in society to raise awareness about mobile phishing attacks and to identify the need for a mobile phishing detection system. According to survey analysis, there is a huge need for such a system in society today. According to the review, the main identified phishing attack techniques are S-detector, Mobi-Fish, SmiDCA, etc. For detecting smishing attacks, researchers have used various approaches and algorithms. Widely used techniques and algorithms are machine learning algorithms, Random Forest algorithm, Feature-based technique, Optical

Character Recognition, Tag & APK check, Rule-based approach, Naïve Bayes classifier, Heuristic approach, Support Vector Machine, Rank correlation algorithms, Decision tree, and Ada boost classifier. Some systems have been made by combining two or three algorithms also. If an approach can produce a result with high accuracy it can identify as an approach with high accuracy.

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Income Tax Regulation and Legal Certainty from the Minister of Finance Regulation (PMK) Number 68 of 2022 concerning Crypto Asset Trading Transactions in Indonesia

Eva mayasari, Stiami

Student Graduated NPM BC211120192
Final Semester Exams, Tax on Income Course
STIAMI Student Graduated, Academic Year 2021/2022
evamayasari910@gmail.com

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Abstract-Regulations that accommodate the imposition of taxes on crypto assets are in line with the rampant transactions of these instruments in recent years, there has been no government policy towards the imposition of crypto asset taxes because the existence of regulations governing the taxation of crypto assets presents, on the one hand, the transactions of crypto assets are very large and can increase state income, on the other hand, the application of crypto assets is considered burdensome for crypto asset players. According to the government, the application of taxes on crypto is intended to equalize the treatment (same level of the playing field) with investment instruments on crypto and stock taxes. Crypto is not a currency or securities, but goods that contain other rights and interests in digital form. The implementation of trading through an electronic system or the so-called PPMSE has facilitated crypto asset trading transactions. This crypto asset transaction is also called an exchanger or physical trader of crypto assets (PFAK). Exchanges or PFAK registered with BAPPEBTI and providers of crypto asset wallet or electronic services, not only to investors but crypto tax rules are also imposed on crypto asset miners. The tax imposed is Income Tax. This research uses Qualitative research methods using a Literature Study The purpose of this study is to find out how income tax regulation and legal certainty on crypto asset trading transactions in Indonesia. Summed up 1. Award of the government collects crypto tax. the application of the tax on crypto is intended to equalize the treatment (same level of playing field) with investment instruments and a set of crypto in Indonesia has been regulated as a commodity item that can be traded on the futures exchange in accordance with the laws and regulations that the policy is included in an effort to increase state income. 2. Crypto assets in Indonesia have been legally traded, especially transactions carried out on physical traders of registered crypto assets. Not only that, tax regulations have also accommodated crypto transactions as tax objects, the policy is

regulated in the Minister of Finance Regulation No. 68 / PMK.03 / 2022 concerning Regulations on Value Added Tax and Income Tax on Crypto Asset Trading Transactions.

Index Terms-Crypto Assets, Additional capabilities, Legal Certainty, Commodities, digital goods.

I. INTRODUCTION

A. Background to the Problem

The crypto asset industry in Indonesia is still new. it needs a proper and non-restrictive regulatory review. Crypto Assets are intangible commodities that take the form of digital assets, using cryptography, peer-to-peer networks, and distributed ledgers, to organize the creation of new units, verify transactions, and secure transactions without interference from other parties. the imposition of a crypto tax will add to the legality of the industry. This indicates that crypto is already a legitimate asset or commodity in the eyes of the country's laws.

Crypto is not a currency or securities, but goods that contain other rights and interests in digital form. The presence of the Indonesian is still widely awaited by various parties because of the existence of crypto exchanges as part of the crypto asset legal trading ecosystem. On the other hand, people's enthusiasm is growing toward crypto assets as an investment.

Crypto assets in Indonesia have been legally traded, especially transactions carried out on physical traders of registered crypto assets. Not only that, tax regulations have also accommodated crypto transactions as tax objects. Crypto asset transactions will be officially subject to income tax per Week (1/5/2022). The

imposition of this tax is in accordance with the mandate of the Minister of Finance Regulation (PMK) Number 68 of 2022.

With the officialization of crypto asset transactions, the imposition of income tax on these crypto asset transactions will increase state income. Provisions regarding crypto asset trading are regulated and supervised by the Ministry of Trade through the Commodity Futures Trading Supervisory Agency. Therefore, crypto assets are regulated not as currencies or securities but are goods in the form of rights and other interests in the form of digital.

B. FORMULATION OF THE PROBLEM

1. What is the reason for the implementation of crypto asset income tax in Indonesia?

2. How is the tax regulation on crypto assets in Indonesia?

C. RESEARCH METHODS

Types Of Research The method that the author uses in this research is descriptive qualitative. This research is qualitative research which is one type of research that is commonly known, research methods based on the philosophy of post-positive are used to examine natural objects which in this study use literature study research.

. D. RESULT OF FINDING DISCUSSION

The government taxing crypto trading can be seen from the positive side, namely the recognition of the legality of crypto trading. The statement referred to the misalignment of policymakers' views on crypto trading that has recently emerged, especially the attitude of the Financial Services Authority (OJK).

Even though it has been under the supervision of the Commodity Futures Trading Supervisory Agency crypto asset trading was criticized by the OJK. Therefore, the emergence of a tax policy on crypto assets is nothing but a confirmation of the recognition of the legality of trading crypto assets. Because making crypto asset tax objects, it means that the state recognizes the legality of these crypto assets. Moreover, regulations related to investment through crypto assets already exist from Bappebti, so it is a question why the OJK some time ago issued a warning to banks in Indonesia

The imposition of a crypto tax also has the potential to have a negative effect on the trading scene which is just starting to grow. This taxation will be enough to disrupt the climate of crypto asset innovation in Indonesia. Because previously these assets were not taxed.

Although a crypto exchange has not yet been formed, the existence of tax rules that specifically regulate crypto assets has placed this digital asset as a potential state income and is no longer considered a threat.

Cryptocurrency is a digital or virtual currency secured by cryptography. With the presence of cryptography, making

cryptocurrencies is almost impossible to fake. Cryptocurrencies can also be used for transactions such as payments or transfers from one person to another online

Cryptocurrency can also be used as a means of payment for online purchase transactions by being exchanged into other currencies such as Dollars, Yen, Rupiah and other currencies.

Other advantages of cryptocurrencies are:

- High return
- Universal
- Fast and easy
- Transparent
- Safe and Legal

Crypto asset tax is a tax imposed by the government on investors or holders of crypto assets. The crypto tax provisions are contained in the Regulation of the Minister of Finance (PMK) Number 68 of 2022. This rule is a derivative of the Tax Regulation Harmonization Law (UU HPP). The basis for the imposition of income tax on crypto due to income from trading crypto assets is calculated as an addition to the economic capabilities obtained by the taxpayer. This is as stipulated in the Income Tax Law.

As mentioned above, now the government officially imposes a crypto tax in Indonesia under the legal umbrella of the HPP Law with technical implementing regulations through PMK 68 /PMK.03/2022.

This research focuses on the imposition of income tax on crypto assets. Regarding the determination of tax collection, the imposition of this tax generally raises a positive side, especially regarding the position of crypto as a digital commodity in Indonesia.

It is hoped that the PMK 68 regulation can encourage the growth of the crypto industry in the country, because there is stronger legal certainty and provides comfort and security for investors, and market participants can contribute to the country's economic development through crypto asset transaction taxes paid so that it can have a big impact on the growth of the number of investors and the volume of crypto transactions in the country

Subjects of income tax

Referring to Article 19 of PMK 68/2022, the subject of crypto tax or those subject to income tax or crypto income tax are:

1. Crypto asset sellers

Referring to Article 1 number 8 PER Bappebti 2/2020, physical traders of crypto assets are parties who get approval from the head of Bappebti to carry out crypto-asset transactions. Transactions can be made on behalf of oneself and/or facilitating transactions of crypto asset customers

2. PMSE Organizer

As stated in Article 4 paragraph (2) of Law No. 1 of 2020, the definition of PMSE is trading whose transactions are carried out through a series of electronic devices and procedures Article 12 of the rules explains, that services for providing electronic means used to facilitate crypto asset transactions are at least in the form of service activities:

- buying and selling crypto assets using fiat currencies;
- exchange crypto assets for other crypto assets (swaps);
- and/or electronic wallets (e-wallets) include deposits, withdrawals, transfers (transfers, crypto assets to other parties' accounts, and the provision and/ or management of crypto asset storage media.

3. Crypto Asset Miner (miner)

Referring to PMK No. 68/PMK.03/2022, the definition of crypto asset miner is stated in Article 1 Paragraph (18), which reads "Crypto Asset Miners are individuals or entities that carry out crypto asset transaction verification activities to get rewards in the form of crypto assets, either individually or in groups of crypto asset miners". In general, crypto-asset miners are parties who provide crypto asset transaction verification services and/or management services for crypto asset miners.

Income Tax Rates

- **0.1%: Final Article 22 Income Tax Rate on crypto asset trading income**

The Article 22 income tax rate on crypto asset trading of 0.1% of the value of crypto assets (if it is PFAK) is imposed on crypto asset trading sellers.

- **0.2: Final Article 22 Income Tax Rate on crypto asset trading income**

Article 22 income tax on crypto asset mining is 0.2% of the value of crypto assets (if not PFAK).

- **0.1%: Final Article 22 Income Tax Rate on crypto asset mining income**

The Final Article 22 Income Tax rate on crypto asset mining income is 0.1% of the income received or earned by crypto asset miners (miners), excluding VAT.

The imposition of a crypto tax or on crypto asset trading is to appoint a third party as the collector of income tax on crypto asset trading. Trade Through the Electronic System (PPMSE), both domestically and abroad. The organizer of trading through an electronic system or PPMSE is a taxpayer who has been confirmed as a Taxable Entrepreneur (PKP). PPMSE parties must also collect Article 22 income tax on crypto-asset transactions.

According to him, the tax policy will increase the legality of crypto assets as digital commodities that are recognized and legally traded in the eyes of the law. Previously, crypto had been recognized as a commodity through regulations from the Ministry of Trade and regulated by an institution called. cryptocurrency in Indonesia starting at the beginning of this month, namely as of May 1, 2022, where the digital asset was officially taxed by the Indonesian Government.

Meanwhile, the policy is regulated in the Regulation of the Minister of Finance No. 68 / PMK.03 / 2022 concerning Regulations on Value Added Tax and Income Tax on Crypto Asset Trading Transactions. Crypto assets are classified as commodities whose regulations are regulated in Bappebti Regulation No. 7/2020 concerning The Establishment of a List of Crypto Assets that can be Traded on the Physical Market of Crypto Assets.

Therefore, crypto assets are regulated not as currencies or securities but are goods in the form of rights and other interests in the form of digital. This is because Bank Indonesia states that crypto assets are not legal tender, while the Commodity Futures Trading Supervisory Agency and the Ministry of Trade affirm that crypto assets are commodities.

The impact on the growth of transactions and the number of investors may be the impact of the imposition of taxes. Therefore, the government must tighten supervision so that domestic crypto investors do not run away from transacting on foreign exchanges to avoid taxes. facilitating crypto asset transactions (exchange services and electronic wallets) is a taxable service

The goal is to provide legal certainty in society. The imposition of taxes on crypto transactions is not only valid when buying and selling occurs but also when exchanging crypto assets between investors

"Article 30 paragraph 1 of PMK Number 68 of 2022 also regulates income tax for miners by imposing Article 22 income tax which is final at a rate of 0.1 per cent. For miners, the Article 22 income tax must be deposited by themselves. In the case of income in the form of crypto assets, the income must be converted into rupiah based on the value of the crypto asset at the time of receipt or acquisition, in the system of the organizer of trading through an electronic system chosen by the crypto asset miner

In addition to imposing taxes on crypto asset trading, the government should also start preparing for the establishment of crypto exchanges. In addition to providing business certainty, legal certainty, and protection for crypto investors and consumers in Indonesia, the presence of crypto exchanges is also very important to supervise crypto trading. At the same time strengthens Indonesia's position as the centre of the world's digital economy, especially for the Asian and Southeast Asian regions.

E. CONCLUSION

1. Potential Returns Great The possibility of making a profit is the main reason why people tend to invest in cryptocurrencies. Trading with this currency, although relatively new, the

potential return is much higher compared to traditional types of investments such as stocks or other assets. A government bills crypto tax. the application of the tax on crypto is intended to equalize the treatment (same level of the playing field) with investment instruments and a set of crypto in Indonesia has been regulated as a commodity item that can be traded on the futures exchange in accordance with applicable laws and regulations and the basis for the imposition of income tax on crypto and income from trading crypto assets is calculated in addition to the economic capabilities obtained by the taxpayer. This is as stipulated in the Income Tax Law. that crypto assets are increasingly becoming a new prima donna in the world of investment and participating in helping the Indonesian economy through the digital economy.

2. Crypto assets in Indonesia have been legally traded, especially transactions carried out by physical traders of registered crypto assets. Not only that, but tax regulations have also accommodated crypto transactions as tax objects, the policy is regulated in the Regulation of the Minister of Finance No. 68 / PMK.03 / 2022 concerning Regulations on Value Added Tax and Income Tax on Crypto Asset Trading Transactions as of May 1, 2022.

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AUTHORS

**Eva mayasari, Stiami Student Graduated
NPM BC211120192**

Final Semester Exams, Tax on Income Course
STIAMI Student Graduated, Academic Year 2021/2022
evamayasari910@gmail.com

Semantic-based Web Page Classification System Using Enhanced C4.5

Hnin Pwint Myu Wai*, Nyo Nyo Yee**, Nandar Win Min**

*Faculty of Information Science, University of Computer Studies Banmaw, Myanmar

** Faculty of Information and Communication Technology, University of Technology (Yatanarpon Cyber City), Myanmar

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Abstract- Web is the largest collection of electronically accessible documents which make the richest source of information in the world. Classification of Web page is essential to many tasks in Web information retrieval such as maintaining Web directories, topic-specific Web link analysis and focused crawling. Traditional Web page classification ignores semantic relationships between keywords and Web pages. To effectively handle the semantic challenge, Semantic-based Web Page Classification System is presented. Moreover, a lot of research focuses to improve the existing classification algorithms used to classify web pages and most of the research is based on web page content. However, there is little focus on exploring new features that can be used to classify web pages based on not only content but also title and link of the web pages. For semantic, ontology is used to store each concept of each word and define links between different types of semantic knowledge. For classification, the Enhanced C4.5 decision tree classifier is applied. HTML pages from the computer science domain is tested to demonstrate its efficiency.

Index Terms- Ontology, Classification, Enhanced C4.5, Semantic

I. INTRODUCTION

With the extreme growth of Web based information, Web page Classification process becomes one of the major challenges in organizing and maintaining the enormous collection of Web pages. Web page classification is useful for managing and extracting relevant information from Web content. Classification of Web pages can also help to improve the quality of Web search. The process of assigning a Web page to one or more predefined category labels is known as classifying/categorizing.

As the pace of Internet usage has rapidly expanded, there has been a massive increase in interest in the automatic classification of Web pages into specified categories. Several machine learning algorithms have been successfully used in the past by the scientific community. They include Neural Networks, Naive Bayes, Support Vector Machines (SVM) and k-Nearest Neighbors (KNN). Traditional algorithms learn the features of categories from a series of classified documents and use the classifier to classify texts into predetermined categories. However, these machine learning methods have some drawbacks: (1) In order to train classifier, human must collect large number of training text term, the process is very laborious. If the predefined categories changed, these methods must collect a new set of training text terms. (2) Most of these traditional methods haven't considered the semantic relations between words. So, it is difficult to improve the accuracy of these classification methods.

In order to solve these problems, this system is proposed as the Ontology-based Web Page Classification System by using Enhanced C4.5 decision tree classifier. This system uses the ontology to search the semantics for each feature in each Web page. Semantic-based Classification method considers the semantic relations between features extracted from Web pages, thus it improve accuracy of the classification method.

The rest of the paper is organized as follows: related work is described in section II. Web page classification is described in section III. Pre-processing for Web page is expressed in section IV. Decision tree classifier, C4.5 classifier and ontology are described in section V, VI and VII respectively. The proposed system design is detailed in section. Sections VIII and IX describe experimental results, respectively. Finally, conclusion is given in section X.

II. RELATED WORK

In 2005, M. Song, S. Lim and D. Kang [12] suggested an automated method for document classification using ontology. Using at least two predefined categories per given document characteristic, ontology-based document classification entails selecting document features that most accurately reflect Web documents and classifying them into the most appropriate categories after studying their

contents. In this approach, Web pages are categorized in real time using comparable calculations between the terminology information taken from Web pages and ontology categories, rather than experimental data or a learning process. As a result, the meanings and relationships specific to each document are determined, resulting in a more accurate document classification.

In 2008, the automatic document classifier system based on the Naive Bayes classifier and ontology was described by Y. Chang and H. Huang [10]. The main concept is to first establish a keyword synonymous table by experts for narrowing down the range and getting the consistency of keywords. The formal concept analysis is then used for establishing knowledge ontology through the complex categories and attributes relation. Finally, the ontology is applied to a Naive Bayes Classifier to get the automatic document classifier system. In this system, 319 documents divided into 11 categories are used to assess the effectiveness of classification, where 224 and 95 documents are the training and testing documents respectively.

In 2012, W. K. Ong, J. L. Hong and F. Fauzi [11] presented a novel and fast ontological-based Web page classification technique to classify a Web page with high accuracy. To speed up our system, we use a segmentation technique that utilizes visual boundary of a region and matches keywords within the region instead of the entire Web page. They used a fast clustering technique to match keywords and label the page based on the nearest match. Experiment results show that their system is accurate in Web page classification.

III. WEB PAGE CLASSIFICATION

The technique of assigning one or more specified categories (topics) to Web pages based on their content is known as web page classification. It can filter Web pages and send them to topic-specific processing methods such as data extraction and machine translation. The automatic Web page classification consists of two phases that are learning phase and classification phase. In the learning phase, users define categories (topics) in which they are interested (their information need) by giving sample documents (training examples) for each of these categories. In the classification phase, new (previously unseen) documents can be given to the classifier which returns a topic. Machine learning, statistical pattern recognition, or neural network approaches are used to construct classifiers automatically [3].

There are three types of automatic Web page classification tasks: supervised Web page classification, where an external mechanism (such as human feedback) provides information on the correct classification of Web pages, unsupervised Web page classification, where the classification must be done entirely without reference to external information, and semi-supervised Web page classification, where the external mechanism labels parts of the Web pages [4].

IV. PRE-PROCESSING FOR WEB PAGES

Some preprocessing procedures are frequently performed before the Web pages in a collection are used for classification. For traditional text documents (no HTML tags), the tasks are stopword removal, stemming, and handling of digits, hyphens, punctuations, and cases of letters. For Web pages, additional tasks such as HTML tag removal and identification of main content blocks also require careful considerations. Stopwords are frequently occurring and insignificant words in a language that help construct sentences but do not represent any content of the documents. Common stopwords in English include a, about, an, are, as, at, be, by, for, from, how, in, is, of, on, or, that, the, these, this, to, was, what, when, where, who, will and with. Such words should be removed before Web pages are indexed and stored [9].

V. DECISION TREE CLASSIFIER

In data mining, a decision tree is a rapid and efficient classification technique that is commonly used for decision making. Decision trees are supervised methods for determining the link between input and target attributes, which is represented in a model structure. It examines the object's attribute values and chooses the best attribute as the root node, then uses that attribute to decide the tree branch's leaf nodes from the root down.

The majority of decision tree classifiers work in two stages: tree-growing (or constructing) and tree-pruning. The tree is constructed from the top down. The tree is recursively partitioned during this phase until all of the data elements are assigned to the same class label. The full-grown tree is pruned back in the tree pruning phase to minimize overfitting and improve the tree's accuracy from the ground up. There are two type of decision trees: tree structure (hierarchical structure) and rules structure (if-then statement) [5].

A. Types of Decision Tree Classifier

A decision tree is a graphical depiction of a tree with conditions connected with the nodes that allows a new instance to be classified into a preset set of classes. There are many types of decision tree classifier. These are CHAID (CHi-squared Automatic Interaction Detector), CART (Classification and Regression Tree), C4.5, C5.0 and Hunt's Algorithm.

B. Advantages of Decision Tree Classifier

Advantages of decision tree classifier are as follows:

- Decision trees are straightforward to comprehend and analyse.
- They only need a little amount of data and can handle both numerical and category data.
- Statistical tests can be used to validate a model.

- They are strong in nature, thus they perform well even if the underlying model from which the data were derived violates some of their assumptions.
- Decision trees can handle vast amounts of data in a short amount of time.
- Personal computers can evaluate large amounts of data in a short amount of time, allowing stakeholders to make decisions based on the results.
- Tree performance is unaffected by nonlinear interactions between parameters.
- The best thing about employing trees for analytics is that they're simple to understand and communicate to executives. [7].

C. Disadvantages of Decision Tree Classifier

Disadvantages of decision tree classifier are as follows:

- A slight change in the data can result in a significant change in the decision tree's structure, causing instability.
- When compared to other algorithms, a decision tree's calculation might be somewhat complex at times.
- The training period for a decision tree is typically longer.
- Decision tree training is fairly expensive due to the increased complexity and time required.
- For using regression and predicting continuous values, the Decision Tree approach is insufficient.

VI. ENHANCED C4.5 CLASSIFIER

C4.5 algorithm is an upgraded version of ID3. Instead of using gain as a splitting criteria in the tree development phase, C4.5 algorithm employs gain ratio as a splitting criteria. Both continuous and discrete properties are handled by this algorithm. In Original C4.5 Algorithm, the semantic logic is not considered to choose the root node (best attribute). In the proposed Enhanced C4.5, the root node is chosen by calculating normalized information gain that is based on both the original and semantic classes. The Enhanced C4.5 Decision Tree Algorithm is described in the following.

Algorithm: Enhanced C4.5 Decision Tree

Input: An attribute-valued dataset D

1. Tree = { }
2. if D is "pure" OR other stopping criteria met then
3. Terminate
4. end if
5. for all attribute $a \in D$ do
6. Compute gain ratio if we split on a based on original class level
7. Next, Compute gain ratio about a based on semantic class level
8. Combine each gain ratio result that is obtained by calculating each attribute value based on original class level and semantic class level
9. end for
10. abest = Best attribute according to above computed criteria
11. Tree = Create a decision node that tests abest in the root
12. Dv = Induced sub-datasets from D based on a best
13. for all Dv do
14. Treev = C4.5(Dv)
15. Attach Treev to the corresponding branch of Tree
16. end for
17. return Tree

At each node in the tree, the normalized information gain is used to choose the test attribute. This method is as follows:

$$Info(D) = - \sum_{i=1}^m P_i \log_2(P_i) \tag{1}$$

$$Info_A(D) = \sum_{j=1}^v \frac{|D_j|}{|D|} \times Info(D_j) \tag{2}$$

$$SplitInfo(A) = - \sum_{i=1}^m \frac{|C_i|}{C} \log_2 \frac{|C_i|}{C} \tag{3}$$

$$Gain(A) = Info(D) - Info_A(D) \tag{4}$$

$$\text{Gainratio}(A) = \frac{\text{Gain}(A)}{\text{SplitInfo}(A)} \tag{5}$$

P_i is the probability that an arbitrary tuple in partition D . $\text{Info}(D)$ is the average amount of information needed to identify the class label of a tuple in D . $|D_j|/|D|$ acts as the weight of the j^{th} partition. $\text{Info}_A(D)$ is the expected information required to classify a tuple from D based on the partitioning by A . C_i is the objects in class C that have value A of A_i . $\text{SplitInfo}(A)$ is the information gain due to the split of class C on the basis of the value of the categorical attribute A . The attribute A with the highest information gain, Gain ratio (A), is chosen as the splitting attribute at Node N [8].

VII. ONTOLOGY

The core of semantic Web is ontology, which is used to explicitly represent conceptualizations. When combining numerous data sources, ontology resolves semantic issues. As a result, ontology is used as a common tool for data integration in many Web applications. Ontology also maintains information about the various data sources' concepts and relationships [1]. The semantic Web's ontology engineering is primarily supported by languages like RDF (Resource Description Framework), RDFS, and OWL (Web Ontology Language). Ontological frameworks are typically created using manual or semi-automated approaches, which necessitate the skills of developers and specialists. Ontologies are divided into two categories: those that are used to explicitly capture "static knowledge" about a domain, and those that provide a logical point of view about the domain knowledge (the second) (problem solving knowledge) [2].

VIII. PROPOSED SYSTEM DESIGN

The proposed system design is shown in Figure 1. The system is divided into two parts: training and testing. In Training, the user inputted Web pages are pre-processed and then extracts features from ontology. Attributes are collected to create the decision tree by pre-processing the web pages and then thresholds values for these attributes are observed by changing different values. In feature extraction, the proposed system extracts features not only from the content but also from the title and link of the web pages. Title of the web pages can be supported more related word for the classification. Therefore, the higher weight value to the title word of the web pages are assigned. Then, Enhanced C4.5 algorithm is used to produce decision rules to perform the classification process. In Testing, the user must input the new Web page that is needed to know category. Before classification process, this system performs preprocessing that includes tokenization and stopwords removal. This system assigns the category according to the decision rules derived from Enhanced C4.5 decision tree classifier. Finally, this system produces the category as a result.

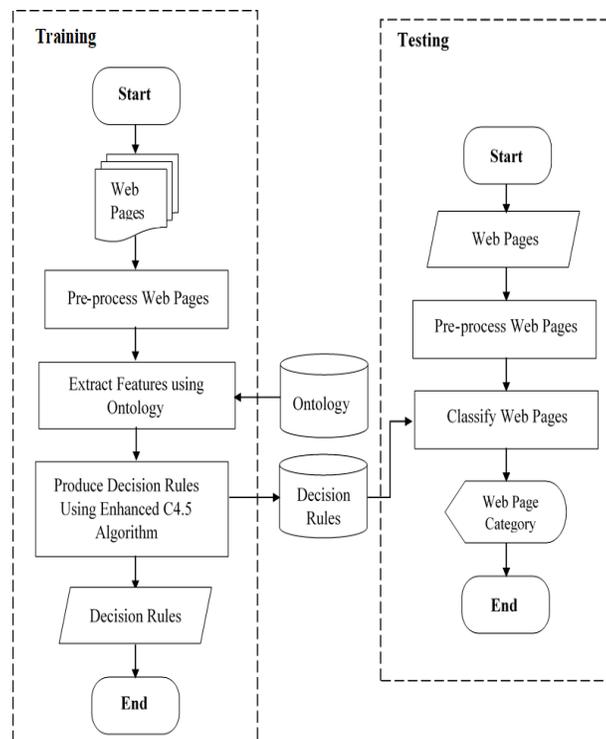


Fig. 1. Proposed System Design

IX. EXPERIMENTAL RESULTES

Most Web page classifications used only body contents of Web pages but this system not only used body contents but also title of Web Pages and link for the classification step to get the better accuracy. In this system, confusion matrix is used to measure the accuracy of the system. A confusion matrix can be used to precisely assess a classifier's potential. To measure the accuracy of the Ontology based Web Page Classification System, the data set is separated into two sets, called the training set and the testing set. 320 training Web pages and 80 testing Web pages about computer science domain are used to test this system. The classification performance of classifier is evaluated by the formula:

$$\frac{TP+TN}{TP+TN+FP+FN} \tag{6}$$

Where, TP = True positive rate,

FP = False positive rate,

TN = True negative rate,

FN = False negative rate

TABLE I
 ANALYSIS RESULTS WITH VARIOUS THRESHOLD VALUES ON BTL AND BODY USING ENHANCED C4.5 CLASSIFIER

Threshold Values	Body + Title + Link (BTL)	Body
Threshold = 3	0.875	0.675
Threshold = 5	0.875	0.575
Threshold = 7	0.750	0.575

Analysis results with various threshold values on BTL (Body + Title + Link) and Body are shown in Table 1.

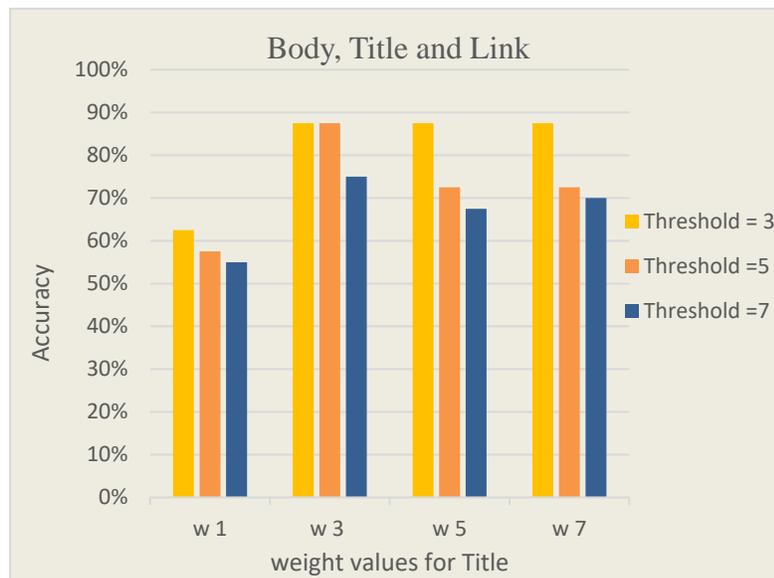


Fig. 2. Analysis results with various threshold values on BTL and Body using Enhanced C4.5 Classifier

X. CONCLUSION

The World Wide Web is the world's greatest collection of electronically accessible documents, making it the world's richest source of information. The issue with the Web is that the information is not clearly structured and arranged, making it difficult to find. Web page classification is important in this case for managing and retrieving relevant information from web resources. To increase the performance of the Web page categorization system, the presented Enhanced C4.5 algorithm considers the semantic class level and the

classification is based on not only content and but also title and link of the web pages. As a result, the proposed Semantic-based Web Page Categorization System can help to improve Web page classification performance.

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AUTHORS

First Author – Hnin Pwint Myu Wai, University of Computer Studies (Bnamaw), Myanmar, hninpwintmyuwai14@gmail.com

Second Author – Dr. Nyo Nyo Yee, University of Technology (Yatanarpon Cyber City), Myanmar, nyylster@gmail.com.

Third Author – Dr. Nandar Win Min, University of Technology (Yatanarpon Cyber City), Myanmar, nandarwinmin@gmail.com

Receivables Review of Affiliated Companies Between Parent and Subsidiaries and Subsidiaries and Subsidiaries

Tri Ratnawati¹, Hedy Widiastoeti²

triratnawati@untag-sby.ac.id, hwidiastoeti@gmail.com

Faculty of Economics and Business, University of 17 Agustus 1945 Surabaya

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ABSTRACT

This study aims to understand the events that often occur in affiliated companies, the relationship between the parent company and its subsidiaries and the relationship between the subsidiary company and its subsidiaries related to affiliated debts and receivables. The phenomenon of payables and receivables of affiliated companies often occurs due to the special relationship between the parent company and its subsidiaries and the subsidiary company and its subsidiaries are often related. This research has studied various methods of preparing financial statements for affiliated companies by recording consolidated financial statements, compiling financial statements and resolving affiliate debt problems using the Debt to Equity Swap method.

The target of this research is business entities which are affiliated companies, namely those that have a relationship between the parent company and the subsidiary company, and between the subsidiary company and the subsidiary company. The results of this study can consider the types of debt and receivables that occur between the Parent Company and Subsidiaries, so that a debt to equity swap is appropriate for a debt to equity swap is the receivables incurred for the Parent Company on loan funds for the operations of the subsidiaries because there has been a deposit of funds.

Keywords: *Debt and Receivable, Affiliation, Parent Company, Subsidiary Company, Debt to Equity Swap*

INTRODUCTION

The legal relationship between the parent company and its subsidiaries, and the responsibility of the parent company as the guarantor of the debts of its subsidiaries in the event of a default in a credit agreement. The problem that occurs is that the provisions regarding the legal relationship between the parent company and its subsidiaries within the group company have not been regulated clearly and carefully, thus creating a legal problem when the subsidiary enters into a credit agreement with the bank. The problem is the legal relationship between the parent company and the subsidiaries in the group company and to find out the responsibility of the parent company as the guarantor when the subsidiary is in default in the credit agreement. The normative legal research method uses a statutory approach and a conceptual approach. The legal relationship between the parent company and the subsidiary has an independent position, where the parent company is the shareholder of the subsidiary. When a subsidiary is in default in its credit agreement, the parent company as the guarantor can be held liable in accordance with the agreement that has been agreed with the bank.

In the business world, many companies are formed in the form of limited liability companies. To develop it there are times when the company forms a subsidiary, thus making it a single entity in a group company. The existence of group companies in Indonesia has not yet become a justification for the need for legal recognition of the status of group companies with other legal entities. The laws and regulations only regulate the relationship between the parent company and do not regulate group companies. Group company refers to the business reality of combining companies to form a group company as an economic entity.

Undang – Undang Perseroan Terbatas Number 40 year 2007 concerning Limited Liability Companies (hereinafter referred to as UUPT) does not make group terminology referring to group companies. This is different from the old Company Law, namely

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Law Number 1 year 1995 concerning Limited Liability Companies which is implied in Article 56 letter b which states that the combined balance sheet of companies that are incorporated in one group. The Company Law is more focused on the legal basis of the company, the framework for regulating the relationship between the parent company and subsidiaries that are incorporated in group companies that still use a single company approach. This UUPT still maintains juridical recognition of the legal entity status of the parent company and its subsidiaries as independent legal subjects so that legally the legal entities of the parent company and its subsidiaries are still recognized and have the right to carry out their own legal actions. The inclusion of a subsidiary in the construction of a group company does not eliminate the juridical recognition of the legal entity status of the subsidiary as an independent legal subject, therefore the subsidiary can take legal actions for the subsidiary itself which can be in the form of an agreement or binding with a third party. Subsidiaries acting as independent legal subjects may enter into engagements with other parties. The inclusion of a subsidiary in the construction of a group company does not eliminate the juridical recognition of the legal entity status of the subsidiary as an independent legal subject, therefore the subsidiary can take legal actions for the subsidiary itself which can be in the form of an agreement or binding with a third party. Subsidiaries acting as independent legal subjects may enter into engagements with other parties. The inclusion of a subsidiary in the construction of a group company does not eliminate the juridical recognition of the legal entity status of the subsidiary as an independent legal subject, therefore the subsidiary can take legal actions for the subsidiary itself which can be in the form of an agreement or binding with a third party. Subsidiaries acting as independent legal subjects may enter into engagements with other parties.

In the engagement, if the subsidiary cannot fulfill its performance, it can result in default. Default is the implementation of obligations that are not timely, carried out inappropriately. To avoid this, the guarantee plays a very important role as a guarantee that the default by the debtor does not harm the creditor himself.

In general, guarantees given by debtors to banks are in the form of material guarantees. The material guarantee itself is regulated in Pasal 1131 and Pasal 1132 of the Kitab Undang Undang Hukum Perdata (hereinafter referred to as the Undang Undang Hukum Perdata). In practice, sometimes banks require debtors to add individual guarantees (borgtocht) in providing credit. The addition of individual guarantees (borgtocht) is carried out because the bank feels that material guarantees are not enough and are not safe, so that it can result in the bank not getting back all of its receivables, if in the future the debtor cannot pay off the debt. In this case, individual guarantees (borgtocht) can be carried out with guarantees.

In some literature, individual guarantees and company guarantees are not clearly distinguished, because if viewed from the nature of the guarantees, they are classified as individual guarantees, namely the existence of a third party who guarantees to fulfill the debt when the debtor defaults. The definition of guarantee is confirmed in Pasal 1820 of the Undang Undang Hukum Perdata which states that: "Guarantee is an agreement in which a third party, for the benefit of the debtor, binds himself to fulfill the debtor's commitment when this person himself does not fulfill it."

The guarantor/guarantor in a credit agreement is only *accessoir*, so it only applies when the debtor cannot fulfill his achievements. Normative legal research is a process to determine a rule of law, legal principle, and legal doctrine to answer the legal problems faced. The approach used in this research is a statutory approach and a conceptual approach.

LITERATURE REVIEW

Based on the Undang – Undang Perseroan Terbatas Number 40 year 2007 (UUPT) concerning Limited Liability Companies regarding the addition of capital, namely:

1. The addition of the Company's capital is carried out based on the approval of the GMS.
2. The GMS may delegate authority to the Board of Commissioners to approve the implementation of the GMS resolutions for a maximum period of 1 (one) year.
3. The decision of the GMS to increase the authorized capital is valid if it is carried out by taking into account the requirements of the quorum and the number of votes in favor of the amendment to the articles of association in accordance with the provisions of this Law and/or the articles of association.
4. The decision of the GMS to increase the issued and paid-up capital within the authorized capital limit is valid if it is made with a quorum of attendance of more than 1/2 (one half) of the total number of shares with voting rights and approved by more than 1/2 (one half) of the total number of shares with voting rights. the total number of votes cast, unless specified greater in the articles of association.
5. The increase in capital must be notified to the Minister to be recorded in the Company register.

6. All shares issued for additional capital must first be offered to each shareholder in proportion to the share ownership for the same share classification.
7. Shares that will be issued for additional capital are shares whose classification has never been issued, those who have the right to purchase first are all shareholders in accordance with the balance of the number of shares they have.
8. The offer does not apply in the event of the issuance of shares:
 - a. Addressed to the Company's employees;
 - b. Addressed to holders of bonds or other securities that can be converted into shares, which have been issued with the approval of the GMS; or
 - c. Conducted in the context of reorganization and/or restructuring that has been approved by the GMS.
9. Shareholders do not exercise the right to purchase and pay off the shares purchased within a period of 14 (fourteen) days from the offering date, the Company may offer the remaining shares that are not subscribed to a third party.

The relationship between the parent company and its own subsidiaries can be explained as follows.

1. Parent Company Ownership of Subsidiary Shares

The parent's ownership of a significant number of subsidiary shares gives the parent company the authority to act as the central leader controlling the subsidiaries as a unit of management. Ownership of shares in a subsidiary gives the parent company voting rights to control the subsidiary through various existing control mechanisms, such as the general meeting of shareholders.

2. General Meeting of Shareholders (GMS)

The parent company has the authority to control subsidiaries through the mechanism of the subsidiary's GMS. In the GMS of the subsidiary, the parent company can determine strategic matters that can support the achievement of the group company's goals as an economic unit, among others through the determination of the company's long-term goals in the form of a five-year business plan known as a strategic plan. In this strategic plan, the directors of the parent company determine the company's basic policies consisting of the company's vision, mission, culture, and strategic goals. This basic policy of the parent company is followed by all subsidiaries in preparing the long-term plans of each company.

3. Placement of Members of the Board of Directors and/or Board of Commissioners of Subsidiaries

Through ownership of the shares of a subsidiary, the parent company has the authority to assign members of the board of directors and/or board of commissioners of the parent company to concurrently serve as directors or commissioners of the subsidiary. The placement of the parent company in the subsidiaries is a form of indirect control over the operational activities of the subsidiary. With this control function, the parent company can know the development of the business activities of each subsidiary.

4. Linkage through Voting Agreement

The relationship between the parent and the subsidiary can also occur because of the voting rights agreement made between the founding shareholders, which agrees that the appointment of the directors and the board of commissioners is determined by one of the founding shareholders.

5. Linkage by Contract

The Company may transfer control of management to another company through a Company Management Agreement. Meanwhile, in the explanation of Article 29 of Law No.1 of 1995, a subsidiary is a company that has a special relationship with other companies which can occur because:

- a. More than 50% of its shares are owned by the holding company.
- b. More than 50% of the votes in the GMS are held by the parent company.
- c. Control over the running of the company, the appointment and dismissal of directors and commissioners are strongly influenced by the parent company.

The legal relationship that arises between the parent company and its subsidiaries is a contractual relationship. The contractual here is that the subsidiary has the right to enter into a personal engagement with other parties, as long as the legal action taken does not exceed the limits in the articles of association of the company. An example that can be taken from a group company relationship is that a subsidiary company to be able to take certain legal actions must obtain the approval of the General Meeting of Shareholders (including the parent company as the majority shareholder). All legal actions of the subsidiary related to the articles of association must be approved by the shareholders (parent company). Therefore, the organization and management of the parent company are regulated in the same manner as an ordinary Limited Liability Company, namely in the articles of association of the parent company.

The parent company supervises the subsidiary to the extent of its position as a shareholder and to the extent stipulated in the articles of association of the subsidiary.

The responsibility of the parent company as the guarantor (corporate guarantee) of the subsidiary if the subsidiary is in default in the credit agreement.

1. In a group company, the parent company and subsidiaries are independent legal entities, so that each company is a holder of its own rights and obligations which also has its own assets which are legally separate and separate from the personal assets of their shareholders. The legal consequences of all legal consequences caused by policies/legal actions taken by the subsidiary even though the action is dictated by the parent company as is often the case with management holding companies, the legal consequences that occur remain the responsibility of the subsidiary, except as previously stated that the parent company has committed an act that violates the law and which can be resolved by using the doctrine of piercing the corporate veil.
2. The subsidiary entered into a credit agreement in the form of borrowing a sum of money from a bank accompanied by a material guarantee as a guarantor of debt repayment. So if the subsidiary does not pay its debt when it is due, the bank can demand the execution of the object that has been pledged by the subsidiary to pay off its debt. In the process, if the material guarantee is deemed insufficient in fulfilling the performance, the bank may request additional individual guarantees in the credit agreement. An individual guarantee or borgtocht is a guarantee provided by a subsidiary not in the form of objects but in the form of a statement by a third party (guarantor/guarantor) who has no interest in either the debtor or the creditor.
3. In the credit agreement, if the subsidiary is in default where the debt repayments are not fulfilled to a predetermined limit, the parent company acting as guarantor can be held responsible for fulfilling the achievements of the debtor. To be able to ask for guarantee accountability, of course beforehand there must be a personal agreement made by the parent company with the bank that if the subsidiary does not meet its achievements, the parent company is willing to voluntarily fulfill the achievements of the subsidiary. The personal agreement made by the parent company with the bank must first obtain approval in the GMS that the parent company is given permission to act as guarantor (guarantor) of the subsidiary's debt in a credit agreement that it does. If the agreement does not exist, the parent company cannot be held responsible for paying off debts from its subsidiary.

RESEARCH METHODS

This research uses Literature Study and examines the applicable regulations, namely Financial Accounting Standards (PSAK), Limited Liability Company Law (UUPT), and Civil Law (KUHP).

The target of this research is business entities which are affiliated companies, namely those that have a relationship between the parent company and the subsidiary company, and between the subsidiary company and the subsidiary company.

Research Stages:

1. Exploring theories in relation to Affiliated Company Payables and Receivables including literature and published articles which are the result of research or study.
2. Reviewing regulations - regulations related to debts and receivables of affiliated companies.
3. Analyzing from the perspective of theory and the perspective of legality or the applicable legal basis.

DEBT ANALYSIS OF AFFILIATED COMPANIES BETWEEN PARENT AND SUBSIDIARIES AND BETWEEN SUBSIDIARIES AND SUBSIDIARIES

Based on PSAK 65 year 2015 requires the preparation of consolidated financial statements for the relationship between the parent company and its subsidiaries, including payables and receivables of affiliates.

CONSOLIDATED FINANCIAL STATEMENTS

Consolidated financial statements are financial statements that present financial information belonging to the parent company and subsidiaries in one report as if they were one entity.

Based on this definition, not all companies apply these consolidated financial statements. Companies that apply these consolidated financial statements have the following requirements:

- Having one or more subsidiaries as evidenced by share ownership.
- The parent company's share ownership of the subsidiary is more than 50%.
- The parent company's share ownership of the subsidiary is less than 50% but the parent company has full control.

Furthermore, based on PSAK 65 requires entities to prepare Consolidated Financial Statements, if the above consolidation requirements are met, in this case the Parent Company cannot present separate reports (without consolidation). The parent company can present its own Financial Statements, if to provide additional information for users of the consolidated financial statements. Thus, it is implied that the parent company's financial statements are presented in additional information. In the event that consolidation is not carried out, investments in subsidiaries must be accounted for using the equity method.

The equity method is an accounting method in which investments are initially recognized at cost.

- It is increased or decreased to recognize the investee's share of profit or loss after the date of acquisition.
- The recognition of the investee's comprehensive income is recognized as comprehensive income and an increase in the investment on the investor's books.
- Distributions from the investee reduce the carrying amount of the investment.

Under the equity method, investments are recorded at cost and then debited or credited with a proportionate share of the subsidiary's profit or loss. Dividends received are recorded to reduce the estimated investment in question.

How to Make Consolidated Financial Statements

The preparation of consolidated financial statements has the same parts as ordinary financial statements, which consist of balance sheets, income statements, statements of changes in equity, and cash flow statements). In the consolidated financial statements, it consists of a consolidated balance sheet, a consolidated statement of income, a consolidated statement of retained earnings, and a consolidated statement of cash flows.

The way to prepare this report is by placing the financial statements of the parent and subsidiary entities side by side in a consolidated working paper. Compilation can use Microsoft Excel or accounting software. With the following steps:

1. Start by examining the financial statements of the parent and subsidiary companies as a whole. Identify if there are errors or omissions in the recording, then make adjustments.
2. Adjust the financial statements by eliminating the intercompany income statement.
3. Eliminate earnings and dividends from subsidiaries.
4. Return the balance of the investment account in the subsidiary to the beginning balance of the period.
5. Make adjustments to make a note of the non-controlling interest in the subsidiary's profits and dividends.
6. Elimination of reciprocal balances on the subsidiary company's statements that were originally reported in the parent company's financial statements.
7. Elimination of previously reported equity in the subsidiary's finances.
8. Perform allocation and amortization when there is a difference in value.
9. Eliminate other respiratory balances, such as debts, income and expenses, and others.

These consolidated financial statements are only required by companies that have subsidiaries, as well as other conditions that have been mentioned. If the company does not have a subsidiary, or the parent company does not have control over the subsidiary, there is no need to prepare consolidated financial statements.

COMPILATION OF FINANCIAL STATEMENTS

The following is presented about the compiled financial statements so that it can be seen the difference with the consolidated reports.

Compiled Financial Statements are services provided by accountants that are limited to the presentation of financial statements and notes to financial statements in accordance with applicable accounting standards, starting with an engagement letter between the accountant and management or owner of a company.

Unlike the General Audit, the Compiled Financial Report does not provide an OPINION or other form of assurance on the fairness of the presentation of the financial statements. If assurance is not stated, the procedure used is the compilation of financial statements.

Several important points need to be underlined that the Accountant's Compilation Report is not an Independent Auditor's Report. Often to avoid misinterpretation, each page of financial statements is usually marked "UNAUDITED" / in accordance with the provisions set by the accounting professional organization.

DEBT TO EQUITY SWAP

In a debt to equity swap transaction, as long as it is carried out with the same value between debt repayment and equity participation, which is equal to the book value of the last debt, there will be no immediate tax consequences. In the event that the debt (to the amount of the last book value) is repaid through a change of form into a smaller capital investment, the difference is a gain due to the debt relief for the debtor and the write-off of receivables for the creditor based on an agreement. On the other hand, if the amount of equity participation is greater than the last book value of the debt paid off, then the difference is interest income for creditors and interest costs for debtors. Agio and disagio shares arising from equity participation transactions using market prices,

Debt to equity swap transaction is a transaction to issue new shares where payment for the shares is made by converting receivables from creditors or shareholders of a limited liability company into new shares. Shareholders or creditors who have claims against the company can compensate their claim rights as a payment for the share price, as long as this is approved by the GMS.

Based on the Payables and Receivables data between the Subsidiaries and their subsidiaries, the amount is for operational funds in 2021 and before, payables incurred for the payment of dividends in 2020 and before and payables due to land leases. In this regard, the relationship between the Subsidiary and its subsidiaries is not regulated in the Undang – Undang Perseroan Terbatas Number 40 year 2007 and not regulated in PSAK, the receivables do not have the criteria for a parent-child relationship.

However, it still affects the performance of the parent company's Financial Statements in the sense that the occurrence of receivables for subsidiaries causes debts to arise for other subsidiaries that transact which can affect the increase or decrease in liquidity performance and leverage performance as well as the working capital performance of each subsidiary.

CONCLUSION

Considering the type of payables and receivables, the appropriate debt to equity swap is the Receivables incurred for the Parent Company on loan funds for the operations of subsidiaries because funds have been deposited.

Meanwhile, if the debt that arises for capital deposit from the Parent Company to the subsidiary is due to the enactment of the Undang – Undang Perseroan Terbatas No. 40 year 2007 and the Receivable arising from the Parent Company due to unpaid dividends by the subsidiary, it cannot use the Debt to Equity Swap strategy because it does not there is a deposit transaction.

Considering the relationship between the terms and conditions of the relationship between the Parent Company and Subsidiaries that have met the following conditions:

- Having one or more subsidiaries as evidenced by share ownership.
- The parent company's share ownership of the subsidiary is more than 50%.
- The parent company's share ownership of the subsidiary is less than 50% but the parent company has full control.

Therefore, it is recommended to consolidate the accounts payable between the Parent Company and its subsidiaries with the following consolidation steps:

1. Start by examining the financial statements of the parent and subsidiary companies as a whole. Identify if there are errors or omissions in the recording, then make adjustments.
2. Adjust the report by eliminating the income statement between each company.
3. Eliminate earnings and dividends from subsidiaries.
4. Return the balance of the investment account in the subsidiary to the beginning balance of the period.
5. Make adjustments to make a note of the non-controlling interest in the subsidiary's profits and dividends.
6. Elimination of respiratory balances in the subsidiary company's statements that were originally reported in the parent company's financial statements.
7. Elimination of previously reported equity in the subsidiary's finances.
8. Perform allocation and amortization when there is a difference in value.
9. Eliminate other respiratory balances, such as debts, income and expenses, and others.

Considering the condition of the parent company and subsidiaries that are still conducting their financial reporting as separate entities with the Independent Auditor's Report (LAI) on each entity. Although the relationship between the parent company and its subsidiaries is that audit reports are issued for each of the parent companies and subsidiaries, in the sense that they have not consolidated but compile the overall financial statements that are not accompanied by an audit opinion for the compiled financial statements, it is recommended that the parent company should use a debt to equity swap strategy with the following steps:

1. Identification of payables and receivables of the parent company and its subsidiaries.
2. What can be done by a debt to equity swap is a debt that is incurred due to a loan of funds in the sense that there is a deposit of funds from parent to child or from child to parent.
3. The plan to transfer from debt or debt to capital or equity must go through the General Meeting of Shareholders or GMS which is attended by related parties from the Board of Directors of the parent company and directors of the subsidiary.
4. Meanwhile, accounts payable between parent and subsidiary that are not due to loan funds, for example, accounts payable that occur due to the capital deposit of the parent company. Payables on dividends or other receivables that arise not due to borrowing funds must still be recorded as accounts payable between the parent and the subsidiary.
5. The consequences are:
 - a. The impact on taxation arising from a tax on interest of 15% becomes a tax on dividends of 20%.
 - b. Prepare notarial deed of changes due to debt to equity swap.
 - c. For the reclassification made from debt or debt to capital or equity for one company, it is necessary to check the recording of the reclassification also from receivables or receivables to equity participation or investment for other companies.
 - d. The above reclassification also affects liquidity performance and working capital performance, receivables performance, debt performance, investment performance and equity performance for the parent company and subsidiaries.
 - e. The occurrence of a debt to equity swap, especially the recording of debt for the parent company to its subsidiaries, will shift the composition of the number of paid-up shares.

Payables and receivables that occur between subsidiaries, especially in terms of loan funds, must remain under the control of the parent company, especially the use of the loan funds so that the funds are used for activities that are profitable for the business of both parties which will ultimately improve the financial performance of the parent and subsidiary.

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The Impact of Street Trading on the Freetown Municipality

Hawa Frances Saidu & Philip Samuel Kongoley-MIH

Department of Business Studies, Milton Margai Technical University
Congo Cross Campus-Freetown Sierra Leone

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Abstract: This paper attempts to investigate the impact of street trading on the Freetown Municipality. Street trading in Freetown is perceived as an economic activity for those with low educational level and highly dominated by women since it is considered as extension of their reproductive and domestic role. There are two categories of street traders in Freetown; sedentary who are found in fixed locations using pavements, verandas, stalls, tables, and sometimes the bare floor and footloose or mobile traders have no fixed locations and move throughout the city or in the city centre in search of customers. Their activities have positive impact such as generating revenue for Freetown City Council, making goods and services available. On the other hand, their activities has caused problems such as traffic congestion, air and noise pollution and poor sanitation, which cause health hazards, pick-pocketing stress is caused to pedestrians and makeshift structures along the streets also mar the environment and degrade the aesthetic quality of Freetown settlements. The main data collection instrument was structure questionnaire and 400 street traders served as respondents from all categories of traders. It is concluded that even though these street traders are of economic benefits, their presence is more embarrassing in terms of face looks.

Index: pedestrians, economic benefit, noise pollution, retailing, petty trading and congestion.

INTRODUCTION

The problem of unemployment of youths in the Freetown Municipality has generated an informal type of trading called street trading. This is as a result of the past ten year rebel war which forced many people to migrate from the rural areas to urban areas especially Freetown. When the war came to an rehabilitation package was introduced for war widows and ex- combatants. In the Freetown Municipality, street trading has become a source of livelihood for many and also as an important source of accessible, convenient and affordable goods for the urban poor. For example, the street food sector provides accessible food items and makes life easy for the working class. Beyond this, the socio – economic role of street trading in terms of its potential for employment and income generation

has attracted many people, male and female, single and married, into the practice. Although some people see and react to street traders as a nuisance, the forces that created their market have made them an inextricable part of the social fabric. Street trading is currently prevalent in Sierra Leone. Selling items from a vehicle, a cart or make – shift shop on a public street is allowed in Freetown without a permit. Male and female placing their wares in front of residential buildings or in make – shift shops are commonly found in Freetown Municipality. Such traders take opportunities of heavy traffic and the consequent frequent hold- ups to sell their goods to drivers and passengers inside vehicles. Other of such traders display their wares in public sidewalks.

The problems faced in Freetown Municipality between the local authorities called the Freetown City Council and other councils in other cities in Sierra Leone and street traders is a continuous battle as street traders are claiming that they have the right as long as they are paying market dues every day. In response to the street trading problem, the Sierra Leone government past and present has been putting up formal market infrastructure across the municipality, so that street traders in an orderly, safer and good environment. This was against the background of the various problems include stealing customers from the formal economy, nonpayment of taxes, causing road traffic congestion and sanitation related diseases such as cholera, crime (pick – pocketing) and working in the city centre is sheer agony for shoppers and pedestrians. However, despite government putting up formal market infrastructure, street traders keep trading from the streets. Street traders in the Freetown Municipality may stay in the business for many years, not planning to change to any other form of business, but some may do it for some time and quit when they get a salaried job or when they are able to afford better forms of businesses.

LITERATURE REVIEW

2.1. What is Street Trading?

Street trading is defined as the selling or offering for sale of any article in the street. Traders who use the public highway to sell goods or services must have a street trading license to carry out the trade from a designated site pitch and display of goods in front of a shop.

2.2. Categories of Street Traders in Freetown

There are two main categories of street traders along the major streets in centre of Freetown. The sedentary traders who works in fixed locations, include vendors of foodstuffs, fruits and vegetables, cooked food and various manufactured goods, such as stationery, watches, mobile phones and electronic goods. The footloose or mobile traders sell newspapers, iced water, ice cream, biscuits, second – hand clothing and different kinds of manufactured goods such as handkerchiefs, toilet roll and shaving sticks along the major streets within the Freetown Municipality centre. They carry their goods on their hands or in push – carts normally called “amulankay” and wheelbarrows.

2.3. Characteristics of Street Traders in Freetown

- Majority of street traders own account workers with majority engaged in reselling;
- A good number of these traders are married and support large families with a high percentage of the women being sole breadwinners. The rest of the traders are either single, widowed or divorced;
- Majority of the street traders are women, although there is also a large number of men and children with age group ranging from 10 years and above;
- Most of the female street traders take care of their own domestic chores and are assisted by relatives from the provinces;
- The male street traders who are married have domestic work done by their wives who are mostly housewives and single male street traders take responsibility of their domestic work;
- At work places which are in the streets, more men hire assistants or have helpers as compared to women depending on the size of the business;
- Most street traders live close to their work place and walk to work. Few use taxis and buses especially those living in the Eastern part of Freetown;
- A good number of these street traders have primary and below level of education. A few have secondary education while very few have professional training. However, the younger street traders tend to have acquired a higher education;
- Male street traders seem to have more professional training as compared to women street traders;
- Most street traders undertake selling due to lack of other sources of income and employment;
- Widows and women who have been deserted by spouses, whose husband were killed during the ten year rebel war and also during the Ebola outbreak opt for the street trade;
- Men tend to join street trade while young and use it as stepping stone for other jobs or further education, while women join early in life and continue till old age;
- Male street traders invest in businesses that require high capital and also yield more profits while women make less profits because they are mostly engaged in activities that require less capital such as selling vegetables, fish, fruits etc,;
- Most street traders work close to 13 hours a day, although the starting and closing time vary depending on gender, type and location of business. Men tend to trade for longer hours.

2.4. Characteristics of Activities of the Street Traders

The activities of these street traders fall under the following:

- Unregulated and competitive markets
- Small scale operation with individual or family ownership:
- Easy of entry and exiting
- Reliance on locally available resources
- Family ownership of business
- Labour intensive and adapted technology
- Absence of access to institutional credit from financial institutions in the country or other supports and protections from the Freetown City Council and the government.

2.5. The Role of Street Traders

Many young men and women in Sierra Leone especially those living in Freetown have opted to street trading as their main source of income. Uwitije C. (2016). Street trading serves an important social role in the generation of income especially for those at the bottom ladder of the social status. At least, it is more dignifying than begging, touting and petty crimes. Apart from the role of street traders, trading is being regarded as one of the contributions to alleviating poverty in the country. Street trading is yet to be fully recognized largely due to the fact that it is classified as underground activity and is not controlled and supervised by established regulatory bodies. Skinner C. (2008). It is observed that many at times corrupt officers from the Ministry of Trade and Freetown City Council are enriching themselves because the actual transactions carried out cannot be accurately quantified and taxed accordingly Skinner C. (2008).

In some cases, street urchins and criminals extort money from street traders without the knowledge of those in authorities. Street trading has shown to be a vital platform that bred entrepreneurs. Here, the unemployed used their untapped potentials to make ends meet by marketing and trading of goods through innovation and creativity Yankso P.W.K (2000).

Although it is widely held belief that street trading has always had a negative connotation, according to Skinner.C. (2008) the negative notion cannot be compared with the enormous contributions to the informal sector when adequate measures are put in place. This means that street trading should be given space in the city because every urban dweller has right access to the city. The flexibility of the trade means that traders have no fixed working hours unlike the normal working standards in pay jobs. For example, the traders

use commercial vehicles to market and make sales when workers are returning from work in the evening. The flexibility also entails their constant movement to areas where potential customers are concentrated. The prices offered by street traders are affordable compared with markets and shopping malls and this greatly benefits the urban poor. Generally, the role of street traders can be viewed from a political, social, economic and spatial point of view. Irrespective of the perspectives, street traders require support to fully rely on its potentials

MATERIAL AND METHODS

The study utilized a quantitative technique in measuring the effects of street trading on Freetown Municipality. The study also employed a cross – sectional survey research design approach for choosing the research instrument and estimating the required sample size. The survey research design approach helped determine the unique characteristics of the large population which is focused on those that patronized street traders. These set of people were selected based on their ability to complete the data instrument. The street traders would have sufficed as the research participants but due to their low educational status, contribution to the data instrument is limited. The population of those that patronize street traders in the study location was calculated through a field investigation and observation. The average daily carrying capacity of the Freetown Municipal centre was calculated at 1,000 persons per day.

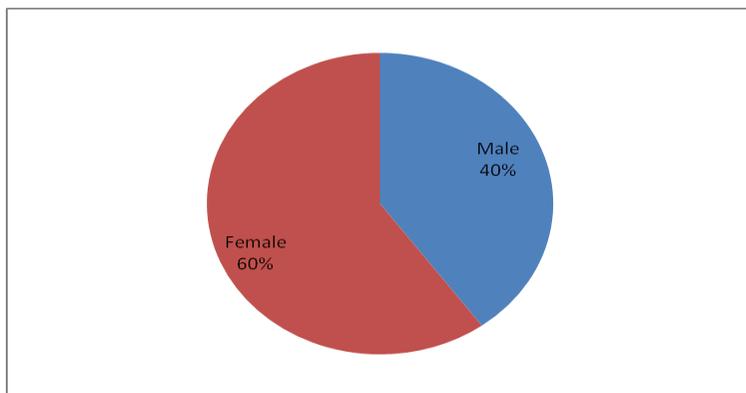
Using a purposive sampling technique, the Taro Yemane formula was utilized to arrive at a sample size of 400 persons as the research participants. The 400 research participants are representatives and a reflection of the entire population within the study area. The study location focused on the centre business district is in Freetown. It is located in the city centre and with popular streets like Sani Abacha, Wilberforce, Regent Road, Garrison all intersecting at PZ.

PZ meaning Paterson Zochonis was named after George Paterson, a Scottish and George Zochonis a Greek. They started the business when the Europeans were leaving their countries for the West Coast of Africa in search of opportunities. Two such European George Paterson and George Zochonis formed a close friendship and worked together for small trading company at Susan's bay in Freetown at Wilberforce Street called "Paterson Zochonis (hence the abbreviation PZ). Today hundreds of street traders converge to PZ to transact their businesses as it is centrally located and has the capacity to accommodate hundreds of people at a go. The data instrument used was a well – structured questionnaire. The questionnaire instrument had four (4) sections that analysed the socio – economic characteristics of street traders, the factors responsible for street trading, the perceived environmental hazard and the perceived spatial implications of street trading on Freetown Municipality. For the data analysis, the study utilized descriptive statistics, which are presented in the result.

RESULTS

The analysis below for this paper was derived from the structured questionnaire administered among the street traders.

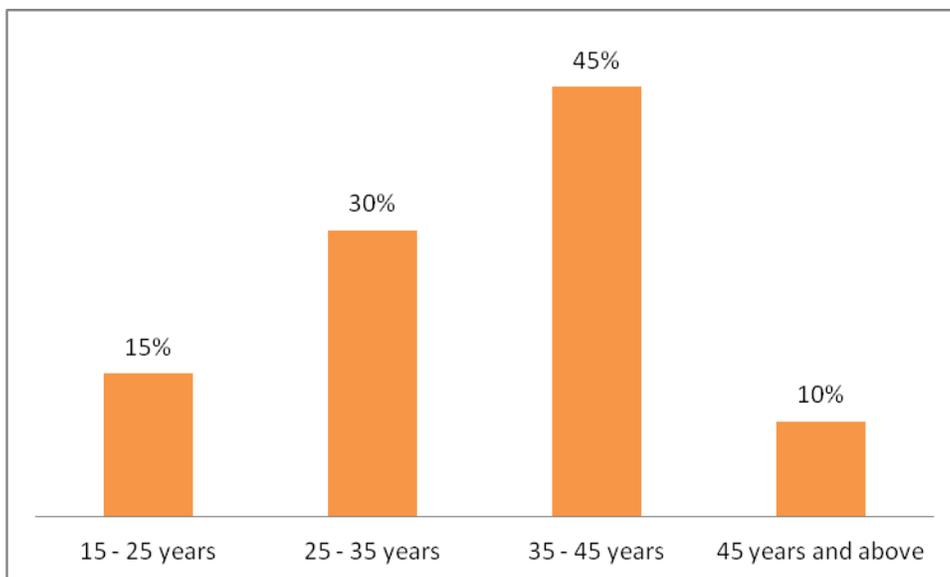
Figure 4.1. Gender of Respondents



Source: Primary Data 2022

The figure above shows that 40% of the respondents contacted for this research are males and 60% are females.

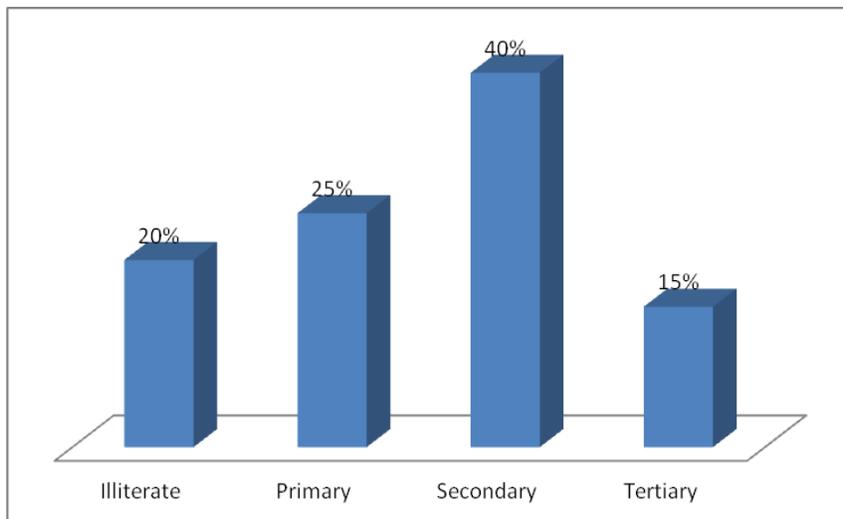
Figure 4.2. Age bracket of Respondents



Source: Primary Data 2022

The figure from above reveals that 15% of the respondents contacted for this research are within the age bracket of 15 – 25 years, 30% within 25 – 35 years, 45% within 35 – 45 years and 10% within 45 years and above.

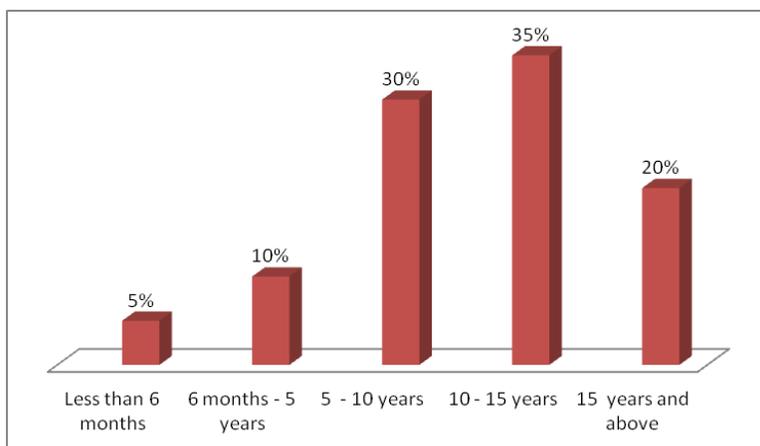
Figure 4.3. Educational level of Respondents



Source: Primary Data 2022

The figure above reveals that 20% of the respondents contacted for this research are illiterate, 25% had a primary education, 40% had a secondary education and 15% had tertiary education.

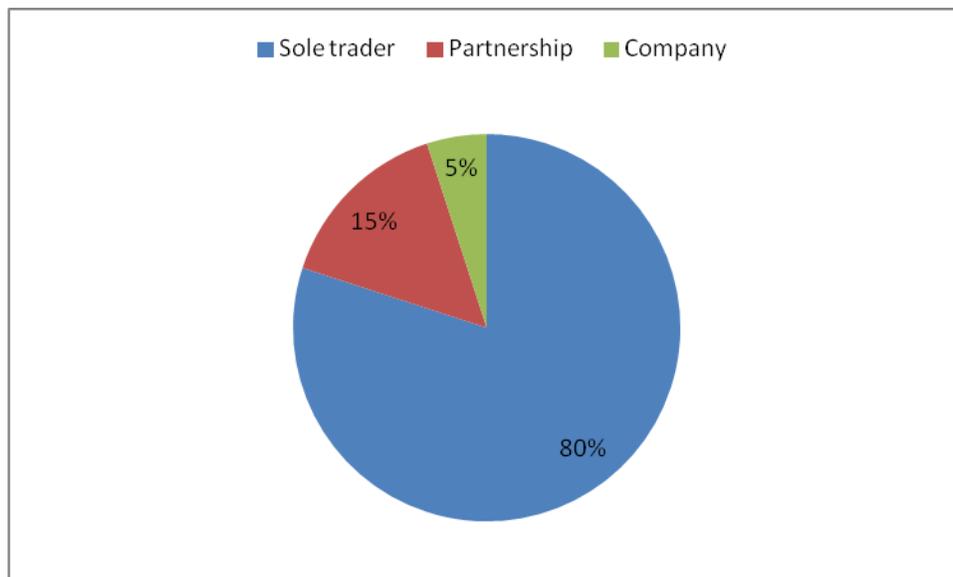
Figure 4.4. Duration of Business



Source: Primary Data 2022

The figure above reveals that 5% of the respondents contacted for this research indicated less than 6 months, 10% indicated between 6 months – 5 years, 30% between 5 – 10 years, 35% between 10 – 15 years and 20% between 15 years and above.

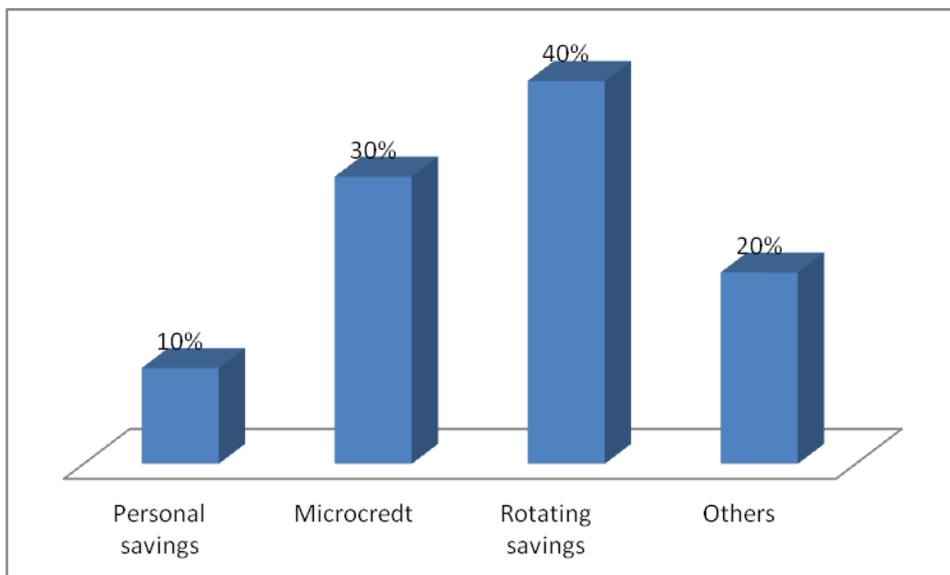
Figure 4.5. Ownership Status



Source: Primary Data 2022

It was revealed that 80% of the ownership of street traders businesses are sole traders, 15% indicated partnership and 5% indicated company.

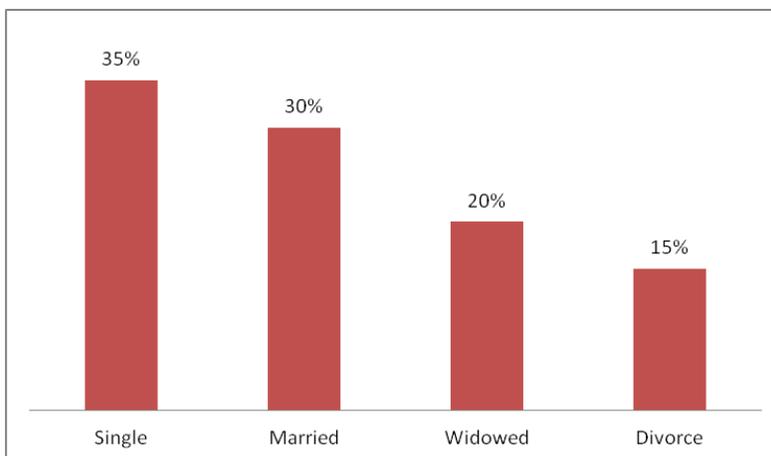
Figure 4.6.Sources of Finance



Source: Primary Data 2022

The figure above reveals that 10% of the sources of income for street traders is from their personal savings, 30% from Microcredit institutions, 40% from rotating savings and 20% from others such bank loan, relatives and friends.

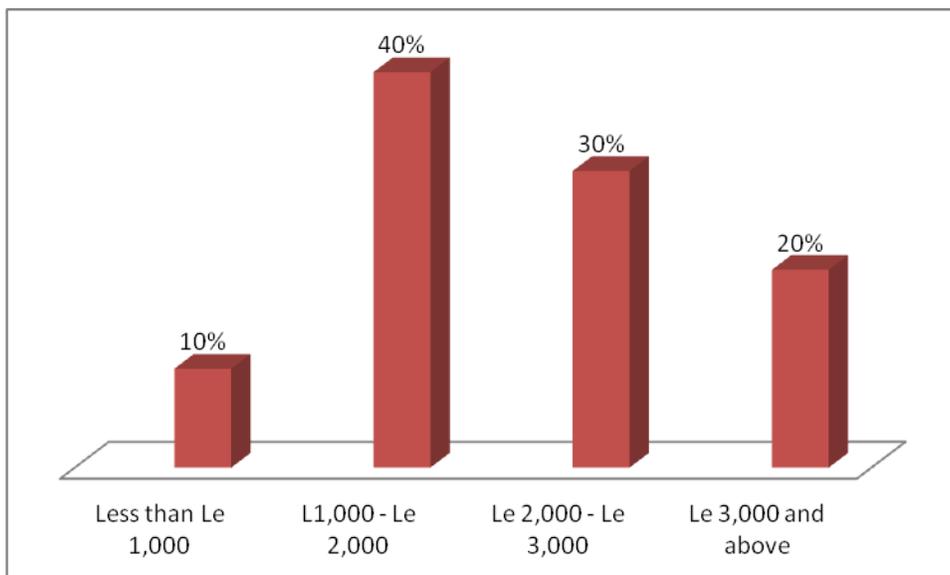
Figure 4.7. Marital Status of Respondents



Source: Primary Data 2022

The figure shows that 35% of the respondents are singles, 30% are married, 20% are widowed and 15% are divorcees.

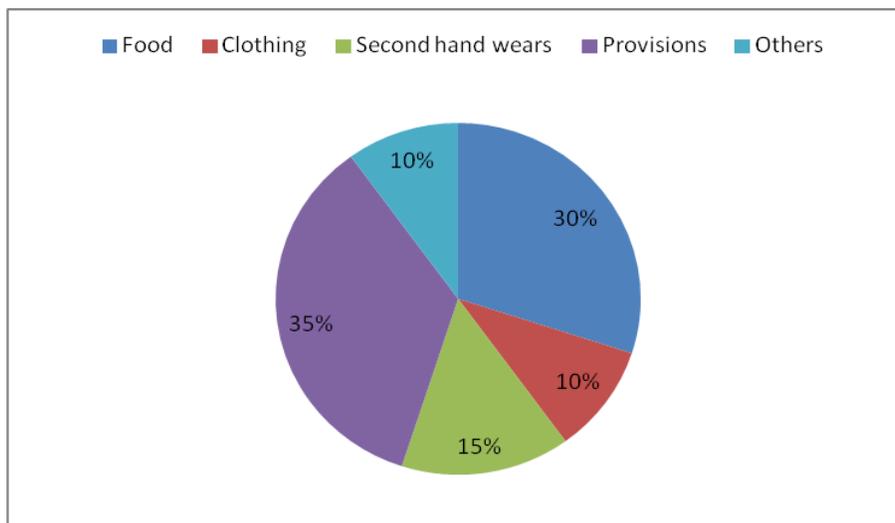
Figure 4.8. Approximately Weekly Profit



Source: Primary Data 2022

The figure above shows that 10% of the street traders approximate weekly income is less than Le 1,000, 40% is between Le 1,000 – Le 2,000, 30% is between Le 2,000 – Le 3,000 and 20% is between Le 3,000 and above.

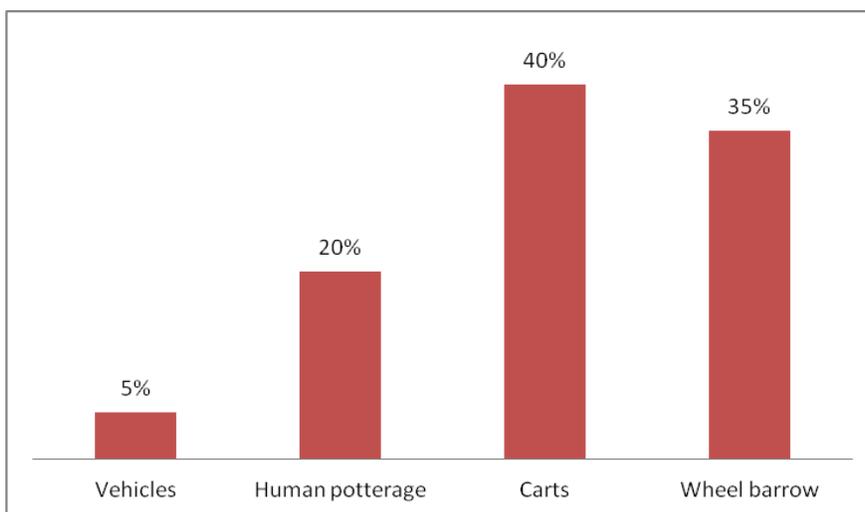
Figure 4.9. Type of Commodities sold



Source: Primary Data 2022

The figure above shows that 30% of the type of commodities sold by street traders is food, 10% is clothing, 35% is provisions, 15% is second hand wears and 10% is others such as open space saloon.

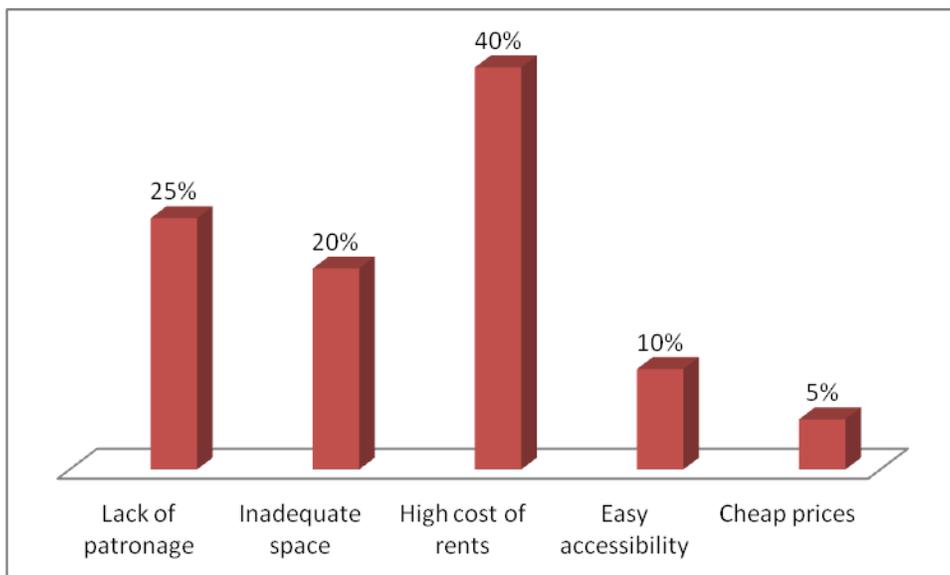
Figure 4.10. Mode of Conveyance of goods



Source: Primary Data 2022

The figure above shows that 5% of the mode of conveyance of goods by street traders is by vehicles, 20% is by human potter age, 40% is by carts and 35% is by wheelbarrows.

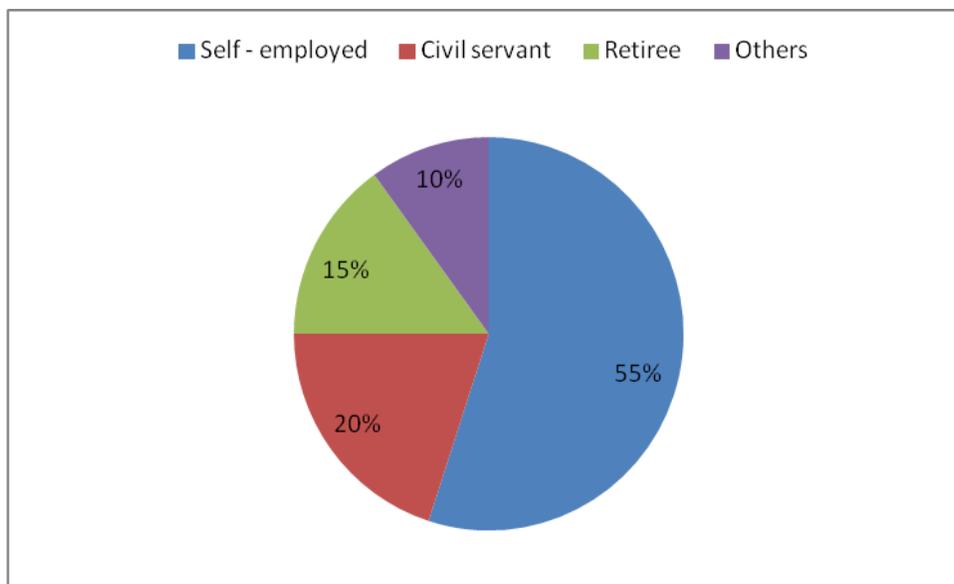
Figure 4.11. Reasons for not using designated shops



Source: Primary Data 2022

The figure above shows that 25% of the street traders indicated lack of patronage as one of the reasons for not using designated shops, 20% indicated inadequate spaces, 40% indicated high cost of rents, 10% indicated easy accessibility and 5% indicated cheap prices.

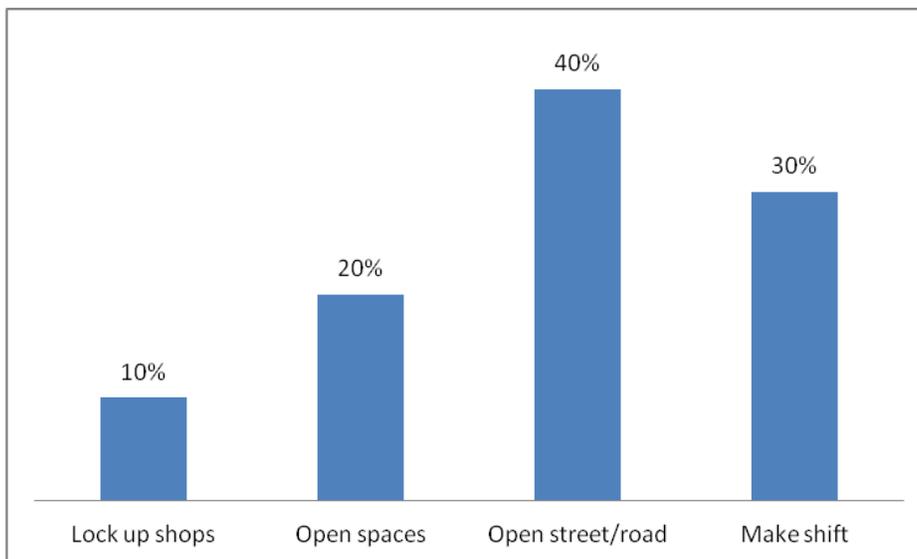
Figure 4.12. Employment Status



Source: Primary Data 2022

The figure above reveals that 55% of the employment status of street traders is self – employed, 20% is civil servant, 15% is retiree and 10% is others such as seasonal traders who are seen in the street during festive seasons.

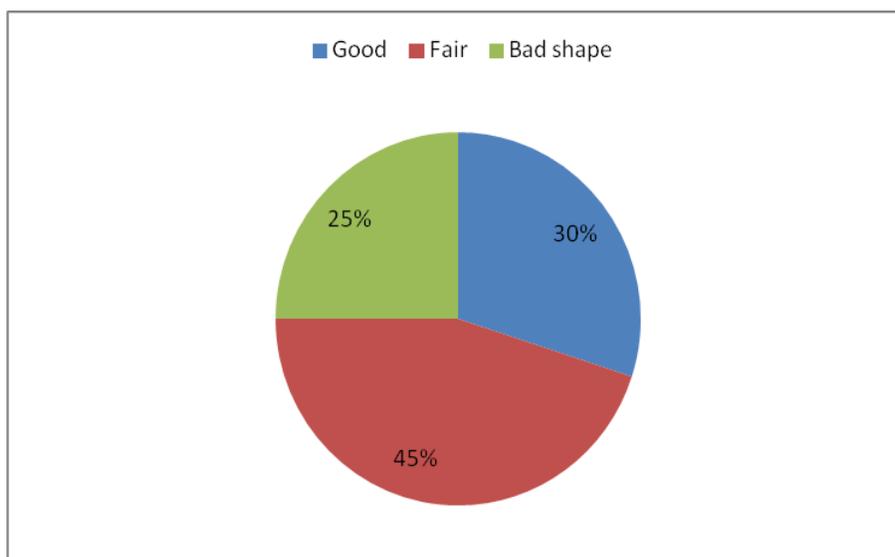
Figure 4.13.Type of Structures



Source: Primary Data 2022

The figure above reveals that 10% of the street traders type of structures are lock up, 20% are open spaces, 40% are open street/road and 30% are make shift.

Figure 4.14.Condition of the Structures



Source: Primary Data 2022

The figure above shows that 30% of the condition of the street traders structures are good, 40% indicated fair and 25% indicated in bad shape.

Figure 4.15. Factors responsible for the patronage of street trading in Freetown Municipality (Strongly Disagree, Disagree,Neutral,Agree and Strongly Agree)

No	Statement	SD	D	N	A	SA	T
1	Availability	20 (5%)	30 (7.5%)	30 (7.5%)	80 (20%)	240 (60%)	400 (100%)
2	Affordability	20 (5%)	25 (6.25%)	35 (8.25%)	80 (20%)	240 (60%)	400 (100%)
3	Location	30 (7.5%)	40 (10%)	60 (15%)	70 (17.5%)	200 (50%)	400 (100%)
4	Cost	40 (10%)	50 (12.5%)	10 (2.5%)	80 (20%)	220 (55%)	400 (100%)
5	Proximity	20 (5%)	25 (6.25%)	40 (10%)	85 (21.25%)	230 (57.5%)	400 (100%)
6	Time	20 (5%)	40 (10%)	40 (10%)	50 (12.5%)	250 (62.5%)	400 (100%)
7	New items	20 (5%)	25 (6.25%)	45 (11.25%)	90 (22.5%)	220 (55%)	400 (100%)
8	Marketability	40 (10%)	20 (5%)	50 (12.5%)	80 (20%)	210 (52.5%)	400 (100%)
9	Handiness	60 (15%)	40 (10%)	30 (7.5%)	80 (20%)	190 (47.5%)	400 (100%)
10	Convenience	30 (7.5%)	50 (12.5%)	40 (10%)	80 (20%)	200 (50%)	400 (100%)
11	Attractiveness	70 (17.5%)	30 (7.5%)	45 (11.25%)	75 (18.75%)	180 (45%)	400 (100%)
12	Comfort	40 (10%)	50 (12.5%)	50 (12.5%)	70 (17.5%)	190 (47.5%)	400 (100%)
13	Customer care	230 (57.5%)	25 (6.25%)	55 (13.75%)	50 (12.5%)	40 (10%)	400 (100%)

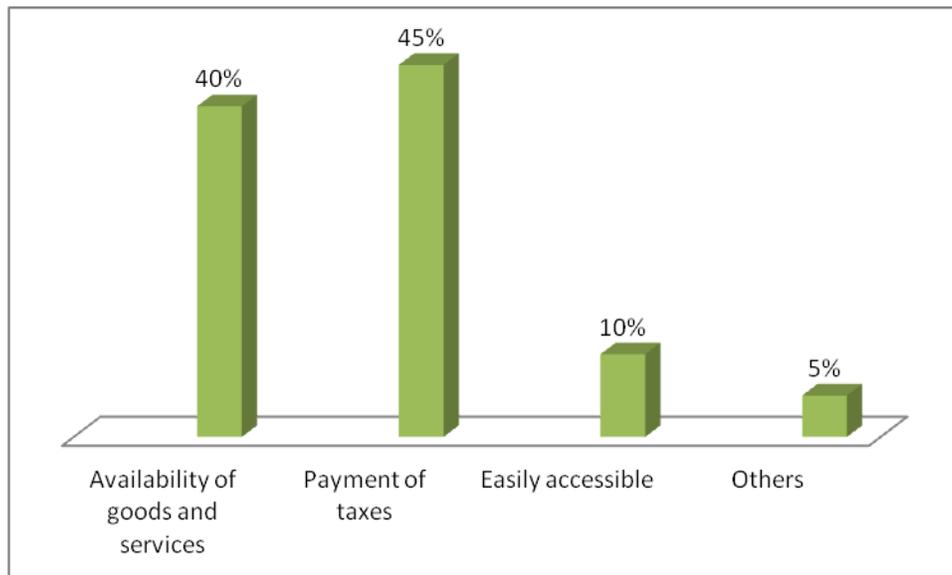
Source: Primary Data 2022

The table above highlighted the responses from street traders in relations to the factors responsible for the patronage of street trading.

With regards to availability, 5% indicated strongly disagree, 7.5% indicated disagree, 7.5% indicated neutral, 20% indicated agree and 60% indicated strongly agree. With regards to affordability, 5% indicated strongly disagree, 6.25% indicated disagree, 8.25%

indicated neutral,20% indicated agree and 60% indicated strongly agree. With regards to location, 7.5% indicated strongly disagree, 10% indicated disagree, 15% indicated neutral, 17.5% indicated agree and 50% indicated strongly agree. With regards to 10% indicated strongly disagree, 12.5% indicated disagree, 2.5% indicated neutral, 20% indicated agree and 55% indicated strongly agree. With regards to proximity, 5% indicated strongly disagree, 6.25% indicated disagree, 10% indicated neutral, 21.25% indicated agree and 57.5% indicated strongly agree. With regards to time,, 5% indicated strongly disagree, 10% indicated disagree, 10% indicated neutral,12.5% indicated agree and 62.5% indicated strongly agree. With regards to new items, 5% indicated strongly disagree, 6.25% indicated disagree,11.25% indicated neutral,22.5% indicated agree and 55% indicated strongly agree. With regards to marketability, 10% indicated strongly disagree, 5% indicated disagree,12.5% indicated neutral,20% indicated agree and 52.5% indicated strongly agree. With regards to handiness, 15% indicated strongly disagree,10% indicated disagree,7.5% indicated neutral,20% indicated agree and 47.5% indicated strongly agree.With regards to convenience, 7.5% indicated strongly disagree,12.5% indicated disagree,10% indicated neutral,20% indicated agree and 50% indicated strongly agree. With regards to attractiveness, 17.5% indicated strongly agree, 7.5% indicated disagree,11.25% indicated neutral. 18.75% indicated agree and 45% indicated strongly agree. With regards to comfort, 10% indicated strongly disagree, 12.5% indicated disagree,12.5% indicated neutral, 17.5% indicated agree and 47.5% indicated strongly agree. With regards to customer care, 57.5% indicated strongly disagree, 6.25% indicated disagree,13.5% indicated neutral, 12.5% indicated agree and 10% indicated

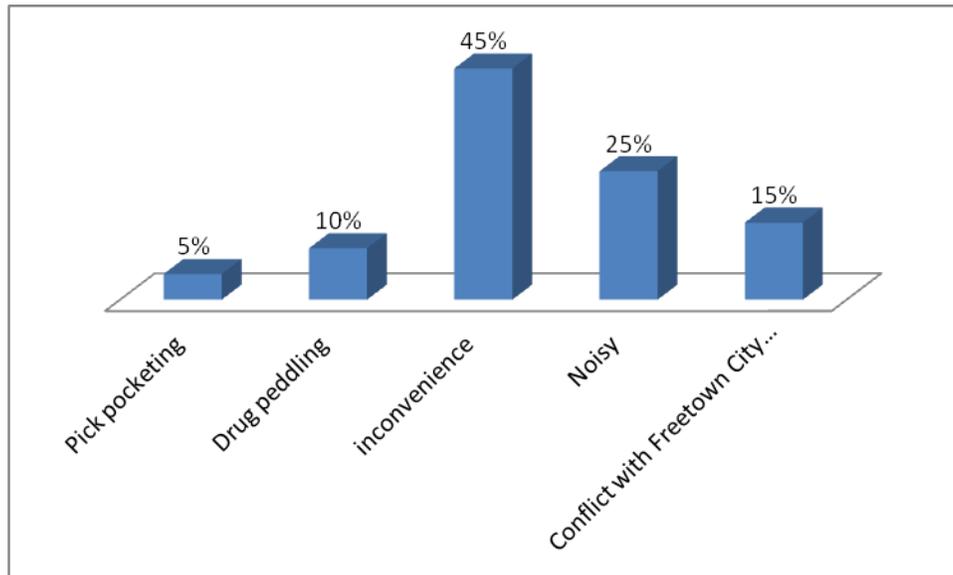
Figure 4.16. Economic Impacts



Source: Primary Data 2022

The figure above reveals that 40% of the economic impact of street trading is availability of goods and services in the market, 45% is payment of taxes to the government through the Freetown City Council, 10% is easily accessible and 5% is others such as hiking of prices at the expense of the buyers.

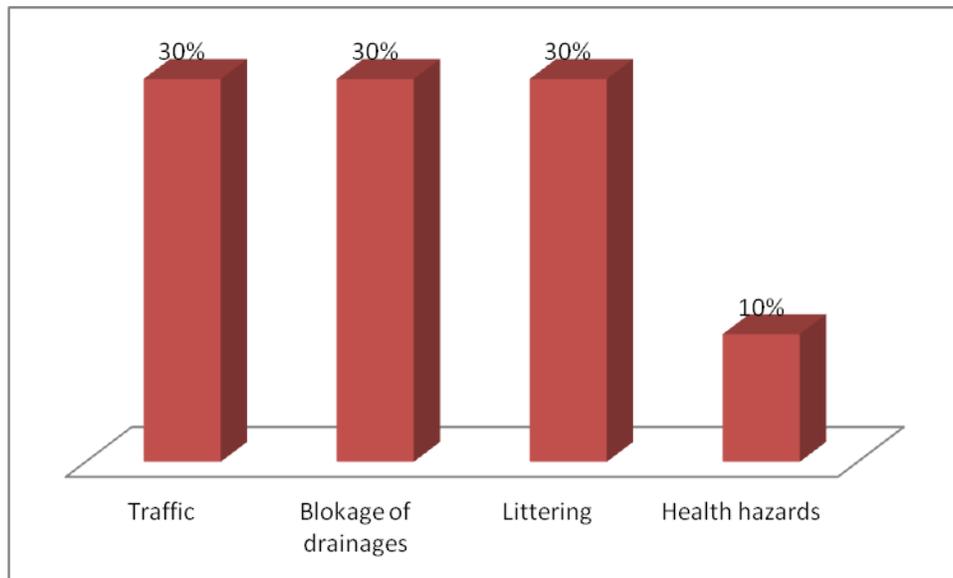
Figure 4.17.Social Impact



Source: Primary Data 2022

The figure above shows that 5% indicated pick – pocketing as one of the social impacts of street trading on Freetown Municipality, 10% indicated drug peddling, 45% indicated inconvenience to the general public, 25% indicated noisy and 15% indicated conflict with Freetown City Council Police.

Figure 4.18 .Environmental Impact



Source: Primary Data 2022

The figure above reveals that 30% of the environmental impacts of street trading on Freetown Municipality is traffic congestion, 30% is blockage of drainages, 30% is littering and 10% is health hazards to the environment and traders themselves.

FINDINGS

Based on the data analysis, it was found out that majority of the street traders are women with 60%, majority of them are within the age bracket between 35 – 45 years with 45%, majority had a secondary education with 40%, majority of them have spent between 10 – 15 years in street trading with 35%, majority of the street traders are sole traders or petty traders with 80%, their major source of finance for their businesses is from rotating savings normally called “Osusu”. Majority are singles with 35%, their weekly profit is approximately within Le 1,000 – Le 2,000 with 40%, major commodities sold in the street is food which consist of vegetables, ice water ,boiled eggs etc with 35%, the cart is the major mode of conveying their goods with 40%. Due to the high cost of rents they preferred trading in the street with 40%, 55% of these street traders are singles, 40% of their structures are open street/road. 45% of the condition of their structures are fair, strongly agree that availability, affordability, location, cost, proximity, time, new items, marketability, handiness, convenience, attractiveness, comfort are the major reasons responsible for the patronage of street trading and strongly disagree with customer care with 57.5%. Payment of taxes which contribute to national development and making available of goods and services in the market are their major economic impacts on the Freetown Municipality. Socially, their presence in the street causes inconvenience for the public with 45% and environmentally, their presence in the street causes traffic congestion, blockage of drainages and littering with 30% respectively..

CONCLUSION

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Key points are established in this paper; First Street trading in Freetown Municipality is poverty alleviation which has to be publicly recognized and appreciated. Secondly, street traders need to be supported by giving free entrepreneurship education to the traders and thirdly, the activity has to be officially regulated in favour of traders and public as a whole. Street trading has benefits to traders and others. The major reasons for them being in street is the high cost of rents and which a good number of them cannot afford, their low level of education is having negative effects on the business.

RECOMMENDATIONS

Based on the findings, the researcher offers some policy recommendations. Though they are context- specific to Freetown Municipality and thus may hold beyond the current study area.

1. Government to encourage training institutions to provide entrepreneurship training for these street traders which will enable them to grow and expand their business. This may create employment for the youths and poverty eradication.
2. Street traders are to be involved in the plan for youth entrepreneurship education.
3. Street trading is a means of livelihood for some people and therefore, should be considered for inclusive physical planning for economic sustainability of the urban poor.
4. Policy measures that incorporate design of trading space for the street traders may be of assistance to solve the problems of street trading activities.
5. Government to regulate between the activities of wholesaling and retailing so that there is a distinction between the two. As long wholesalers are retailing it will be difficult to regulate street trading.
6. Building formal market structures will be appreciated by the street traders if only wholesalers are not retailing which deprive them of customer and will prevent them from the patronage of structures as in the case of Krootown Road as an example.
7. Politicians should not see the street traders as campaign tools by telling them vote for our party we will not remove you from the street and once the party is in power finds it difficult to regulate them.
8. Ministry of Health and Trade to enforce the cleaning of these streets where the daily trading activities are transacted with strong penalties for defaulters
9. Street and informal traders require laws that recognize their economic activities as an important component of the city economy, and ensure their right to trading space.
10. Freetown City Council to develop areas like Lumley, Shell Company and Wellington more attractive for business to encourage traders to concentrate their rather than converging to PZ on a daily bases

11. The market dues collected should be put into physical development such building of public toilets for the traders to benefit from.

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Health Challenges Associated with Internet Addiction: A Case Study Of Four Selected Tertiary Institutions In North-West Nigeria

Shamsudeen Muhammad Sani, Falalu Abdulra'uf Musa*, Usman A. Ismail

Department of Computer Science, Federal Polytechnic Kaura-Namoda, Zamfara State–Nigeria.

*Corresponding author: abdulfmusa@gmail.com

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Abstract

The use of the internet has expanded dramatically in recent decades, and internet addiction has become a serious public health issue around the world. The goal of this study was to find out how common internet addiction is among some selected students (16–45 years old) in four chosen tertiary institutions in North-West Nigeria, as well as factors that contribute to it. This work investigated possible impact of excessive internet usage and its associated consequences such as, eye dryness, backbone pain, sadness, stress, and anxiety among sampled students, as well as the psychopathological effects of internet use on them. Although there are varying outcomes from the different institutions, on average, results of the analysis revealed that there is a positive correlation between internet addiction and mental health challenges among students of the selected institutions, thus, having significant impact on their educational output (research and study).

Keywords: *Internet addiction, social media, social media addiction, mental health, depression, anxiety.*

1. INTRODUCTION

Recently, technological advancement has accelerated, particularly in the realm of digital technology, which includes internet networking. With the rapid growth of electronic gadgets, the digital revolution has changed how we communicate, educate, and entertain ourselves, as well as how we act as people in a society (Kurniasanti et al., 2019). Adolescents born in the digital age are surrounded by computers, the internet, video games, mobile phones, and other hand-held devices at home, at school, and in every aspect of their lives. According to (Peter & Brosius, 2021), the digital environment, like family, peers, and school, should be treated as another social context in adolescent development. The first study on internet addiction was published in 1996, and the results were presented to the American Psychological

Association. The researchers looked at nearly 600 cases of heavy Internet users who showed signs of addiction, as determined by an adapted version of the DSM-IV criteria for compulsive gambling (Young et al., 2012).

According to Internet World Stats, out of Nigeria's estimated population of two hundred and six million, one hundred and thirty nine thousand, five hundred and eighty nine (206,139,589), one hundred and twenty-six million, seventy-eight thousand, nine hundred and ninety-nine (126,078,999) (or 61.2 percent of the country's population) use the Internet, while the remaining eighty million, sixty thousand, five hundred and ninety (80,060,590) do not use the Internet; likewise, both the annual change in Internet users and growth rate of the population are estimated at about 13.2 percent (Odusanya & Adetutu, 2020).

Traditionally, the term "addiction" has been associated with psychoactive substances such as alcohol and cigarettes. However, more recently, addictive behaviors such as Internet use have been recognized (Sim et al., 2012). Internet addiction is defined as "excessive or poorly regulated preoccupations, impulses, or behaviors surrounding computer use and internet access that contribute to impairment or suffering." (Shaw & Black, 2008), while social media addiction is a type of Internet addiction in which people feel compelled to use social media in excessive amounts. Individuals who suffer from social media addiction are frequently too concerned about it and are motivated by an uncontrolled need to log on and utilize it. Mood, cognition, physical and emotional reactions, as well as interpersonal and psychological difficulties, have all been linked to social media addiction in previous studies. According to reports, around 12% of users on social networking sites suffer from social media addiction (Hou et al., 2019).

Many studies on social media use and mental health have found that long-term use of social media sites like Facebook is favorably related to mental health problems such as stress, anxiety, and depression, while being adversely connected to long-term well-being (Eraslan-Capan, 2015). For example, social media sites (such as YouTube, Snapchat, and Instagram) are routinely used, with over three-quarters (71%) of young adults in the United States accessing them many times per day. As a result, many young adults may be susceptible to online gaming and/or social media addictions (Wong et al., 2020). Behavioral addictions can cause negative health implications due to a lack of control over repetitive, persistent, and dysfunctional behaviors, such as social connection issues, impairments in functional tasks and activities, sleep problems, and mental disorders (Alhassan et al., 2018). Furthermore, it has been demonstrated that, some types of social media use are linked to lower academic achievements (Al-Menayes, 2015). According to Lau (2017), while

utilizing social media for academic purposes did not predict academic success as measured by the cumulative grade point average (CGPA), using social media for non-academic purposes (particularly video gaming) and social media multitasking did. In addition, a large sample (N = 1893) survey done in the United States discovered that the amount of time students spent on Facebook was inversely related to their overall GPAs (Junco, 2012).

Mental health, according to the World Health Organization (WHO), is defined as “a condition of well-being in which an individual recognizes his or her own potential, can manage typical life stresses, can work successfully and fruitfully, and can contribute to his or her community (Galderisi et al., 2015).”

Survey analysis found that 24.6 percent reported frequent problems due to internet use, and all had loneliness, depressed mood, compulsivity, and other psychological impairments, according to research conducted at the National Institute of Mental Health and Neuroscience, Department of Psychology, which focused on identifying the pattern of internet addiction and its association with a mental health problem (Bisen & Deshpande, 2020).

There is no enough relevant scholarly literature in emerging countries like Nigeria. Consequently, this research aims at investigating relationship between internet addiction and mental health problems in North-West Nigeria using some selected students of some tertiary institutions in the region. The primary goal of this research is to look at the link between internet addiction and the health issues caused by it especially among tertiary institution students in Nigeria's northwestern region.

2.MATERIALS AND METHODS

The methodology adopted for this research includes two stages; fundamental investigations and phase of utilizing a research instrument. The work incorporates surveys and analysis.

2.1 Methodology

This section starts with the methodology of the research. Survey instruments have been identified as the most popular data collection tools in outcomes measurement and evaluation (Taherdoost, 2018). For this study, we carried out data

collection within a focused/targeted group using a questionnaire. We selected students of average socioeconomic levels in four tertiary institutions, thus, they have easy access to smart phones and the Internet.

2.2 Research Instrument

To meet some expectations, a questionnaire was distributed as an instrument for data collection, and in the questionnaire, a survey to determine demographic information, including gender, age, year of study, etc. was carried out, and the questionnaire was divided into five main parts. Furthermore, an analysis was carried out to identify possible addiction type.

2.3 Target Groups and Sampling

We designed a questionnaire to source for data in order to ascertain level of internet addiction and its possible health effects, sourcing of the data (survey) was carried out in the four (4) tertiary institutions in the North-West geo political zone of Nigeria, namely;

- i. Federal Polytechnic Kaura-Namoda
- ii. Ahmadu Bello University Zaria
- iii. Nuhu Bamalli Polytechnic Zariaand,
- iv. Federal College of Education Zaria.

The four tertiary institutions were chosen because of their diversity (as they comprise of students from different parts of the country) and high number of internet users. The questionnaire gathering of data targeted youths ranging from the age of 16-45 years —particular preference is given in-terms of gender diversity.

Table 1.1 shows the instruments used, the response scale, and the focus areas for each instrument.

S/N	Question Asked	Choose Answer	Percentage (%)
1	What is your gender?	Male	63
		Female	37
2	What is your age?	16-25	40.7
		26-34	50
		35-39	7.4
		40 & above	1.9
3	What is your level of study?	ND I or NCE I	9.3

		ND II or NCE II	7.4
		HND I or NCE III	5.6
		HND II	20.4
		100L	3.7
		200L	9.3
		300L	3.7
		400L	22.2
		500L	27.8
4	Do you have a smart phone?	Yes	100
		No	0
5	Do you have internet accessibility on your phone?	Yes	100
		No	0
6	What is your source of internet use?	Data Network	92.6
		Wi-Fi	1.9
		Others	5.6
7	Social Media Usage (Facebook)	Never	13
		1-2 hours	48.1
		2-5 hours	16.7
		>5	7.4
		Always	14.8
8	Instagram	Never	37
		1-2 hours	37
		2-5 hours	14.8
		>5	5.6
		Always	5.6
9	Twitter	Never	42.6
		1-2 hours	38.9
		2-5 hours	5.6
		>5	5.6
		Always	7.4
10	WhatsApp	Never	0
		1-2 hours	18.5
		2-5 hours	25.9
		>5	9.3
		Always	46.3
11	Telegram	Never	64.8
		1-2 hours	24.1
		2-5 hours	1.9
		>5	5.6
		Always	3.7
12	Snapchat	Never	72.2
		1-2 hours	14.8
		2-5 hours	5.6
		>5	1.9
		Always	5.6
14	Likee	Never	83.3
		1-2 hours	11.1
		2-5 hours	3.7
		>5	0
		Always	1.9
15	Vskit	Never	83.3

		1-2 hours	9.3
		2-5 hours	3.7
		>5	1.9
		Always	1.9
16	Pinterest	Never	85.2
		1-2 hours	7.4
		2-5 hours	5.6
		>5	0
		Always	1.9
17	Email Apps	Never	25.9
		1-2 hours	44.4
		2-5 hours	3.7
		>5	3.7
		Always	22.2
18	Others	Never	57.4
		1-2 hours	24.1
		2-5 hours	3.7
		>5	1.9
		Always	13
19	Do you think you can survive without your phone?	Yes	29.6
		No	29.6
		Maybe	40.7
20	On a daily basis, about how much time do you spend on your mobile phone application using internet?	Never	1.9
		1-2 hours	24.1
		3-5 hours	24.1
		6-12 hours	24.1
		Always	25.9
21	The use of internet has brought about laziness in your learning process.	Never	20.4
		Almost Never	13
		Sometimes	57.4
		Often	7.4
		Very Often	1.9
22	The use of internet in classroom often leads you to becoming distracted.	Never	29.6
		Almost Never	11.1
		Sometimes	35.2
		Often	13
		Very Often	11.1
23	Have you ever experienced sleep deprivation because of internet browsing?	Never	27.8
		Almost Never	5.6
		Sometimes	40.7
		Often	15.7
		Very Often	9.3
24	You feel unhappy when you are not able to renew your data subscription.	Never	3.7
		Almost Never	3.7
		Sometimes	42.6
		Often	16.7
		Very Often	33.3
25	You have tried hard but failed to control your addiction to browsing on your phone.	Never	29.6
		Almost Never	11.1
		Sometimes	31.5
		Often	20.4

		Very Often	7.4
26	You usually use your phone longer than intended.	Never	13
		Almost Never	13
		Sometimes	35.2
		Often	22.2
		Very Often	16.7
27	Have you ever regretted being online for long?	Never	38.9
		Almost Never	11.1
		Sometimes	37
		Often	7.4
		Very Often	5.6
28	You feel comfortable in the virtual world than the real world.	Never	29.6
		Almost Never	13
		Sometimes	48.1
		Often	7.4
		Very Often	1.9
29	You get impatient when you don't find your phone showing a notification.	Never	25.9
		Almost Never	13
		Sometimes	44.4
		Often	13
		Very Often	3.7
30	Running out of battery in your phone disturbs you.	Never	3.7
		Almost Never	7.4
		Sometimes	31.5
		Often	20.4
		Very Often	37
31	You neglect important activities at school/home because of internet over-use?	Never	44.4
		Almost Never	14.8
		Sometimes	24.1
		Often	9.3
		Very Often	7.4
32	Do you anticipate about the next online session or rethink about previous online activity often?	Never	25.9
		Almost Never	16.7
		Sometimes	44.4
		Often	13
		Very Often	0
33	Have you missed a meal because of over-engagement with your online activities?	Never	48.1
		Almost Never	7.4
		Sometimes	33.3
		Often	3.7
		Very Often	7.4
34	The prolong use of internet causes your eyes to dryness.	Strongly Agree	14.8
		Agree	57.4
		Neutral	22.2
		Disagree	5.6
		Strongly Disagree	0
35	Do you send frequent online requests to people to engage in online game?	Strongly Agree	3.7
		Agree	7.4
		Neutral	31.5
		Disagree	42.6
		Strongly Disagree	14.8

36	You use the internet to search for medical information when you are having symptoms of sickness.	Strongly Agree	25.9
		Agree	50
		Neutral	14.8
		Disagree	5.6
		Strongly Disagree	3.7
37	You have tried hard and failed to control your addiction to your phone.	Strongly Agree	20.4
		Agree	24.1
		Neutral	31.5
		Disagree	24.1
		Strongly Disagree	0
38	Sometimes you have the sensation that your phone is ringing or vibrating when it's not.	Strongly Agree	24.1
		Agree	55.6
		Neutral	9.3
		Disagree	9.3
		Strongly Disagree	1.9
39	Staying long browsing the internet on your phone/computer affect your backbone thereby causing back ache.	Strongly Agree	22.2
		Agree	40.7
		Neutral	14.8
		Disagree	20.4
		Strongly Disagree	1.9
40	Sometimes you ignore the people you are with when you are online.	Strongly Agree	13
		Agree	55.6
		Neutral	14.8
		Disagree	16.7
		Strongly Disagree	0

The exact questions asked, choice of replies, and the total percentage of responses supplied by respondents from the four different higher institutions in the two separate states of Kaduna (comprising of Ahmadu Bello University Zaria, Federal College of Education Zaria and Nuhu Bamalli Polytechnic Zaria) and Zamfara (which has Federal Polytechnic Kaura-Namoda) during the survey are represented in Table 1.1.

A total of 400 students were polled, with 386 filling out and returning their completed questionnaire forms.

Table 1.2.1: Aggregate of Respondents on Question 34 of Table 1.1 (The prolong use of internet causes your eyes to dryness) based on scale (Strongly Agree (SA), Agree, Neutral, Disagree and Strongly Disagree (SD)) concerning the Various Institutions.

S/N	Institution	Aggregate of SA	Aggregate of Agree	Aggregate of Neutral	Aggregate of Disagree	Aggregate of SD

1	Federal Polytechnic Kaura-Namoda	20	45	30	5	0
2	Ahmadu Bello University	16	61	15	6	0
3	Nuhu Bamalli Polytechnic	14	57	20	4	0
4	Federal College of Education Zaria	7	58	21	7	0

Table 1.2.2: Aggregate of Respondents on Question 35 of Table 1.1 (Do you send frequent online requests to people to engage in online game?) based on scale (Strongly Agree (SA), Agree, Neutral, Disagree and Strongly Disagree (SD)) concerning the Various Institutions.

S/N	Institution	Aggregate of SA	Aggregate of Agree	Aggregate of Neutral	Aggregate of Disagree	Aggregate of SD
1	Federal Polytechnic Kaura-Namoda	5	9	40	28	18
2	Ahmadu Bello University	4	10	28	42	14
3	Nuhu Bamalli Polytechnic	3	5	34	33	20
4	Federal College of Education Zaria	2	5	20	61	5

Table 1.2.3: Aggregate of Respondents on Question 36 of Table 1.1 (You use the internet to search for medical information when you are having symptoms of sickness) based on scale (Strongly Agree (SA), Agree, Neutral, Disagree and Strongly Disagree (SD)) concerning the Various Institutions.

S/N	Institution	Aggregate of SA	Aggregate of Agree	Aggregate of Neutral	Aggregate of Disagree	Aggregate of SD
1	Federal Polytechnic Kaura-Namoda	30	36	20	10	4
2	Ahmadu Bello University	20	65	5	5	3
3	Nuhu Bamalli Polytechnic	25	48	14	3	5
4	Federal College of Education Zaria	25	44	18	4	2

Table 1.2.4: Aggregate of Respondents on Question 37 of Table 1.1. (You have tried hard and failed to control your addiction to your phone) based on scale (Strongly Agree (SA), Agree, Neutral, Disagree and Strongly Disagree (SD)) concerning the Various Institutions.

S/N	Institution	Aggregate of SA	Aggregate of Agree	Aggregate of Neutral	Aggregate of Disagree	Aggregate of SD
1	Federal Polytechnic Kaura-Namoda	19	28	27	26	0
2	Ahmadu Bello University	22	27	31	18	0
3	Nuhu Bamalli Polytechnic	15	20	38	22	0
4	Federal College of Education Zaria	23	18	25	27	0

Table 1.2.5: Aggregate of Respondents on Question 38 of Table 1.1 (Sometimes you have the sensation that your phone is ringing or vibrating when it's not) based on scale (Strongly Agree (SA), Agree, Neutral, Disagree and Strongly Disagree (SD)) concerning the Various Institutions.

S/N	Institution	Aggregate of SA	Aggregate of Agree	Aggregate of Neutral	Aggregate of Disagree	Aggregate of SD
1	Federal Polytechnic Kaura-Namoda	18	55	15	10	2
2	Ahmadu Bello University	28	52	10	6	2
3	Nuhu Bamalli Polytechnic	20	52	5	16	2
4	Federal College of Education Zaria	27	55	6	4	1

Table 1.2.6: Aggregate of Respondents on Question 39 of Table 1.1 (Staying long browsing the internet on your phone/computer affect your backbone thereby causing back ache) based on scale (Strongly Agree (SA), Agree, Neutral, Disagree and Strongly Disagree (SD)) concerning the Various Institutions.

S/N	Institution	Aggregate of SA	Aggregate of Agree	Aggregate of Neutral	Aggregate of Disagree	Aggregate of SD
1	Federal Polytechnic Kaura-Namoda	26	25	20	29	0
2	Ahmadu Bello University	38	36	7	15	2
3	Nuhu Bamalli Polytechnic	8	49	10	25	3

4	Federal College of Education Zaria	14	47	20	10	2
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Table 1.2.6: Aggregate of Respondents on Question 40 of Table 1.1 (Sometimes you ignore the people you are with when you are online) based on scale (Strongly Agree (SA), Agree, Neutral, Disagree and Strongly Disagree (SD)) concerning the Various Institutions.

S/N	Institution	Aggregate of SA	Aggregate of Agree	Aggregate of Neutral	Aggregate of Disagree	Aggregate of SD
1	Federal Polytechnic Kaura-Namoda	15	56	17	12	0
2	Ahmadu Bello University	12	58	14	14	0
3	Nuhu Bamalli Polytechnic	15	51	11	18	0
4	Federal College of Education Zaria	8	50	15	20	0

Tables 1.2.1 to 1.2.7 show the total number of respondents in this scale range (Strongly Agreed (SA), Agreed, Neutral, Disagree, and Strongly Disagreed (SD)). In each institution, the total number of respondents who responded based on the five scales of the complete questions were given.

2.4 Data Gathering Techniques

The survey tool was first tested on a small group of participants (15 students) from Federal Polytechnic Kaura-Namoda. They were given a questionnaire to fill out and return to get faster results. The pilot phase allowed us to amend several

ambiguous questions before finalizing the questionnaire, which was then distributed to the selected tertiary institutions for data collection, with the study's goal explained and the targeted groups' voluntary participation sought.

2.5 Analysis of Data and Results

Pictorial representations of the analysis are depicted in the following figures. The complete questions asked, choice of replies, and overall percentage of answers supplied by respondents from the four different tertiary institutions are shown in Table 1.1. Four hundred students were questioned, and 386 students filled out and returned their completed questionnaire forms. Federal Polytechnic Kaura-Namoda submitted 100 questionnaires, Ahmadu Bello University Zaria submitted 98, Nuhu Bamalli Polytechnic submitted 95, and Federal College of Education Zaria submitted 93 questions.

2.6 The Study's Major Findings

The study's primary conclusions are summarized below, based on responses from the questionnaire survey.

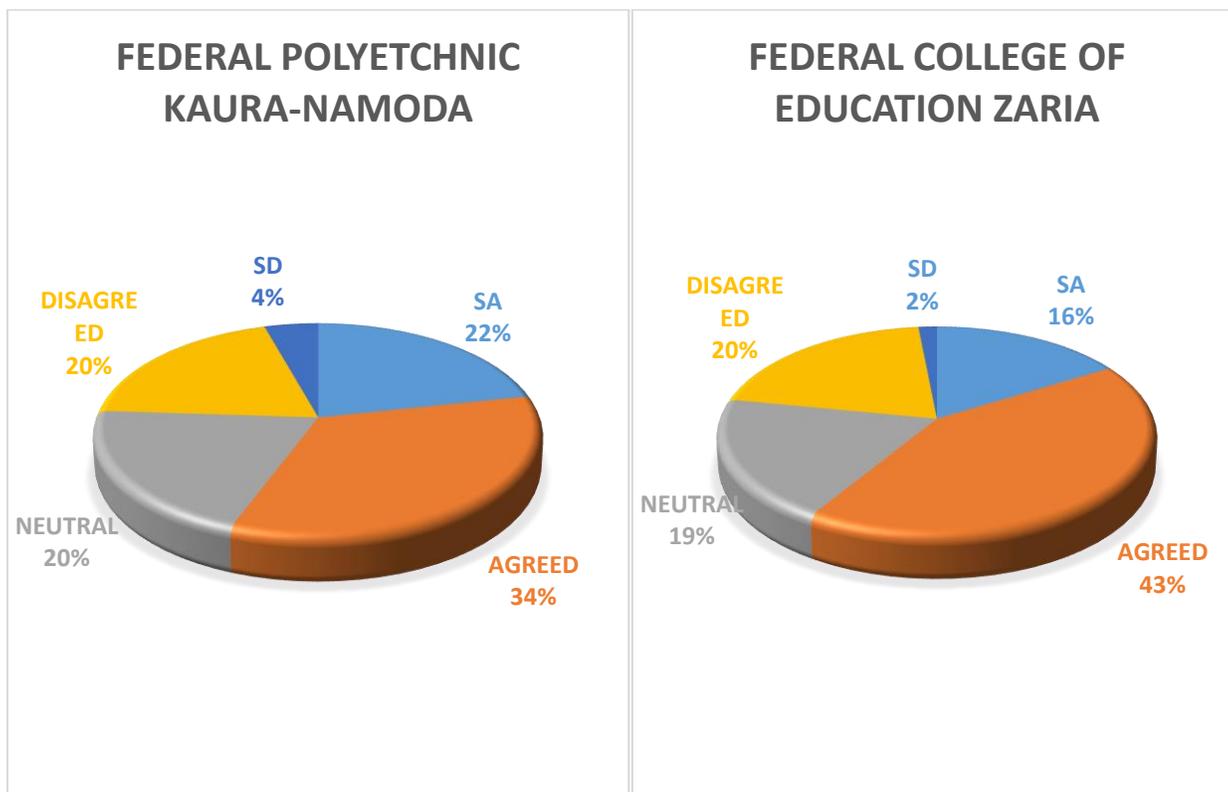


Figure 1.1: Respondents' responses to the various tertiary institutions on a scale of (Strongly Agree (SA), Agree, Neutral, Disagree, Strongly Disagree (SD)).

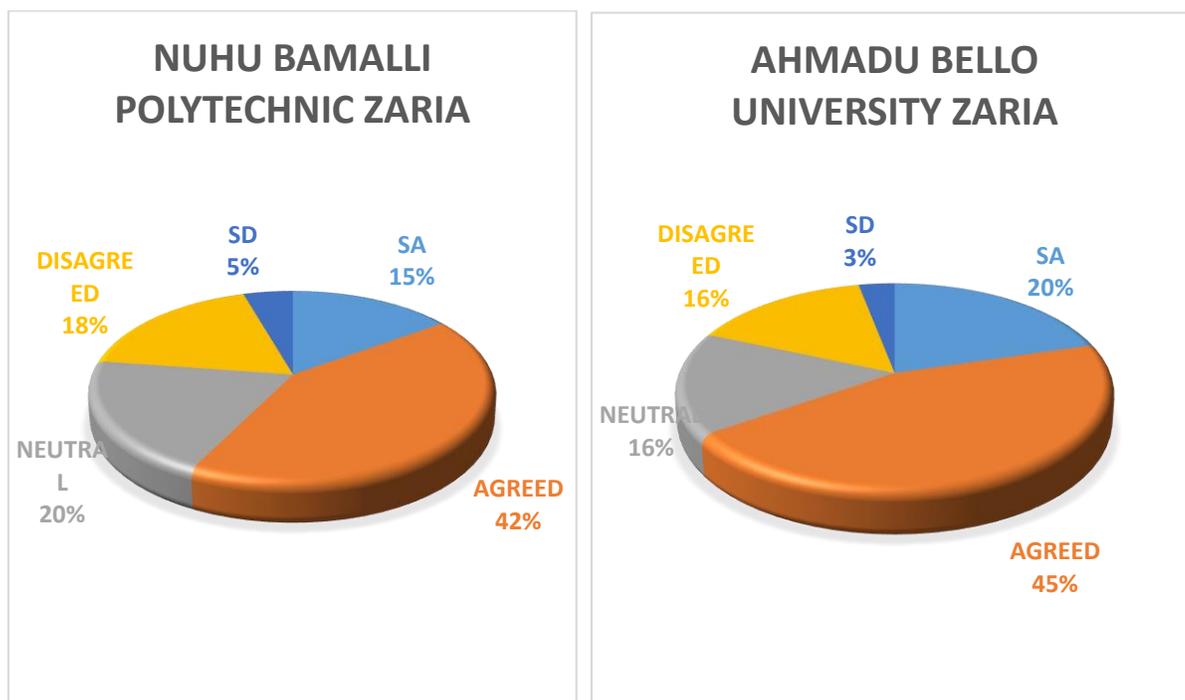


Figure 1.2: Respondents' responses to several questions on a scale of (Strongly Agree (SA), Agree, Neutral, Disagree, Strongly Disagree (SD)).

The graph in Figure 1.1 depicts the total number of respondents in relation to the total aggregate of questions answered in Federal Polytechnic Kaura-Namoda where 22% strongly agreed, 34% agreed, 20% are neutral, 20% disagreed with 4% strongly disagreed and Federal College of Education Zaria where 16% strongly agreed, 43% agreed, 19% are neutral with 20% disagreeing and 2% strongly disagreed; Similarly, Figure 1.2 shows the total number of responses from Nuhu Bamalli Polytechnic Zaria with 15% of the respondents strongly agreeing, 43% agreed, 20% were neutral, 18% disagreed while 5% strongly disagreed, likewise, in Ahmadu Bello University Zaria, 20% strongly agreed, 45% agreed, 16% were neutral, another 16% disagreed while 3% strongly disagreed.

They show that, seven of the forty questions asked about the possible health effects in the instrument (questionnaire) have a significant percentage of agree (50%) or higher, while only three questions have a significant percentage of agree (below 50%). This shows that most internet users believe or understand that Internet addiction has adverse effects on humanity.

2.7 The Study's Limitations

This research study focuses solely on some selected students of some tertiary institutions in one geo political zone of Nigeria, the students surveyed utilize the internet to obtain a comprehensive and well-established harmful influence of the internet on humanity. Further research should focus on gathering data from medical practitioners and psychologists, as they are professionals who must have dealt with a wide range of physiological, psychological, and mental problems related to internet addiction, and it should be extended beyond the four selected institutions and zones in the country.

3. CONCLUSION

The results of this study strongly show that, despite the internet's extensive use and importance in society, it nevertheless has evitable negative consequences to humanity that cannot be dismissed or ignored. In this study, addiction to the internet, particularly social media, was shown to possibly pose numerous hazards to human health, life, and well-being. Also, based on these findings, most of the inheritably internet related crimes such as harsh, criminal, sexual, and lethal actions displayed by both adults and children may result from unfettered access to potentially harmful information via smartphones and the internet. Finally, we conclude that spending too much time on the internet can have dangerous or positive consequences.

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Comparison of incidence of post spinal hypotension between pre-loading and co-loading of fluid in parturient undergoing elective caesarean section with perfusion index greater than 3.5.

Tshering Sherpa*, Pradeep Kumar Rajbhandari*, Devendra Maharjan*, Abhisesh Kumar Pradhan*,
Peru Pradhan**, Gyabina Maharjan*

* Department of Anesthesiology, Kirtipur Hospital Phect, Kathmandu, Nepal

**Department of Obstetrics and Gynecology, Kirtipur Hospital Phect, Kathmandu, Nepal

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Abstract

Background: Spinal anesthesia is most preferred method of anesthesia in both emergency and elective caesarean deliveries. It helps reduce complications related to general anesthesia but it has spectrum of complications, most common being hypotension due to sympathetic blockade. Perfusion index greater than 3.5 is associated with higher incidence of post spinal hypotension. Preloading and coload of crystalloid have been studied and showed different results, this study compares preloading and coload in patients with PI>3.5.

Materials and Method: Sixty-four (32 each group) parturient with PI>3.5, ASA II and posted for elective caesarean delivery were enrolled. Preload group (group P) and Coload group (group C) both received 15ml/kg of fluid through 16 G IV cannula. Preload group received 20 minutes before and group C received right after spinal anesthesia. Vitals were recorded at baseline, every two minutes for first 10 minutes then every five minutes there after till end of operation. Bupivacaine heavy 0.5% 2ml was given at L3-4 in sitting position. Severe hypotension was treated with bolus Mephentermine.

Results: Demographic data were comparable between groups. Systolic, diastolic and mean arterial pressure, heart rate, saturation showed no statistical significance. Incidence of hypotension was 68.75% in group P. 62.5% in group C (p=0.599). 59.37% received vasopressor in group P and 37.5% received vasopressor in group C (P=0.08). There was no statistically significant difference between the two groups.

Conclusion: Both Preloading and coload of fluid decreased incidence of hypotension in parturient with PI value greater than 3.5. The reduction in incidence of hypotension was more in group C. Need of vasopressor was more in group P. The results being statistically not significant we cannot recommend one method over the other.

Keywords: Caesarean section, perfusion index, crystalloid, hypotension, spinal anesthesia

I. INTRODUCTION

Spinal anesthesia (SA) is the most preferred anesthetic method in caesarean deliveries because it eliminates the potential risks associated with airway management in pregnant women. SA leads to hypotension in approximately 70% of patients (all perfusion index value) which may vary based on the definition of hypotension used (1). Commonly used definition is systolic arterial blood pressure below 90 mmHg (2) and 20% decrease from baseline(3).

Post spinal hypotension (PSH) which may cause severe adverse effects in mothers along with mild symptoms like nausea, vomiting, dizziness, and may cause umbilical arterial acidosis in infants. An ability to identify those who would suffer from hypotension following spinal anaesthesia would give clinicians an opportunity to take preventive measures and treat this complication to reduce maternal and neonatal morbidity (4). On the other hand, unnecessary infusion of large amount of fluid with aim to prevent PSH will be deleterious to the patient especially to those with cardiac, renal compromises (5). Studies have been carried out with noninvasive methods like Tilt test (6), thoracic electrical bioimpedance(7), measurement of heart rate variability(8), cerebral near-infrared spectroscopy (9), point-of-care ultrasound (10), perfusion index (PI) (11) and Pleth variability index (PVI) (12) to predict which parturient would develop hypotension.

Non-invasive blood pressure (NIBP) is standard practice in BP monitoring but its intermittent and may fail to diagnose hypotension timely (13). PI is also non-invasive but gives continuous monitoring. Perfusion Index is the ratio of the pulsatile blood flow to the non-pulsatile static blood flow in a patient’s peripheral tissue such as in a fingertip, toe, or ear lobe and is obtained from a pulse oximeter. Previous researches have shown that baseline PI greater than 3.5 as cut off value in identifying parturient at risk of post spinal hypotension (14)(15)(16)((17)(18). The incidence of hypotension in PI less than 3.5 was 18.8% compared to 81.3% in parturient with PI greater than 3.5(16).

Though researches have shown PI greater than 3.5 is a good predictor of post spinal hypotension, there is limited researches comparing use of preload or co-load of fluid as prevention measure of post spinal hypotension in parturient with PI value greater than 3.5. So, whether preload or co-load is better in prevention of post spinal hypotension and to what extent preloading and co-loading of fluid reduces incidence of PSH in parturient with PI greater than 3.5 is still not clear

II. MATERIALS AND METHOD

After obtaining approval from Institutional review committee of Phect Nepal, this prospective comparative clinical study was done in Kirtipur hospital running under phect Nepal. Sixty-four parturient were enrolled in this study after taking informed written consent and meeting the inclusion criteria.

Inclusion criteria included perfusion index greater than 3.5, Singleton pregnancy, term (gestational age >36 weeks) pregnancy, age 18-40 years, ASA II, posted for elective caesarean section, written informed consent provided. Exclusion criteria included patient refusal, emergency cases age less than 18 and greater than 40, gestational age < 36weeks, ASA III and IV, placenta previa, preeclampsia/eclampsia, cardiovascular or cerebrovascular disease, gestational diabetes, twin pregnancy, hypertensive and those who had contraindication to spinal anesthesia. Included 64 parturient were randomly (lottery method) assigned to two groups, Group P (preloading) 32 and Group C (co-loading)32. Baseline measurements including height, weight, age, diagnosis, blood pressure (systolic, diastolic and MAP), heart rate, saturation was recorded once assigned to a group. Participants were confirmed nil per oral status as per protocol for elective surgery. Intravenous line was opened with 16G cannula. Participants assigned to P group got 15ml/kg of crystalloid fluid (Ringer’s Lactate) within period of 20 min in supine position. For participants assigned to co-loading (C group) 15ml/kg of similar fluid was given under pressure bag immediately after spinal anaesthesia was given. Spinal anaesthesia included inj. Bupivacaine heavy 0.5% 10mg at L3-4 interspace with 26 G spinal needle in sitting position. Level of spinal blockade was assessed with cold sensation to spirit (ethyl alcohol). Once the level of T4 achieved, operation was started. Hypotension was considered if systolic blood pressure was less than 90 mmHg or 20% decrease from baseline value. After giving calculated fluid participants got maintenance fluid using 4:2:1 method. Mepentermine 6 mg was used if hypotension occurred and repeated if needed. Heart rate less than 50 beats per minute was considered bradycardia and treated with atropine 0.6mg. Patient were withdrawn from the study if excessive blood loss occurred needing transfusion or converted to general anaesthesia. Vitals were recorded at the start (baseline) then every 2 minutes from start of spinal anaesthesia till delivery of baby and every 5 minutes thereafter till the end of surgery.

Results on continuous measurements were presented as mean ± standard deviation (SD), and results on categorical measurements were presented as number (%). Student's t-test was used for quantitative data, Pearson’s chi-square test was used for categorical variables for comparison between the groups. P-value of <0.05 was considered to be statistically significant. Data were tabulated using excel and analyzed using SPSS 26.

III. RESULTS

Demographic data were comparable between the groups and showed no any statistically significant difference (Table 1)

	Group P	Group C	P value
	Mean±SD	Mean±SD	
Age	27.69±3.43	28.09±4.21	0.674
Weight	70.19±9.08	69.54±10.27	0.791
Height	5.11±0.25	4.98±0.35	0.082

Table 1: Distribution of cases based on age, weight and height.

The baseline vitals were comparable between two groups and difference were not statistically significant (Table 2).

	Group P	Group C	P value
	Mean±SD	Mean±SD	
SBP	122.81±11.59	127.16±12.36	0.152
DBP	78.47±12.86	79.19±7.14	0.783
MAP	90.22±9.44	93.38±9.07	0.178
Pulse rate	97.28±14.96	100.53±13.57	0.366
PI	6.88±2.98	6.28±2.48	0.383

Table 2: Comparison of baseline values between the two groups

The changes in systolic blood pressure during the first hour after spinal anesthesia showed no any statistically significant difference as shown in table 3.

SBP	Group P	Group C	P value
	Mean±SD	Mean±SD	
M1	119.75±15.65	123.03±11.89	0.349
M3	110.56±17.90	114.06±17.84	0.436
M5	109.03±19.28	112.22±17.80	0.495
M7	113.66±17.74	110.48±14.48	0.310
M9	113.44±20.42	113.28±14.77	0.972
M15	115.28±15.25	111.66±15.21	0.345
M20	117.66±11.41	112.22±14.23	0.097
M25	115.66±14.22	117.53±14.53	0.604
M30	114.16±12.70	115.66±11.67	0.628
M35	112.71±11.40	114.44±14.44	0.492
M40	111.66±11.99	111.94±13.97	0.982
M45	112.68±12.89	113.94±10.84	0.686
M50	113.11±13.52	112.17±10.71	0.651
M55	111.22±12.37	112.18±10.18	0.762
M60	113.40±10.69	111.35±10.54	0.531

Table 3: Comparison of systolic blood pressure (SBP) during first hour of spinal anesthesia.

The changes in mean arterial pressure (MAP) during the first hour after spinal anesthesia showed no any statistically significant difference as shown in table 4.

MAP	Group P	Group C	P value
	Mean±SD	Mean±SD	
M1	83.22±14.99	88.00±13.17	0.180
M3	76.34±15.01	81.22±17.00	0.229
M5	74.22±14.81	78.06±15.38	0.313
M7	79.41±16.37	76.91±13.84	0.512
M9	80.41±18.16	78.72±11.46	0.656
M15	80.91±12.92	77.03±12.97	0.236
M20	82.84±10.13	77.66±12.27	0.070
M25	80.25±10.84	79.34±12.60	0.759
M30	79.26±10.82	79.72±10.74	0.866
M35	76.58±9.17	76.59±13.70	0.996
M40	77.29±9.33	76.45±10.98	0.756
M45	76.79±11.08	79.32±7.98	0.313
M50	76.26±9.25	77.30±9.21	0.672
M55	76.83±11.44	76.18±8.23	0.815
M60	80.58±8.82	75.43±7.96	0.052

Table 4: Comparison of MAP during first hour after spinal anesthesia

Comparison of heart rate during the first hour after spinal anesthesia showed no statically significant difference in between the two groups as in table 5.

HR	Group P	Group C	P value
	Mean±SD	Mean±SD	
M1	99.19±17.00	103.22±17.85	0.359
M3	100.88±18.37	101.19±18.05	0.945
M5	97.19±18.55	100.19±19.64	0.532
M7	100.50±16.92	98.97±17.76	0.725
M9	94.88±16.66	95.13±14.81	0.950
M15	94.06±22.50	96.31±19.40	0.670
M20	94.34±19.87	95.88±18.03	0.748
M25	91.75±18.85	93.78±16.44	0.648
M30	92.48±14.79	94.72±14.96	0.553
M35	89.87±15.94	96.31±15.63	0.110
M40	90.39±12.66	94.42±18.29	0.335
M45	91.57±14.06	90.97±16.12	0.879
M50	91.00±13.08	92.60±15.25	0.674
M55	90.13±11.15	93.18±17.48	0.473
M60	84.15±8.85	97.05±13.40	0.001

Table 5: Comparison of heart rate (HR) during the first hour after spinal anesthesia.

The incidence of hypotension in group P was 68.75% and 62.5% in the group C, but the difference was not statistically significant. There was difference in need of Mephentermine among two groups but the difference was not statistically significant. 19 parturient needed Mephentermine in group P among them 1 got 18mg, 7 got 12mg and 11 got 6 mg of Mephentermine. 12 parturient needed Mephentermine in group C among them 3 got 12 mg and 9 got 6mg of Mephentermine.

	Group P	Group C	P value
Number of patients with hypotension	22 (68.75%)	20 (62.5 %)	0.599
Number of patients requiring inj. Mephentermine	19 (59.37%)	12 (37.5%)	0.08

Table 6: Incidence of hypotension

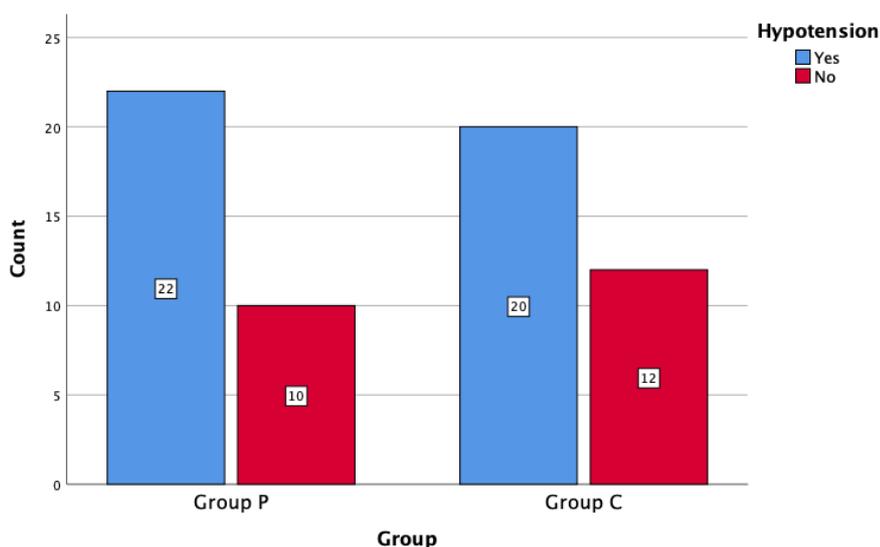


Figure 1: Incidence of hypotension between the group P and group C.

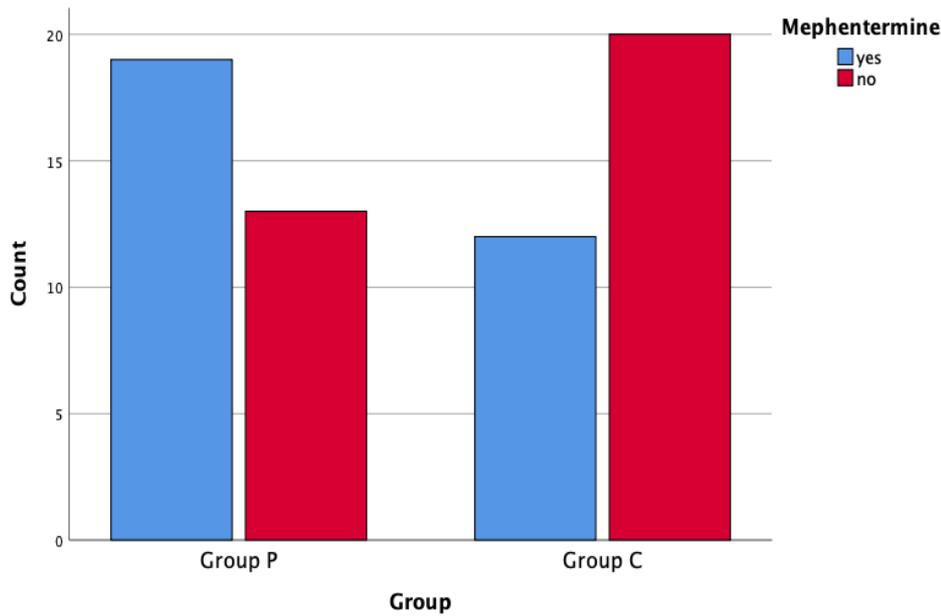


Figure 2: Use of Mephentermine between the group P and group C.

IV. DISCUSSIONS

Spinal anesthesia is choice of anesthesia for both elective and emergency LSCS unless otherwise contraindicated. Spinal anesthesia helps to reduce the complications associated with general anesthesia and also allows mothers to have experience of birth of their baby. Despite the benefits spinal anesthesia also has its associated risks and complications.

Spinal block causes peripheral vasodilation and venous pooling due to blockade of preganglionic sympathetic fibres (19)(7) leading to hypotension of various degree causing mild symptoms to severe complications. Aortocaval compression caused by the gravid uterus is also one of the reason for hypotension in late pregnancy (20). Maternal hypotension could be detrimental to both mother and new born if left unprevented and untreated.

Various methods of preventing hypotension have been studied like preloading and co-loading of crystalloid or colloid, bolus or infusion of various vasopressors, leg raising, applying bandages etc. Instead of applying preventive measure to every patient it would be great if we could predict whether patient is going to develop hypotension or not and apply preventive measures accordingly because bolus of fluid or vasopressor for prevention of hypotension might have deleterious effect in certain patients.

Various methods have been used to predict post spinal hypotension but perfusion index being noninvasive, easy and inexpensive has been used for prediction of post spinal hypotension.

Toyama et al. (2013) found that cut-off PI value of 3.5 identified parturients at risk for spinal anaesthesia-induced hypotension with a sensitivity of 81% and a specificity of 86% ($P=0.001$)(17).

Pyakurel et al. (2020) found incidence of hypotension in $PI < 3.5$ group was 18.8% compared to 81.3% in those with $PI > 3.5$ ($P = 0.000$, odds ratio 0.11).

Varghese (2018) (22) showed the incidence of hypotension is 86.67% in group with $PI > 3.5$ whereas it is 6.67% in group with $PI < 3.5$.

In our prospective comparative study, the incidence of hypotension showed reduction from 81.3% in those with $PI > 3.5$ as per Pyakurel et al. (2020) to 68.75% (group P) and 62.5% (group C) both group in our study comprised PI value greater than 3.5. Of those with hypotension only 59.37 percent needed vasopressor in group P and 37.5% needed vasopressor in group C. Though there is difference in need of vasopressor between group P and C statistical significance was not found (p value=0.08).

Kulkarni et al. (2016) (22) showed the incidence of hypotension was more in preload group (72%) than coload group (46%), P value 0.004. Our study showed the incidence of hypotension 68.75% in group P and 62.5% in group C, lower than that in group P but the difference between the group was not statistically significant. This difference in result could be methodological as we only enrolled parturient with PI greater than 3.5 where they did not have this criterion, we used 15ml/kg of fluid whereas they used 20ml/kg of fluid.

Dyer et al. have compared co-loading and preloading of fluid and their results showed co-loading was better in reducing incidence of hypotension (23). Volume of fluid infused also varies among previous studies. Some used 15ml/kg, some 20ml/kg and some used 30ml/kg.

Heart rate variability during the first hour of spinal anesthesia also showed no significant difference between the groups. There was slight decrease in heart rate after the fluid was given in both the groups. This was similar to Dyer et al. (23) and (22), their study too showed no significant difference in heart rate between the preload and coload group.

We preloaded the fluid within 20 minutes before the spinal anesthesia. Previous study (24) has shown that there was no difference in incidence of hypotension between preloading of fluid in 10 and 20 minutes before spinal anesthesia.

Mean arterial pressure (MAP), Diastolic blood pressure (DBP) and SpO₂ changes between two groups were not significant.

Though in literature coload of fluid has shown better results in prevention of post spinal hypotension in general pregnant population under going LSCS. There are not many studies comparing preloading and coload of crystalloid only among patients with PI greater than 3.5 (high incidence group). Our study showed there was low incidence of hypotension in coload group and vasopressor need was also low in coload group but this difference was not statistically significant. We need more of such studies in patients with PI greater than 3.5 to come with a recommendation in method of preventing hypotension and reducing incidence as low as in group with PI value less than 3.5.

V. CONCLUSIONS

This study showed both preloading or coload of crystalloid fluids led to reduction in incidence of hypotension compared to incidence of hypotension in patient with PI greater than 3.5. The reduction in incidence of hypotension was greater in group C, use of vasopressor was less in group C compared to Group P. Though there is difference in result between the groups result was not statistically significant so we cannot recommend one method over the other.

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AUTHORS

First Author: Tshering Sherpa, MD (Anesthesiology), Kirtipur Hospital, plect, Kathmandu, Nepal, chiewang1434@gmail.com
Second Author: Pradeep Kumar Rajbhandari, MD (Anesthesiology), Kirtipur Hospital, plect, Kathmandu, Nepal
Third Author: Devendra Maharjan, MD (Anesthesiology), Kirtipur Hospital, plect, Kathmandu, Nepal
Fourth Author: Abhishesh Kumar Pradhan, MD (Anesthesiology), Kirtipur Hospital, plect, Kathmandu, Nepal,
Fifth Author: Peru Pradhan, MD/MS Gynecology and Obstetrics, Kirtipur Hospital Plect, Kathmandu, Nepal
Sixth Author: Gyabina Maharjan, MBBS, Kirtipur Hospital, plect, Kathmandu, Nepal

Corresponding Author: Tshering Sherpa, MD (Anesthesiology), Kirtipur Hospital, plect, Kathmandu, Nepal, chiewang1434@gmail.com, +9779844829991

Nature and Extent of Energy Sector Management System with Regard to Electrical Fire Disaster in Kisumu County, Kenya

¹Rev. Sgt. Rtd. Dr. Odhiambo, E .O. S. & ²Hassero, C.

*Bomet University College (BUC), Kenya
Department of Arts, Governance and Communication Studies
**Kenya Bureau of Standards (KEBS)

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Abstract: Quality Management has become essential in many organizations with aim of capitalizing on the sources for improvement through quality goal setting and measurement. Deficiency in exploring quality management systems in utility power transmission and distribution systems, are described along with their observed vulnerabilities to electrical fire disasters in Kisumu County. The perfect Quality Management System is not adhered to in energy sector, power lines design, electric equipment, and systems planning doesn't meet specific prescribed quality standards. The paper therefore examines the nature and extent of energy sectors quality management systems with regard to electrical fire disaster in Kisumu County. The study adopted Cross-functional management model and Crosby Theory of Quality theories. A descriptive research design was used in the study. Purposive, census and stratified random sampling techniques were used to select a sample size from the energy sectors; Kenya Power and Lighting Company, Kenya Electricity Transmission Company, Kenya Energy Generating Company and customers connected to electricity grid. The structured questionnaires, interviews guides and observation methods were used to collect data. Findings indicated that lack of electrical fire disaster planning, design of power equipment and power line design were factors contributing to electrical fire disasters. Poor quality power equipment were factors hindering quality service provision. The paper recommends that Kenya energy organizations should foster coordination for quality service delivered. Energy sector to create awareness of departmental procedures on how quality management should be implemented to its customers, ensure electrical fire disaster planning and adapt effective power line designs to prevent electric disasters.

Key Words: *Quality Management Systems, Power distribution systems, Power transmission systems*

1. INTRODUCTION

Quality Management is described as an approach that seeks to improve quality and performance which will meet customer expectations. This can be achieved by integrating all quality-related functions and processes throughout the company. Globally, utility power transmission and distribution systems are described along with their observed vulnerabilities to natural and man-made hazards (Sioshansi, 2011). For instance, earthquakes destroy transmission and distribution systems, including cables, towers and utility poles.

Sioshansi (2011), argues that restoration of this infrastructure and the services it provides take very long periods of time. Further, electrical equipment belonging to consumers can be swamped with water, posing the risk of electrocution, and therefore loss of lives (Krishnamurthy and Kwasinski, 2013). This means that power equipment must meet the required standards to ascertain qualities in considerations of type of hazard.

Kisumu County which is in Kenya, approximately 40% of the load is supplied via 33/0.433 kV secondary distribution transformers. However, transformers at Kisumu, Kegati 132/3 3 kV substations are overloaded in the existing system

under peak load conditions. Further, voltage and loading issues are evident on the Kondele feeder supplied from Obote Road primary substation. This is due to low thermal rating of conductors as a result of inadequate sizing. Several line sections feeding a large proportion of the load are of conductor type 25mm² ASCR causing an effective “bottleneck”.

Sinei (2013), argued that planning guidelines provided by KPLC have not been applied during the extension of a spur from the main feeder. Thus, some of the electric gadgets are not standard which causes outages. That the manual recording, he argues, result in erratic values that may not represent the true load behavior.

Voltage and loading issues are evident on the Kondele feeder supplied from Obote Road primary substation. This is due to low thermal rating of conductors as a result of inadequate sizing. In this region, many substations have either un-calibrated or non-operational metering on some feeders. Additionally, the measurements at the substation transformers are seldom recorded. At peak hours, the load is high such that power is lost in some parts of this region. Sometimes, it takes long to restore power. The power supply doesn't meet demand, and therefore, power fluctuations are a norm (Greenwire *et al.*, 2008). Secondary transformers do not guarantee stable power supply, and therefore, power fluctuations would lead to electric disasters such as outages.

1.2 Statement of the Problem

Kenya Energy Sector is making losses as a result of poor quality management systems. These electrical disasters are at company and consumer levels. These losses are electric induced fires that lead to destruction of property and loss of lives. For example, Kenya Power and Lighting Company have made economic losses due to an amount of electricity lost during transmission from generation plants to consumers (Vanya, 2015).

A related fact is when the Energy Regulatory Commission (ERC) reduced the amount that KPLC can recover from consumers 14.9% down from 15.9%. Kenya's 14.9% recovery is still high compared to global average of 11%. Other challenges the sector face are a range of financial, technical and institutional challenges such as lack of access to capital, poor coordination across sectors and institutions, and high levels of poverty resulting in low ability to pay for services (Otuki, 2017).

Kisumu regions are known for heavy storms and strong winds. Power outages are common and electrical fire disasters related to the same are common. Approximately 40% of the load in the Kisumu region is supplied via 33/0.433 kV secondary distribution transformers.

Secondary transformers do not guarantee stable power supply, and therefore, power fluctuations would lead to electrical disasters as a result of outages.

1.3 Objective of the Study

The objective of the study was to examine the nature and extent of energy sector management system with regard to electrical fire disaster in Kisumu County, Kenya.

1.4 Research Question

What is the nature and extent of energy sector quality management systems in regard to electrical fire disaster in Kisumu County?

1.5 Justification of the Study

1.5.1 Academic Justification

The study will provides a foundation for further research in the field of disaster management. The findings of the study will improve the academics in electrical fire disaster response among organizations, and how energy organizations should adopt use of quality management systems in daily running in their functions and beyond by increasing reference materials in academic institutions to act as training manual for corporates.

1.5.2 Policy Justification

The study have suggested policy change with regard to quality management systems such as design, planning and standards of electrical equipment that bring about electrical fire disasters as a result of natural or man-made hazards. Thus, policy makers in the energy sector can improve on quality of electric equipment, management of power lines and how to prepare, respond and recover from electric disasters.

2.1 Quality Management Systems

Hoyle and David (2005), defines quality management system as a formalized system that documents processes, procedures, and responsibilities for achieving quality policies and objectives. It spells out that a Quality Management System (QMS) helps coordinate and direct an organization's activities to meet customer and regulatory requirements and improve its effectiveness and efficiency on a continuous basis. Therefore, it is the international standard specifying requirements for quality management systems in any organization.

According to Garvin *et al* (2007), there are benefits of quality management systems to any organization or company. First is the implementation of a quality management system which affects every aspect of an organization's performance. For example, benefits of a

documented quality management system are such that it meets the customer's requirements, which helps to instill confidence in the organization, in turn leading to more customers, more sales, and more repeat business. Secondly, it meets the organization's requirements, which ensures compliance with regulations and provision of products and services in the most cost- and resource-efficient manner, creating room for expansion, growth, and profit. This means that with quality management systems such a company rarely runs losses (Hoyle and David, 2005).

Further, these benefits offer additional advantages, such as helping to communicate a readiness to produce consistent results, preventing mistakes, reducing costs, ensuring that processes are defined and controlled, and continually improving the organization's offerings. However, the elements and requirements of a quality management system of an organization vary but each element of a quality management system helps achieve the overall goals of meeting the customers' and organization's requirements (Garvin *et al.*, 2007).

There are basic steps to implementing a quality management system. First is the design and build portions serve to develop the structure of a QMS, its processes, and plans for implementation. Secondly, senior management should oversee this portion to ensure the needs of the organization and the needs of its customers are a driving force behind the systems development. Thirdly, the deployment is best served in a granular fashion by breaking each process down into sub-processes, and educating staff on documentation, education, training tools, and metrics. Fourth is control and measurement are two areas of establishing a QMS that are largely accomplished through routine, systematic audits of the quality management system (Talib, *et al.*, 2013).

According to Wickramasinghe (2012), the specifics vary greatly from organization to organization depending on size, potential risk, and environmental impact. The goals are to determine the effectiveness and efficiency of each process toward its objectives, to communicate these findings to the employees, and to develop new best practices and processes based on the data collected during the audit.

From this review, it is clear that QMS put in place by a company determines the kind of service or product that the end customer gets. If not well planned, implemented, assessed and shared by everyone in the organization through education and training, the end product or service can be disastrous or simply put, does not meet expectations. The following section looks at the concept of Disaster.

2.2 Quality Management Systems with Regard to electrical fire disasters

According to Sioshansi (2011), whilst BCP are a growing area of attention for many companies, experience from recent major disasters suggests that more needs to be done. For example, in 2005, the Japanese government's Disaster Prevention Basic Plan suggested that all companies should develop a BCP, and recommended a target that all large-scale companies in Japan develop and implement such a plan by 2018. By 2011, 70 % of large-scale Japanese companies and 35 % of middle-scale companies had prepared and/or were in the process of planning BCP, when the Great East Japan Earthquake struck.

However, most of the BCP did not work as planned, and lack of electricity supply was a critical factor in the process of post-disaster recovery. Following this massive disaster, 271 companies were surveyed regarding the impact of the disaster. Of these companies, 106 claimed they faced significant IT system problems after the earthquake, and 137 companies did not have a BCP. Among the Japanese companies surveyed who did have a BCP, only one company replied that their plan had worked as designed. In analyzing the gap between the disaster that ensued, and the continuity plans originally developed, it is clear that long grid outages, collapse of supply chains that might affect electricity supply, or the loss of critical infrastructure, were rarely foreseen (Blyden and Lee, 2006).

Given the complexity of electricity systems and the growing popularity of distributed generation and related energy technologies in customer's premises, a new continuity plan specifically focused on electricity supply resilience and restoration is needed in many organizations. So-called ECP will specifically consider how to rapidly restore electricity supply to a particular site, based either on outside supply or internal provision (Marnay *et al.*, 2008). Thus, preparedness against disaster will never be perfect without appropriate operational strategies. Installation of a back-up system or microgrids (i.e. ECS is considered to be an investment in hardware) reinforce the preparedness against disaster. The hardware will demonstrate its full performance when it is combined with appropriate software.

In contrast to BCP, unique electrical issues that should be considered by an ECP include: Alternative generation sources – the use of local back-up generation; dependencies outside the electrical equipment that may affect electricity supply – for example, the availability of fuel for back-up generators and identification of particular electrical loads, their priority for business functions, and their energy requirements (Heavey *et al.*, 2014).

When preparing an ECP there are a number of key steps to determine the particular threats to electricity supply and steps to mitigate these risks for a given facility. For example, when preparing an ECP, it is critical to identify the risks that the various types of natural disasters may pose to a particular facility. Currently, there is no standard method to classify particular types of natural disaster and their potential impact on a facility. Similarly, there is no way to compare facilities – to determine whether one facility (or design) is more resilient against a certain disaster than another (Krishnamurthy and Kwasinski, 2013).

Whilst there will always be significant unforeseen disasters, the most common disasters causing electric outage in a geographical area can often be anticipated. It is reasonable to assume that earthquakes will continue to plague areas around the Pacific Rim. Similarly, geographies prone to large storms or flooding will continue to be at risk. In order to plan, one must begin by classifying disasters by type. As a consequence, a number of metrics are likely to be available for comparing likely impacts of the disaster versus the resilience measures in place (Blyden and Lee, 2006).

Blyden and Lee (2006), further notes that electrical fire disasters impact depends on the country, geography and infrastructure. Thus, the ECP metrics need to be carefully selected and assessed in terms of the insight they offer regarding the likely impact on electricity supply. The ultimate aim to standardize the way of measuring and comparing potential natural disasters is critical.

Krishnamurthy and Kwasinski (2013), argues that once an understanding of likely disasters and their severity has been established, a facility can then start to evaluate to what extent it is prepared against each disaster. The goal is to design a standard set of metrics that can indicate a facility's preparedness against disaster and loss of energy supply, effectively allowing the level of preparedness of each facility to be compared to one another. The preparation of metrics to measure disaster preparedness or resilience will be a complicated exercise. This work will need to grapple with how to measure a facility's resilience against a very wide range of potential natural disasters and how this can be distilled into a number of common metrics.

According to Heavey *et al* (2014), most facilities do not indicate other important factors, such as length of the outage, dependencies on outside fuel supplies. The goal is to standardize a way of measuring a facility's preparedness against a variety of disasters, to allow internal evaluation and comparison of different facilities. He argues that when classifying a facility's resilience against an electrical outage, it is critical to have a detailed understanding of the

loads in the facility. Different loads can accommodate different levels of power quality, and/or length of supply failure, without having significant economic effect.

There is currently no standard method to specify a load's electricity supply requirements. Such classifications may be based on individual pieces of equipment, where classes of load are introduced based on metrics such as: Acceptable supply interruption duration; acceptable supply frequency range and acceptable supply voltage range (Krishnamurthy and Kwasinski, 2013).

Therefore, classifications both by type of operation facility, and equipment, are possible. For example, a medical facility has critical loads (such as a respirator) and non-critical loads (such as an entertainment system for patients). On the other hand, an office building has no critical loads, but the computer systems are very important for business continuity. Dwellings usually have no high priority loads unless a resident uses a home medical care system (Basir *et al.*, 2011).

2.3 State of power supply between substations (Nairobi and Kisumu County)

Within Nairobi Region, ASTM (2014), acknowledges that, the network configuration differs from that of the other KPLC regions. The region is supplied from the transmission network via several 220/66 kV and 132/66 kV transmission substations or bulk supply points (BSPs). A number of 66 kV feeders emanate from each BSP and each 66 kV feeder supplies one or more primary (66/11 kV) substations. Each primary substation supplies a number of 11 kV feeders, which in turn supply 11/0.433 kV distribution substations.

According to Final Energy report Kenya (2018), larger customers may be supplied at 11 kV or 66 kV. The Nairobi network is interconnected both at 66 kV and 11 kV, with normally open points to allow transfer of load across BSPs or primary substations respectively. The 66 kV feeders are mostly overhead using single and double circuit wood-pole construction. The 11 kV feeders are also mostly overhead using single circuit wood or concrete pole construction. In Nairobi city centre, where there are space constraints or issues with clearances, underground cables are used for 11 kV and a few for 66 kV. There are a few 66/33 kV substations on the outskirts of Nairobi, which supply neighboring areas via long 33 kV feeders.

In Kisumu County, The distribution network suffers from poor reliability and quality of supply, which is generally due to under-investment. Some of the key issues identified during the study are that many parts of the distribution network are supplied over extremely long, radial 33 kV and

11 kV feeders, with no alternative source of supply. In some cases, 33 kV feeders may be hundreds of km long, with many spurs, resulting in a total length (in extreme cases) in excess of 1000 km supplied from a single source (Final Energy report Kenya, 2018). A fault on such a long feeder will have wide-spread impact, be difficult to locate and therefore will result in a long restoration time.

These parts of the network are not surprisingly subjected to frequent and prolonged outages. Due to excessive feeder lengths and use of undersized conductors, voltage levels on feeders, particularly outside of the urban areas are typically poor and significantly under the required standard. Automatic voltage regulators (AVRs) have been installed on feeders in the past, however many of these have failed and have subsequently been bypassed (Sinei, 2013).

2.4 Conceptual Framework

Wasike and Odhiambo (2016) discuss the role of theories in guiding the thrust of academic studies. They emphasise the importance of theories in offering compelling and incisive causal explanations with calculated precision. They buttress their argument by quoting Smith (1996) who asserts that theories play the role of predicting, prescribing and evaluating socio-political phenomena hence they cannot be ignored.

2.4.1 Cross-functional management model

Juran cross-functional management approach comprises three legislative processes:

Quality Planning: a process that involves creating awareness of the necessity to improve, setting certain goals and planning ways to reach those goals. This process has its roots in the management's commitment to planned change that requires trained and qualified staff.

Quality Control: a process to develop the methods to test the products for their quality. Deviation from the standard will require change and improvement.

Quality Improvement: a process that involves the constant drive to perfection.

According to Juran (1992), Quality improvements need to be continuously introduced. Problems must be diagnosed to the root causes to develop solutions. The Management must analyze the processes and the systems and report back with recognition and praise when things are done right.

Basing on his work, he viewed that organizations progress depends on implementation of strategies basing on; structured on a regular basis with commitment and a sense of urgency, building an extensive training program and cultivate commitment and leadership at the higher echelons of management if they are to achieve high quality.

Quality by design incorporates modern tools to preemptively control variation (Juran, 1992). These tools and methods begin by measuring and understanding the variation that exists by using historical data, testing, and modelling to help forecast, analyze, and eliminate the deleterious effects of variation using standard statistical techniques. Process control consists of three basic activities: Evaluate the actual performance of the process, compare actual performance with goals and take action on the difference. The final activity of the quality by design process is to implement the plan and validate that the transfer has occurred.

2.4.2 Crosby Theory of Quality

Crosby's principle, Doing It Right the First Time, was his answer to the quality crisis. He defined quality as full and perfect conformance to the customers' requirements. The essence of his philosophy is expressed in the *Absolutes of Quality Management* and the *Basic Elements of Improvement* (Creech, 1994).

2.4.2.1 The Absolutes of Quality Management

Crosby defined Four Absolutes of Quality Management, which are; The First Absolute: The definition of quality is conformance to requirements. The Next Absolute: The system of quality is prevention. The Third Absolute: The performance standard is zero defects and the Final Absolute: The measurement of quality is the price of non-conformance.

2.4.2.2 Zero Defects

Crosby's Zero Defects is a performance method and standard that states that people should commit themselves too closely monitoring details and avoid errors. By doing this, they move closer to the zero defects goal. According to Crosby, zero defects was not just a manufacturing principle but was an all-pervading philosophy that ought to influence every decision that we make especially energy sectors. Managerial notions of defects being unacceptable and everyone doing 'things right the first time' are reinforced (Crosby, 2012).

2.4.2.3 The Quality Vaccine

Crosby explained that this vaccination was the medicine for organizations to prevent poor quality.

Integrity: Quality must be taken seriously throughout the entire organization, from the highest levels to the lowest. The company's future will be judged by the quality it delivers.

Systems: The right measures and systems are necessary for quality costs, performance, education, improvement, review, and customer satisfaction.

Communication: It is required to communicate the specifications, requirements and improvement opportunities of the organization. Listening to customers and operatives intently and incorporating feedback will give the organization an edge over the competition.

Operations: a culture of improvement should be the norm in any organization, and the process should be solid.

Policies: policies that are implemented should be consistent and clear throughout the organization.

Figure 1 showing the interaction of the variables.

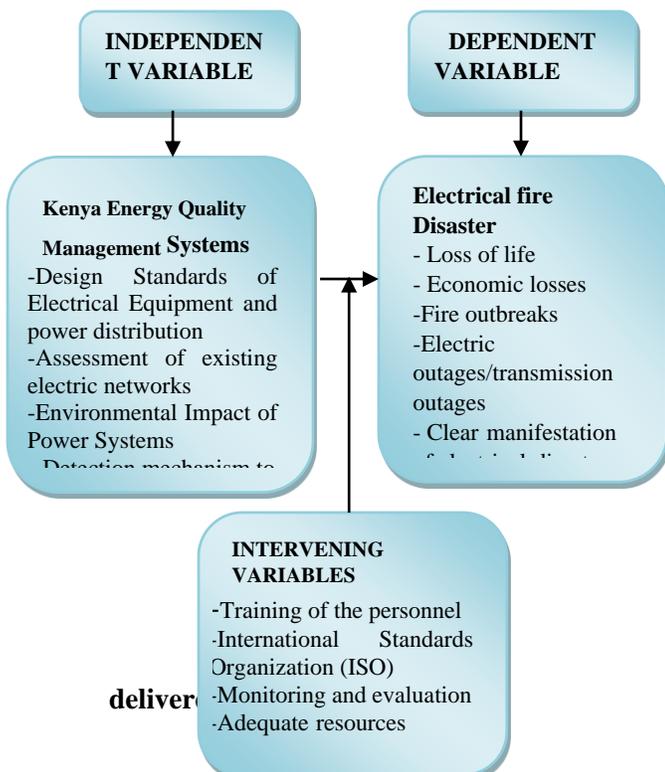


Figure 1: Conceptual Model

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<http://dx.doi.org/10.29322/IJSRP.12.08.2022.p12837>

Source: Researcher, 2019

3. RESEARCH METHODOLOGY

3.1 Research Design

The study was qualitative in approach; with a single overall objective aimed to examine the effectiveness of energy sector quality management systems in response to electrical fire disaster in Kisumu County. Descriptive survey design was conducted in the selected areas of Kisumu County considered appropriate to enhance an apt determination of the state of quality management systems and their effectiveness in response to electric fire disasters.

3.2 Sample Size Determination and Sampling Procedure

A sample size of one hundred and sixty respondents drawn from energy sectors and customers connected to electricity grid clusters was used in the study. The sample size was drawn from the target population of 1865 by use of purposive sampling in which (30%) technique applied in selection of respondents from the identified five organizations; KEBS, Energy Regulatory Commission, KENGEN, KPLC and KETRACO. Customers connected to the electricity grid also formed part of the sample size.

3.3 Data Collection Methods

Both primary and secondary data collection was used to collect the relevant information. Primary data was collected from the field through structured questionnaires, interviews guides, observation checklist, focused group discussion and document analysis. The use of several data collection methods was enable the researcher to avoid the deficiency that springs from using one method of data collection method (Kothari, 2004). Secondary data was collected by analysis of publications such as electrical fire disaster journals, electricity/energy related legislations and government documents.

3.4 Data Analysis

The collected data was cleaned by listing, removed errors and checked extreme values and edited to ensure conformity. The group survey data was analyzed using SPSS Version 27. The variables were subjected to descriptive statistics. Quantitative data was analyzed using descriptive statistics such as frequencies and percentages. Findings were presented in form of frequency tables, pie charts, bar graphs and narratives.

4. Results

4.1 Coordination as an issue affecting quality of service

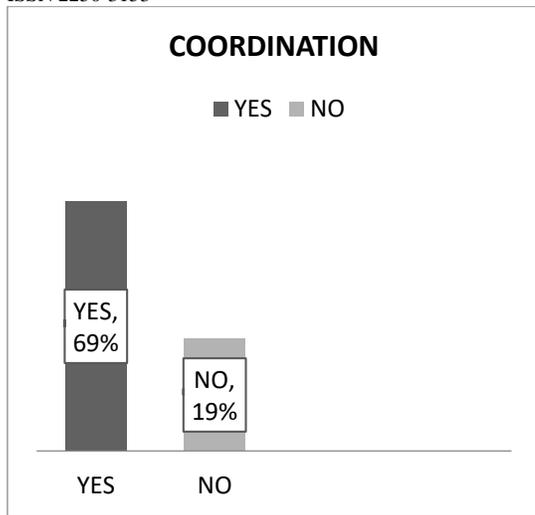


Figure 2. Coordination affecting quality of service delivered

Source: Field Data Analysis (2019)

Basing on the findings, the study indicated that out of 141 (88%) respondents, 110 (69%) of the respondents affirmed that coordination was as an issue affecting quality of service delivered while 31 (19%) of the respondents had different views stating that coordination was not an issue affecting quality of service delivered in energy organizations.

The research findings indicated that coordination was an issue affecting quality of service delivered in energy sector. The study findings corroborate (Ngure, 2012) who asserts that one source of complexity in emergency planning was the need to integrate several dimensions into the programmed emergency response. That there was always difference in hierarchical divisions, geographical divisions which indicated the spatial jurisdictions to which plans refer, and possibly also to questions of mutual assistance and difference in organizational divisions due to different agencies that participate in emergency responses.

Abdullah *et al* (2009), argues that strategic planning is essentially in that it helps in resources finding and ensuring that there is assemblage of response units, so that it meets the needs of the population affected by disaster. That the permanent emergency plan is a backdrop to activities. He suggests that it should neither be slavishly and rigidly followed nor ignored. That it should ensure that fundamental tasks are apportioned, responsibilities are clear, and appropriate action is stimulated. There were no coordinated emergency plans because all these organizations are in market industry thus competing for profit making. When one fails, the other organization celebrates.



Figure 3. The dynamic hierarchy of emergency plans.

Source: Researcher (2019)

According to ASIS (2009), emergency planning should be a co-operative effort in which the users and beneficiaries of the plan are stakeholders who have an interest in ensuring that the plan works well. It is also important to create and maintain interoperability, so that emergencies that require large-scale responses do not lead to chaos and to groups of people working at cross purposes.

4.2 Aspects that contributes to occurrence of electrical fire disasters in energy sectors

Respondents were further asked to rate some of the aspects that were interconnected to occurrence of electric disasters in their respective organization and the response was captured in figure 4.6.

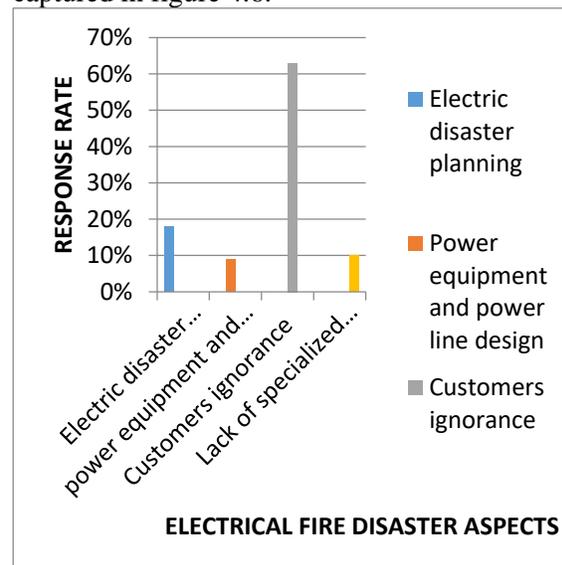


Figure 4. Aspects influencing occurrence of electrical fire disasters

Source: Field Data Analysis (2019)

According to the findings, customer’s ignorance was identified as the most aspect which was related to occurrence to electric

disasters. This was represented by a high response rate of 100 (63%) of the respondents. Followed by electrical fire disaster planning represented by 29 (18%) of the respondents. Low response rate was realized few specialized personnel with response rate of 16 (10%) and power equipment and power line design at 15 (9%) respectively. Basing on the findings, it was clear that most of the respondents concurred that customer ignorance to issues related to electricity was the main challenge as an aspect contributing to electric disasters. The data correlate with data obtained from focus group discussion in which the respondents asserted that Electricity theft due to customer ignorance on effects of electricity was the main challenge in relation to occurrence of electric disasters in their organization



Figure 5: Electricity bypassing by customers in Kisumu
Source: Field data (2019)

According to Tan *et al* (1998), that electrical circuits were designed to handle a limited amount of electricity. Any overload occurring when you draw more electricity than a circuit could safely handle affected to the circuit which caused electric disasters. The electricity usage of each device when running adds to the total load on the circuit. Exceeding the rated load for the circuit wiring causes the circuit breaker to trip, shutting off the power to the entire circuit. If there was no circuit breaker in the circuit, an overload would cause the circuit wiring to overheat, which could melt the wire insulation and lead to a fire.

On power equipment and power line design, it was noted that the Kondole feeder supplied from Obote Road primary substation, there was low thermal rating of conductors as a result of inadequate sizing. Several line sections feeding a large proportion of the load were of conductor type 25mm² ASCR causing an effective bottleneck. Evaluation suggested that the planning guidelines provided by Kenya energy sector had not been applied during the extension of a spur from the main feeder (KPLC, 2013).

4.3. Factors hindering quality service provision in energy sector



Figure 6. Factors hindering quality service provision in energy sector

Source: Field Data Analysis (2019)

Research findings indicated that out of 141 (88%) respondents, 52 (33%) of the respondents indicated that poor quality power equipment was the main factor hindering quality service provision in energy sector. Followed by theft of electric equipment with response rate of 47 (29%) and lastly storms with response rate of 42 (26%).

This response rate tallies with response obtained from focus group discussion from managerial and administrative positions from energy departments. This indicates that the results were reliable. The findings concur with Zaramdini (2007), on poor quality power equipment. That though equipment is regularly maintained and updated, problems normally occur from cables, connectors, transformers and switches require replacement and can trigger a power interruption.

In relation to research done in this field, the energy organizations were responsible for transmission and distribution of electricity. The accident frequency rate (AFR), which was an international standard had reached highs of 6.9 with the lowest having been recorded at 1.9 against an acceptable benchmark of 0.5. The fatalities had significantly reduced over the last two financial years, they were still at alarming levels by the end of the financial year ending June, 2009 (Krishnamurthy and Kwasinski, 2013). Vanichchinchai and Igel (2009), assert that Kenya Power customers experience power interruptions due to vandalism to electrical

equipment. This act jeopardizes the individuals' safety, the public's safety as well as the safety of Kenya Power employees. Damage to Kenya Power properties led to loss of electricity for entire communities including essential services such as

hospitals and other emergency services and this affected the quality service deliverance to the customers.

On effects of storm, most power outages are caused by severe weather, high winds, lightning, rain or flooding. That during a storm power poles are vulnerable to lightning strikes while strong winds snapped off tree branches and down power lines and this affected the quality of service expected to be delivered to the customers (Krishnamurthy and Kwasinski, 2013).

4.4 Organization measures put in place to ensure quality management and provision of quality service

On assess if energy organizations had ensured that there are measures put in place to ensure quality management and provision of quality service and energy sector, the respondent's response was as in figure 4.9.

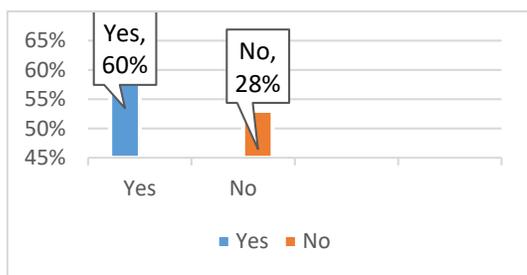


Figure 7. Organization measures put in place to ensure quality management and provision of quality service

Source: Field Data Analysis (2019)

From the data analysis, out of 141 (88%) respondents who participated, 96 (60%) of the respondents agreed that their organizations had measures put in place to ensure quality management and provision of quality service to the customers while 45 (28%) assured the researcher that there were no measures put in place to ensure quality management and provision of quality service in energy sector. 45 (28%) claimed that nowadays that Kenya power and lighting company sees the need to strategies and come up with measure to ensure quality management and quality service provision for retention of customers. But at the moment there is no strategies explored but are proposed, for instance to strategies on how to curb electricity outage through installation of alarm systems in electric equipment (Minik *et al*, 2003).

5. Summary and Conclusion

Findings indicated that lack of electrical fire disaster planning, design of power equipment and power line design were factors contributing to electrical fire disasters. Poor quality power equipment were factors hindering quality service provision.

6. Recommendation

Kenya energy organizations should foster coordination for quality service delivered. Energy sector to create awareness of departmental procedures on how quality management should be implemented to its customers, ensure electrical fire disaster planning and adapt effective power line designs to prevent electric disasters.

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Benefiting from biomass waste in energy production in Libya

Hifa Salah Adeen Embirsh *, Eng. Yousuf Almukhtar mathkour Ikshadah **

* Faculty of Sciences Saratha Department of Physics,

** Zawiya University Faculty of Engineering Sabratha in Libya , University of Belgrade, Faculty of Technology and Metallurgy, Belgrade, Serbia.

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Abstract- Libya is one of the world's oil-producing countries and owns the world's eighth oil reserves. This situation has led to rapid growth in the country's electricity demand and municipal solid waste generation (MSW). The project proposes a brilliant plan for the use of renewable energy, including waste-to-energy facilities (WTE). This research assesses the potential contribution of WTE facilities to the peak energy demand in Libya until 2030, based on two scenarios: mass incineration and mass combustion with recycling of the whole nation and for six urban areas in the Libya. The analysis shows the possibility of producing about 197 MW (MW) based on the overall incineration scenario and about 57 MW on a mass burn basis with a recycling scenario. These values amount to about 0.82% and 0.24% of the expected 2030 peak electricity demand of 24.1 Gigawatt. The expected results for each of the scenarios can be used to design future WTE facilities in the major cities of Libya. It is recommended that further investigations be conducted to assess the scenarios based on financial, social, technical and environmental standards.

I. INTRODUCTION

It is the responsibility of the municipalities to handle the waste issues [1]. However, their financing and technical capabilities are limited [2]. Metropolitan municipalities have a higher budget and better access to funds than smaller municipalities. The interest of the private sector in waste projects is increasing, because of the incentives available to the sector. Collection of waste and operation of landfills by private sector is possible on basis of a concession given by the municipality. Some companies are focusing on the rehabilitation of old dumpsites due to their potential for energy recovery from landfill gas . The amount of electricity generated and sold to the grid is a major source of income and the projects' cash flow [4]. There is also growing interest in establishing new sanitary landfills in an integrated waste management format, where recycling, composting, energy recovery are all possible. Companies active in this field are interested in developing of lower income countries. Globally, solid waste management costs will increase from today's annual \$206 billion to about \$376 billion in 2025. Cost increases will be most severe in low

income countries and lower-middle income countries. The global impacts of solid waste are growing fast . Solid waste is a large source of methane, a powerful GHG that is particularly impactful in the short-term The recycling industry, with more than two million informal waste pickers, is now a global business with international markets and extensive supply and transportation networks. Locally, uncollected solid waste contributes to flooding, air pollution, and public health impacts such as respiratory ailments, diarrhea and dengue municipalities or other local authorities. These wastes are generally in either a solid or a semi-solid form. They can be classified as biodegradable wastes that

II. THE PROBLEM OF SOLID WASTE IS EXACERBATING IN MOST CITIES IN LIBYA

Solid waste problems have aggravated at the entrances to Libya's cities and their main and subsidiary streets and within residential neighborhoods. These wastes are distributed among urban household, construction and commercial waste and other hazardous industrial, agricultural, medical and radiological waste. Some of the reason is due to the lack of advanced means to dispose of piles of solid garbage resulting from the daily activities of humans. Shows figure 1. Garbage accumulation pollutes the air of the Libyan capital[3].

Data on official estimates of waste quantities are only available in the capital, Tripoli, and the[4] most populous city of Benghazi.



Figure 1. Garbage accumulation pollutes the air of the Libyan capital.

III. WASTE TREATMENT PROJECT

He suggested that special projects for waste treatment and recycling be adopted, which would save the state a lot of money, in addition to making use of raw materials that were processed in various industries, thus reducing the spread of garbage and reducing environmental pollution resulting from burning and the diseases that result from it.

IV. CHOOSING THE BEST METHOD FOR SOLID WASTE MANAGEMENT

The public cleaning services company uses a number of cars with a load

Different types of solid waste transportation from different parts of the city by a number of

Small compactors with an average tonnage of 3 tons to collect Waste from collection centers and is characterized by ease of movement and transfer between

City streets, and their cargo is unloaded in the interim landfill. exist

In the landfill are trucks with a larger tonnage capacity of 6 tons and the other 8

tons, and through bulldozers, these trucks are filled with solid waste

To be transported and deported m, but as a result of the increase in the quantities of waste

The solid, which is about 450 tons/day for the city, is no longer there

For the factory to absorb these quantities, because the factory was not modernized, and its need for maintenance [5].

In placing weights, the opinion of experts is taken into account academics, and decision-makers to reach homogeneous judgments and logical [6].

V. WTE PRODUCTION FORECAST

The population and MSW forecast results were used to estimate the WTE production potential in the Libya. The WTE production potentials were calculated for the two scenarios. The Mass Burn with recycling scenario forecasting results are presented in Figure 5. The figure shows a potential to produce about 57 Megawatt (MW) of electricity from MSW by the year 2030. This value forms about 0.14% of the 24.1 GW peak electricity demand in 2030. City potential production results show that Tripoli city has the largest potential of 9MW and the minimum potential is for Sirt City at about 1 MW by the year 2030. The figure shows the potential to produce about 197 Megawatt (MW) of electricity from MSW by the year 2030. This value forms about 1.73% of the 24.1 GW peak electricity demand for that terminal the forecast results for the six cities apropos the two scenarios cities of the Libya. There is substantial difference between the potential energy productions of the two scenarios.. Further investigations are recommended to compare the two scenarios with reference to financial, social, technical, and environmental criteria. The decision to select between the two scenarios is crucial and should be taken at a political level based on the results of intensive research.

VI. CONCLUSION

Exploitation of solid waste recycling method as a raw material to restore its industrial cycle, it is new in the industry and has several advantages environmental protection, including the preservation of natural resources, including trees and forests, as well as for this method, Joanna.Reduction in the proportion of water. Also, I saw a lot of positivity Experts and specialists and preferring them to others in terms of waste management alternatives.

Solid, when used, does not produce harmful oxides, nor noise.

Therefore, it is environmentally friendly. This is an economical piece of cake that makes it an economical choice

It is preferred, as it is not expensive to use, and it does not need advanced technology .It provides employment opportunities for society, and it has great economic impact on society and the state. The alternative of recycling when using it works on reducing its volume. and quantities of solid waste, and maintain the cleanliness and beauty of the environment.

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AUTHORS

First Author – Hifa Salah Adeen Embirsh, ** * Faculty of Sciences Saratha Department of Physics, * University of

Belgrade, Faculty of Technology and Metallurgy, Belgrade, Serbia, Yhaifa23@yahoo.com

Research on the Situation of Self-protection Skills Education for 5-6 year-old Children according to the Experiential Approach at Preschool in Northern Mountainous Area

Le Thi Thanh Hue, Nguyen Thi Thanh Huyen

¹University of Education – Thai Nguyen University
Email: Hueltt@tue.edu.vn

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Abstract: Self-protection skills education for 5-6 years old preschool children according to the experiential approach at preschools in the Northern mountainous area has an important meaning in helping children have enough knowledge and life skills to reduce risks for children at home and when travelling to school in the condition that most children belong to ethnic minorities living in remote areas - areas with mountainous terrain and harsh climate. In particular, children in this area are often shy, have little social interaction, and have limited Vietnamese language skills; the conditions of facilities and teaching facilities are poor. Therefore, the author conducted this study with the aim of discovering the current situation of self-protection skills education for 5- 6-year-old preschool children according to the experiential approach at preschool in the Northern mountainous area, figuring out the advantages and disadvantages of self-protection skills education for children in this area. The research methods used include survey, process observation, interview, mathematical statistics (SPSS 20.0 software).

1. Introduction

Educating children on self-protection skills according to the experiential approach at preschool is the process of organizing activities for children to participate in and directly contact with different things, phenomena and practical activities in order to effectively perform a reasonable, flexible self-protection action or activity to keep themselves physically and mentally safe.

Self-protection skills education for 5-6-year-old children according to the experiential approach is to implement an integrated educational perspective, which is also a process of synchronously integrating elements of the educational process as a whole. The study of educating children on self-protection skills according to the experiential approach has important theoretical and practical significance. There are many benefits to teaching self-protection such as helping students form awareness, develop strong discipline, develop physical skills and real-world experiences, improve ability to fight back, develop self-confidence, improve communication skills, improve physical fitness and develop mental strategies (Chen, 2011), and providing them with appropriate guidance on how to protect themselves (D. Brown & Johnson, 2000). Children must be equipped with the ability to perceive situations that are dangerous for themselves and to overcome undesirable things that happen to them (Kimberly, 2007). Children not only learn what, but more importantly, how to learn and foster the love to discover in children (Maria Montessori, 2014). According to Banks, Aaron L (2010), the goal of modern self-protection education is to help students make good choices, recognize potentially dangerous situations, and take action to prevent a physical change. To form and educate social skills for children, the most basic way is to organize specific activities for children to practice and train direct experience. Early childhood education programs in many advanced countries such as the US, Singapore, New Zealand, and Japan have a common tendency to educate necessary social skills through active exploration of the surrounding environment through experiential activities. They choose positive educational theories and consider them as an educational philosophy in education in general and early childhood education in particular (Nguyen Thi Thu Hanh, 2017). In order to effectively organize self-protection skills education activities for 5-6-year-old children at preschool, teachers need to create a safe operating environment for children (in terms of physical and psychological aspects); planning and organizing educational activities suitable to the cognitive characteristics of children of each age; using a combination of methods (verbal, visual, hands-on - experiential), forms (during or after school) when organizing activities to encourage children's positivity; create opportunities for children to explore and apply knowledge and skills to solve different situations; cooperating closely with parents (Nguyen Thi Hong Van, 2017).

2. Methodology

The survey was conducted on 575 preschool teachers teaching classes at some preschools of 9 provinces/cities: Bac Giang, Thai Nguyen, Bac Kan, Ha Giang, Cao Bang, Yen Bai, Lang Son, Hoa Binh, Phu-Tho. To assess the situation, we carried

out a survey using questionnaires combined with observation, in-depth interviews, conversations with preschool teachers and research on the products of teachers of 5-6-year-old children (lesson plan, plan to organize activities of self-protection skills education, records, etc.). Survey data were processed with SPSS software version 20.0, analyzed with Pearson's correlation coefficient r between survey variables and evaluated by 5-level Likert scale: Poor (1 point) - Not important/ Never/ Not effective/ Not difficult/ Not influential; Weak (2 points) - Not really important/ Not often/ Not really effective/ Not really difficult/ Not really influential; Average (3 points) – Normal; Fair (4 points) - Important/ Often/ Effective/ Difficult/ Influential; Good (5 points) - Very important/ Very often/ Very effective/ Very difficult/ Very influential.

3. Results and discussion

3.1. Content, methods and forms of self-protection skills education for 5-6-year-old children according to the experiential approach in preschools in the Northern mountainous area

* The contents of self-protection skills education for 5-6-year-old children according to the experiential approach in preschools in the Northern mountainous area

The contents of self-protection skills education for children is carried out in association with different topics during the school year. In order to organize effective self-protection skills education activities for 5-6-year-old children according to the experiential approach at preschool, the content must be practical and suitable for children and the practical conditions of each school. The results of the survey of teachers in those preschools about the importance and effectiveness of implementing the contents with the results of mean scores, standard deviations, and ranking are as follows:

Table 1: Actual situation of content of self-protection skills education according to the experiential approach in preschools in Northern mountainous area

No.	Content	Level of importance			Implementation efficiency		
		Mean	SD	Rank	Mean	SD	Rank
1	Skills to avoid dangerous actions, unsafe places, life-threatening items;	4.39	0.49	9	3.76	0.77	7
2	Safe eating skills;	4.53	0.50	7	4.03	0.69	2
3	Abuse prevention skills;	4.64	0.48	2	3.77	0.80	6
4	Safety skills when travelling;	4.61	0.50	4	3.84	0.75	4
5	Skills to avoid getting lost and being kidnapped;	4.62	0.49	3	3.95	0.75	3
6	Skills to recognize some emergencies and call for help;	4.55	0.50	6	3.83	0.77	5
7	Skills to perform a number of behaviors and social codes of conduct to ensure safety;	4.52	0.51	8	3.69	0.76	8
8	Skills to maintain body hygiene and health;	4.81	0.39	1	4.06	0.69	1
9	Self-protection skills in cyberspace.	4.59	0.51	5	2.64	0.68	9

The importance of the content of self-protection skills education has a high mean score, is distributed relatively evenly, from 4.39 to 4.81 with standard deviation < 0.5 , so there is little gap between ranks.

The efficiency of self-protection education content has a lower mean score and the difference is also clearer between ranks, ranging from 2.64 to 4.06 with standard deviation > 0.5 . This shows that, although the teachers highly appreciate the importance of implementing the content of self-protection education for children, the expected effect has not been achieved; There are differences in performance across classes and fields.

The statistics table also shows that the skills to maintain body hygiene and health are most appreciated by teachers, ranking first in terms of both level of importance ($M=4.81$, $SD=0.51$) and implementation efficiency at preschool ($M=4.06$, $SD=0.69$). This is also a topic of special interest to preschool teachers because in many mountainous areas, living conditions in many families are still unsanitary, and some children have to take care of themselves when their parents work far away from home for a long time and most children do not have these skills at the most basic level when they go to school. However, because children are regularly and daily trained by teachers, skills are formed and developed very well. Ms. N.V.A. from School... district... Cao Bang shared: “We also teach children personal hygiene skills in the absence of clean water or sanitary equipment (faucets, antibacterial soap, etc.), self-protection skills in severe weather, ...”.

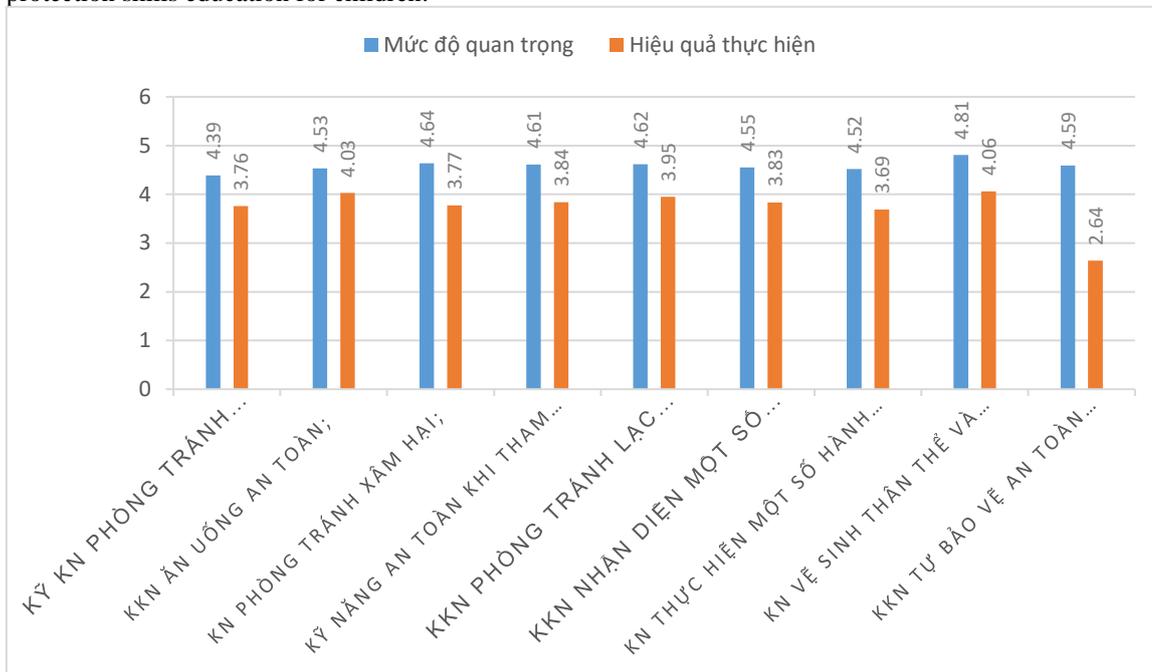
Ranked second in terms of the importance of the content of self-protection skills education is the content of abuse prevention skills ($M=4.64$, $SD=0.48$). This is really essential content to equip all children before entering 1st grade and when many children have to walk long distances to school on their own. However, the performance of this content is only ranked 6th ($M=3.77$, $SD=0.8$). The reason is that the teachers think that the school does not have a program with specific content or has detailed instructions on methods and forms of organization; the teachers have to find reference materials themselves and integrate them into other children's activities.

The following content is education on skills to prevent getting lost and being kidnapped with both the level of importance ($M=4.62$, $SD=0.49$) and implementation efficiency ($M=3.95$, $SD=0.75$) being ranked 3rd. ; Safety skills when travelling have the important level ($M=4.61$, $SD=0.5$) and implementation efficiency ($M=3.84$, $SD=0.75$) both being ranked 4th.

The content of education on self-protection skills in cyberspace was rated as highly important by teachers ($M=4.59$, $SD=0.5$) but the level of implementation efficiency was low ($M=2.64$, $SD=0.68$). Most teachers and parents had not really been concerned about this issue until the Covid-19 epidemic took place, children were absent from school and stayed at home with

limited space and increasing use of Internet. Therefore, what used to be of little concern for parents and teachers such as: mental and physical health when using the internet for a long time, children accidentally or curiously accessing harmful sites (performing dangerous character-based challenges, violence, anti-educational, depraved publications, etc.) became a major subject of concern. Therefore, teacher need to not only educate children but also propagate and coordinate with parents to raise their awareness about the importance of this content.

The following chart shows more clearly the average score for assessing the importance and effectiveness of the contents of self-protection skills education for children:



* The methods of educating self-protection skills for 5-6-year-old children according to the experiential approach in preschools in the Northern mountainous area

Table 2: The actual situation of self-protection skills education methods for 5-6 year old children according to experiential approach in preschools

No.	Method	The frequency of implementation			Implementation efficiency		
		M	SD	Rank	M	SD	Rank
1	Conversation	3.87	0.71	7	3.86	0.69	6
2	Visualization	4.42	0.49	1	4.29	0.60	1
3	Role-playing	4.03	0.69	4	4.02	0.71	2
4	Practice	3.99	0.64	6	3.96	0.66	4
5	Gamification	4.01	0.69	5	3.92	0.68	5
6	Situational method	4.05	0.45	3	3.97	0.69	3
7	Group discussion	4.11	0.57	2	3.59	0.73	8
8	Exemplification	3.59	0.79	8	3.69	0.81	7

In order to teach self-protection skills for 5-6 year old children according to the experiential approach, teachers have used diverse and flexibly different methods in the system of preschool education methods in general.

The visualization method has the highest frequency (M=4.42, SD=0.49) and the highest level of implementation efficiency (M=4.29, SD=0.60). Because the requirement of the activity is that children have practical experience, this method is always the first priority of teachers. In addition, because each child is allowed to do it by himself, directly manipulating the learning aids, tools and the surrounding natural environment, he is very interested and highly engaged.

The group discussion method ranked second in frequency (M=4.11, SD=0.45) but its implementation efficiency was ranked at the lowest level (M=3.59, SD=0.73). This is a method that teachers need to use a lot after allowing children to experience directly to share experiences and orientate them how to apply those experiences. However, preschool teachers assessed that the effectiveness of the group discussion method was not as high as expected (ranked 5th). Explaining the reason, teachers said that because the form of organizing group discussions for children sometimes does not stimulate the children's courage and initiative, and also because this method is not used regularly when organizing other educational activities.

The situational method ranked 3rd in terms of both frequency of (M=4.05, SD=0.45) and implementation efficiency (M=3.97, SD=0.69). Creating situations that simulate potential risks to children so that they can experience emergency situation handling skills and self-protection skills is considered a key method which helps children identify dangerous factors associated with reality that may occur.

The role-play method ranked 4th in frequency (M=4.03, SD=0.69), the second most effective method (M=4.02, SD=0.61) and the gamification method has both frequency (M=4.01, SD=0.69) and implementation efficiency (M=3.92, SD=0.68) ranked 5th. These are still the main methods used in organizing educational activities for preschool children, helping them to actively engage in "play and learn" activities. This method is often used by teachers to excite children before the experience or emulation game when getting them to share the actual experience that has just taken place.

The next methods on the list are practice (ranked 6th); conversation (ranked 7th); exemplification (ranked 8th). The frequency of those methods is of nearly equal mean score, ranging from 3.99 to 4.01 on a scale of 5. It is noteworthy that the method of conversation is not appreciated for its effectiveness even though the mean score for frequency was M=3.87. Ms. H.T.M of Khe Mo Kindergarten, Dong Hy, Thai Nguyen said that most of the children in her class are ethnic minorities, they are still shy, so they are "afraid" to share their feelings and experiences drawn from experiential activities with friends and teachers when being asked even though they understand. Each group usually only focuses on about 2 or 3 brave children. If the teachers want the children to answer, they need to have a flexible way of asking such as reading results backwards, multiple-choice questions illustrated with pictures or competing between groups to choose the right answer, etc.

The above results also show that most of the content of self-protection skills education for 5-6-year-old children according to the experiential approach in preschool are of high frequency and the implementation efficiency is also high. Some methods such as group discussion and conversation have not been effective at the highest level due to the psychological characteristics of children in preschools in the surveyed area and children attend school unevenly due to epidemic conditions. These methods need to be implemented more actively by teachers because the initiative and willingness to talk to friends, teachers and adults whom children trust is also an essential skill for children to protect themselves from potential risks, especially those that cause psychosocial insecurity (mental self-protection).

* The forms of self-protection skills education for 5-6-year-old children according to the experiential approach in preschools in the Northern mountainous area.

The forms of organizing self-protection skills education activities for 5-6-year-old children according to the experiential approach at preschool needs to be diverse and open so that teachers can flexibly choose one or more forms depending on the purpose, content, method, target, practical conditions, etc. It can be experiential activities with hypothetical nature in purposeful learning activities, activities for fun (playing in corners, playing outdoors), care - hygiene activities (having lunch, taking naps, keeping personal hygiene) or experience directly in the real environment such as sightseeing and picnic, festivals and holidays, labor activities. The results of the survey on the forms that teachers choose to use when organizing self-protection skills education activities for 5-6-year-old children according to the experiential approach in preschool are shown in the following table. :

Table 3: Actual situation of the forms of organizing educational activities according to the experiential approach in preschools

No.	Form	Frequency			Implementation efficiency		
		M	SD	Rank	M	SD	Rank
1	Playing for fun	4.17	0.60	3	3.99	0.59	4
2	Purposeful learning	4.11	0.62	4	4.01	0.56	3
3	Festivals and holidays	3.72	0.73	5	3.67	0.66	5
4	Sightseeing and picnic	3.54	0.86	6	3.56	0.82	6
5	Taking care and hygiene	4.31	0.56	1	4.13	0.56	1
6	Labor activities	4.13	0.65	2	4.06	0.58	2

Most of the surveyed teachers choose taking care and hygiene, playing, labor activities and purposeful learning activities as forms of organization with a high level of frequency (M from 3.17 to 3.31) and a high level of implementation efficiency (M from 4.01 to 4.13). These activities are held daily at preschool, teachers can actively prepare the environment, children can directly participate in the activities and practice skills regularly. Festivals, holidays and sightseeing and picnic activities are also forms with many outstanding advantages in educating children on self-protection skills according to the experiential approach because these activities are mainly organized outdoors. These are ways to help children experience the social reality around them, so teachers can easily create many situations for children to handle. However, these two forms are not often used because the implementation depends on the school's year plan, on the actual conditions of teachers, children, and resources. Ms. H.T.Y.T (Thai Nguyen) said that many teachers were still confused in building plans to organize experiential activities for their own class. If activities are organized on a school-wide scale, it will be difficult to assess children's skills.

With regards to the forms of organizing self-protection skills education activities for 5-6-year-old children according to the experiential approach in preschool, the level of frequency and the implementation efficiency are also positively correlated with each other, shown in the mean scores in both columns are equal in rank (the result of analysis Pearson r - the value of the correlation coefficient also gives r>0) .

3.2. Forces participating in self-protection skills education for 5-6 year olds according to the experiential approach in preschools in the Northern mountainous area

An important factor for effective self-protection education for 5-6 year olds is the companionship and coordination of forces inside and outside the school. The results of a survey on teachers on the level of participation and coordination of forces that are both directly related to children and responsible for ensuring the safety of children at all times and places in the organization of 1 self-protection skills education activities for 5-6 year old children according to the experiential approach in preschool are shown in Table 4 below:

Table 4: Actual situation of forces participating in self-protection skills education for 5-6-year-old children according to the experiential approach in preschools in the Northern mountainous region

No.	Force	M	SD	Rank
1	Administrators	4.01	0.82	2
2	Preschool teachers	4.39	0.68	1
3	School medical staff	3.81	0.88	4
4	Family and society	3.94	0.81	3
5	Child protection agencies and organizations	3.39	0.76	5

Preschool teachers are a key force in educating children and keeping in constant contact with other educational forces. Therefore, the survey opinions all rated the level of participation in self-protection skills education for children according to the experiential approach of teachers as the highest (M=4.39, SD=0.68). The teachers are also the people who develop a plan to educate children on self-protection skills in their class and choose the contents methods and forms of organizing activities so that they can coordinate with other forces. The next on the table is the force of school administrators (M=4.01, SD=0.82), who play an important role in directing the development of plans to organize self-protection skills education activities for 5-6-year-old children according to the experiential approach, orient teachers to organize appropriate activities and also be the focal point to connect with other educational forces. The level of coordination and participation of school, family and social health workers, child protection organizations has not been appreciated. Some opinions from in-depth interviews are that sometimes those forces do not know the content of self-protection skills education for 5-6-year-old children because there is little contact (Ms. N, T, A - Cao Bang), some other forces think that educating children is the responsibility of teachers and schools, so they have not really cared (Ms. H.T.H.H - Ha Giang), the school has not had any activities that can connect these forces effectively (Ms. N.M.TH – Thai Nguyen). In particular, child protection agencies and organizations have the lowest level of participation (M=3.39, SD=0.76). This result is due to two main reasons: firstly, preschools have very little connection with child protection agencies and organizations; Secondly, child protection agencies and organizations have not actively coordinated with preschools in educating children on self-protection skills. Although it is clearly stated in Article 53 of the Law on Children 2016 that these agencies and organizations, especially the People's Committees of communes/wards, specialized child protection officers have the duty to advise and provide information and guidance for children and their parents and caregivers to access child protection services, social assistance, health care, education, legal aid and other resources; Counseling parents, caregivers and family members and the community on child protection knowledge and skills, no preschool teacher is aware of this information.

3.3. Difficulties in organizing self-protection skills education for 5-6-year-old children according to the experiential approach in preschools in the Northern mountainous area

The research listed difficulties during implementation in terms of the physical environment, organizing educational activities according to the experiential approach, the large number of children per classes, and coordinating with students' parents to choose the level of education. The average score of teachers' assessment is high, from 3.26 to 4.56. However, the standard deviation from 0.78 to 0.96 shows that there is a disparity in the assessment among teachers, the difficulties encountered by teachers are also different among provinces, schools and classes as follows:

Table 4: Situation of difficulties when organizing self-protection skills education for 5-6-year-old children according to the experiential approach in preschools in the Northern mountainous region

No.	Content	M	SD	Rank
1	The school does not plan to organize activities according to the experiential approach	3.91	0.93	4
2	The location chosen to organize activities is not spacious enough	3.26	0.96	8
3	There are not enough tools, means and funds to organize activities	4.08	0.78	3
4	The number of children per each class is large, the teacher has not paid attention to each child	4.30	0.80	2
5	Difficulties in using methods, forms, and processes to organize activities according to the experiential approach	4.56	0.74	1
6	Parents do not regularly cooperate with teachers	3.85	0.82	6
7	There are no criteria to evaluate children's self-protection skills and the effectiveness of activities	3.87	0.82	5
8	Children have limited Vietnamese language skills	3.71	0.77	7

The teachers rated the difficulty in using methods, forms, and processes to organize activities according to the experiential approach as the highest (M=4.56, SD=0.73). Accordingly, the difficulty that there are no criteria for assessing children's self-protection skills and the effectiveness of activities also has a high average score (M=3.87, SD=0.77). This is because many teachers have not been trained in self-protection skills education, in organizing experiential activities in preschool. In addition, the large number of students per classes in many localities which still lack teachers also results in a great difficulty for teachers when organizing activities (M=4.30, SD=0.80). Preschools in remote communes still lack many essential tools for teaching, so the difficulty of not having enough supplies, means, and funding for organizing activities is assessed by the teachers at a high level,

ranked 3rd ($M=4.08$, $SD=0.78$) Although preschools and teachers both recognize the importance of self-protection skills education for 5-6 year olds, there is a fact that the education of self-protection skills in particular and the education of life skills in general are still considered as an integrated content or an extra-curricular program, many schools have not included it into the educational plan of the school year and deploying to teachers to prepare detailed educational plans for each class, therefore, the fact that the school does not have a plan to organize activities according to the experiential approach is also a difficulty that teachers perceive ($M=3.91$, $SD=0.93$). With the average score of difficulty level only slightly lower than the 4th rank, the difficulty of parents not being able to cooperate regularly with teachers ($M=3.85$, $SD=0.82$), children have limited Vietnamese language skills ($M=3.71$, $SD=0.77$) and the location chosen to organize activities is not spacious enough ($M=3.26$, $SD=0.96$). These are also common limitations of most preschools in remote areas, separate schools, mixed classes, schools shared infrastructure with primary schools, especially in Ha Giang, Yen Bai, and Cao Bang. Children do not speak Vietnamese well, and shyness is a big barrier for all preschool teachers when working in ethnic minority and northern mountainous areas. However, this is also the basis for teachers to actively organize educational activities according to the experiential approach, because only by experiencing can children easily integrate into common activities and acquire knowledge and skills. Ms. G.A.B (Yen Bai) said in these areas, young parents mainly work in the fields, and a few of them work as workers in industrial zones far from home (their children live with their grandparents) so the coordination in preparation of knowledge, psychology, or means and tools for experiential activities is limited. Some teachers still have to mobilize parents to send their children to school every week.

According to the survey results on 575 preschool teachers with questions about recommendations to improve the quality of self-protection skills education for 5-6-year-old children according to the experiential approach in preschools in the northern mountainous area, the research received 536 recommendations or additional comments for the difficulties faced by teachers, including 83 comments of preschool teachers about the desire to add more tools, toys, equipment and improvement of the physical environment and space inside and outside the classroom to organize educational activities on self-protection skills for children according to the experiential approach; 78 opinions expressed their desire to participate in training courses on self-protection skills education for 5-6-year-old children according to the experiential approach, topics on educating children on self-protection skills, model activities on self-protection skills education for 5-6-year-old children according to the experiential approach; 26 comments on the need to strengthen cooperation with parents of students; 26 comments suggested that preschools need to have an educational plan on educating children on self-protection skills and guide how to organize according to the experiential approach; 15 comments on the lack of references and guidelines; 6 opinions on difficulties in using methods, forms, and processes to organize activities and evaluate children, etc.

3.4. Factors affecting self-protection skills education for 5-6 years old children according to the experiential approach in preschools in the Northern mountainous area

The effectiveness of organizing educational activities in preschool depends on many subjective and objective factors. When organizing activities according to the experiential approach, assessing the factors affecting the effectiveness will help schools and teachers have a direction to adjust the educational plan to suit the reality.

Table 4: Actual situation of factors affecting the effectiveness of educational activities according to the experiential approach in preschool

No.	Factors	M	SD	Rank
1	Time	3.44	0.69	8
2	Location	3.51	0.75	7
3	Facilities	3.52	0.72	6
4	Psychological characteristics and experience of children	3.82	0.73	4
5	Teachers' ability to organize activities according to the experiential approach	4.56	0.49	1
6	The cooperation between schools, teachers, parents and society	4.25	0.71	2
7	Manual materials	4.11	0.76	3
8	Preschool Education Program	3.54	0.59	5

* Subjective factors:

- The factor of teachers' ability to organize activities ($M=4.56$, $SD=0.49$) has a great influence on effectiveness. Most of the teachers who answered during the in-depth interviews said that among the causes affecting the quality of the process of educating children on self-protection skills according to the experiential approach, there are many reasons that stem from their awareness of education according to the experiential approach; the content, methods, forms and processes of organizing activities, building detailed plans, handling experiential situations.

- Psychological characteristics and experience of children ($M=3.82$, $SD=0.73$) are considered a factor that directly affects the results of the formation and development of self-protection skills for children; affecting children's comfort and participation in activities.

* Objective factors:

- The cooperation between schools, teachers, parents and society is also a factor that is assessed to have a great influence in educating children on self-protection skills according to the experiential approach ($M=4.25$, $SD=0.71$). This coordination needs to be conducted closely and regularly to raise awareness and responsibility of the community in educating children on self-protection skills anytime, anywhere. Mobilizing a variety of material and spiritual resources from the community will contribute to improving the environment for children.

- The next influencing factor is the manual materials ($M=4.11$, $SD=0.76$). Currently, the life skills education program - self-protection skills for preschool children is not consistent, there are no specific and clear instructions, so if there are detailed

instructions on the content and methods, the form, organizational process as well as the way to evaluate children, it will become easier for teachers in the implementation process. In addition, the means of organizing activities (tools, toys, materials, teaching and learning equipment, etc.) is also an important factor affecting the results of children's skill formation ($M= 3.52$, $SD=0.72$). For the mountainous areas in the commune with special difficulties, this is the most influential factor because most of the schools do not have enough essential supplies.

- Other factors such as: organization time; location; Preschool education programs were also rated by teachers with a high degree of influence, with average scores of 3.44, 3.51 and 3.54 respectively.

4. Conclusion

The research has evaluated the actual situation of organizing self-protection skills education activities for 5-6-year-old children according to the experiential approach in preschools in the Northern mountainous region in terms of contents, methods, and forms of organizing activities; forces involved in educating children on self-protection skills; difficulties in organizing activities and factors affecting the organization of these activities. The results show that many teachers are still confused in organizing and designing the process of educating children on self-protection skills according to the experiential approach as well as building appropriate assessment criteria for children. The experiential approach is a new approach in early childhood education in Vietnam, especially in mountainous areas, so the results of the study will be an important basis for proposing measures to improve the quality of education activities for self-protection skills for children.

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Determination Of Some Physicochemical Parameters And Selected Heavy Metals In Borehole Water Samples From Wawa Town, In Borgu Local Government Area Of Niger State, Nigeria.

Sufyan Chiroma Salihu*, Mohammed Salisu Musa*, Shehu Turaki Aliyu**, Hashimu Abdulmumini***

*Department of Pure and Industrial Chemistry, Bayero University, Kano, Nigeria.

**Department of Science Laboratory Technology, Federal Polytechnic, Daura.

***Department of Pure and Applied Chemistry, Kebbi State University of Science and Technology, Aliero.

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Abstract: Some physicochemical parameters and heavy metals were investigated in water samples collected from selected boreholes in Wawa town for the purpose of ascertaining the water quality of the boreholes for drinking and other domestic purposes. Four selected boreholes were sampled three times each. The physicochemical parameters investigated are as follows; temperature, pH, electrical conductivity, alkalinity, turbidity, total dissolved solids and total hardness using standard methods. And from the results, the physicochemical parameters had mean values of 32.35 ± 0.92 °C, 7.06 ± 0.18 , 217.42 ± 72.60 $\mu\text{S}/\text{cm}$, 140.25 ± 23.00 mg/L, 0.94 ± 0.23 NTU, 130.90 ± 49.05 mg/L and 246.25 ± 25.97 mg/L respectively. The results obtained were compared with the WHO [1] and NSDWQ [2] standards for drinking water and it was observed that majority of the physicochemical parameters had values which were within the maximum permissible limits. However, the total hardness of all the sampled boreholes were above the permissible limit set by NSDWQ (150 mg/L) but lower than the permissible limit set by WHO (500 mg/L). The heavy metals investigated are zinc, cadmium, iron, copper and lead. The heavy metals listed had mean values of 0.165 ± 0.095 mg/L, 0.001 ± 0.0004 mg/L, 0.715 ± 0.09 mg/L, 0.145 ± 0.02 mg/L and 0.008 ± 0.0007 mg/L respectively. The results obtained revealed that the values for zinc, cadmium, copper and lead were below the maximum permitted levels set by WHO (5 mg/L, 0.003 mg/L, 2 mg/L and 0.01 mg/L) and NSDWQ (3mg/L, 0.003mg/L, 1 mg/L and 0.01mg/L) respectively. The values obtained for iron in all of the water samples were also below the acceptable limit for groundwater set by WHO (3 mg/L) but above the permissible limit for drinking water by NSDWQ (0.3 mg/L). As such, the borehole water is of good quality for human consumption and other domestic uses. However, treatment is recommended to reduce or remove the lead and cadmium concentrations in the boreholes.

Keywords: Borehole, Heavy metals, Physicochemical parameters, Water samples, Wawa Town.

I. INTRODUCTION

Water is the most abundant substance on the earth's surface that is essential for the survival of all known forms of life. Next to air we breathe, water is humankind most important substance [3]. It is always the vital commodity for humans, used for drinking, cooking, agriculture, transport and recreation, among other purposes. Nevertheless, most important is the fact that water is a major constituent of all living matter, comprising up to two-thirds of the human body. In addition, water plays an important role in the world economy, as it functions as a solvent for a wide variety of chemical substances, industrial cooling and transportation. It also serves as a receptor of industrial waste, domestic waste and wastewater resulting from other uses of water [4], as well as playing significant roles in the growing, development and establishment of cities and communities [5], hence man rely on water for proper existence.

Clean drinking water is now recognized as a fundamental right of human beings but over a billion people lack access to safe potable water supply globally and out of this number, around 6–8 million people die each year due to water related diseases and disasters and more than 300 million people living in rural area of sub-Saharan Africa are being affected [6]. In Nigeria, due to the inability of the various levels of government to provide water for its citizens, there has arisen private boreholes indiscriminately drilled by individuals, corporate organizations and even government agencies in their different homes, and office environments [7, 8] to curb the menace of inadequate water supply. The alternative sources of water supply provided is uncontrolled and therefore produces negative implications on the groundwater and surface water which negates the principle of sustainable development and its goals [9].

Rural settlements in Nigeria are characterized by lack of portable water supply. This situation makes dwellers depend on stream, lakes, shadow dug wells etc. However, it is known that water resources in rural areas of Nigeria are prone to pollution either by low level of hygiene manifested by the inhabitants or by agricultural and local industrial activities of the inhabitants [10]. These rural areas are most often neglected by government as they lack basic infrastructure like potable water, health facilities, access roads, sanitation facilities and even electricity. The near absence of these facilities exposes the dwellers to a variety of health-related risks. Contamination of water resources unarguably stands prominent among the many ills plaguing the rural settlements in developing countries [11].

The major source of drinking water for the inhabitants of Wawa town in Borgu Local Government Area of Niger state is the untreated groundwater obtained from recently drilled boreholes across the entire study area by non-governmental agencies and individuals. Hence, quality assessment of these borehole water samples has become necessary to provide firsthand information on their quality to ascertain their suitability as drinking water.

II. MATERIALS AND METHODS

In the preparation of reagents, it was ensured that chemicals of analytical grade and distilled water were used in order to avoid unnecessary contamination. Glassware were washed thoroughly with detergent, rinsed properly with distilled water, immersed in 25% nitric acid and finally rinsed with distilled water and dried in an oven before use. The condition of all the equipment used were inspected in order to make sure equipment is safe for use and that all systems are working properly. They were also calibrated according to manufacturer's specifications.

2.1 Study Area

Wawa is a town located in Borgu local government area of Niger state, Nigeria. Its geographical coordinates are 9° 54' 8" North, 4° 25' 9" East, with postal code 912105. It shares its boundaries with Kainji and with Kaiama in Kwara state. Wawa town has an area of 19km² and a population of 23, 438 at the 2006 census. The people of Wawa are predominantly farmers that engage in commercial crops and animal production. The major source of their water in recent time is the groundwater in the form of boreholes which are being drilled across the entire study area mostly as non-governmental agency projects and in some cases by individuals.

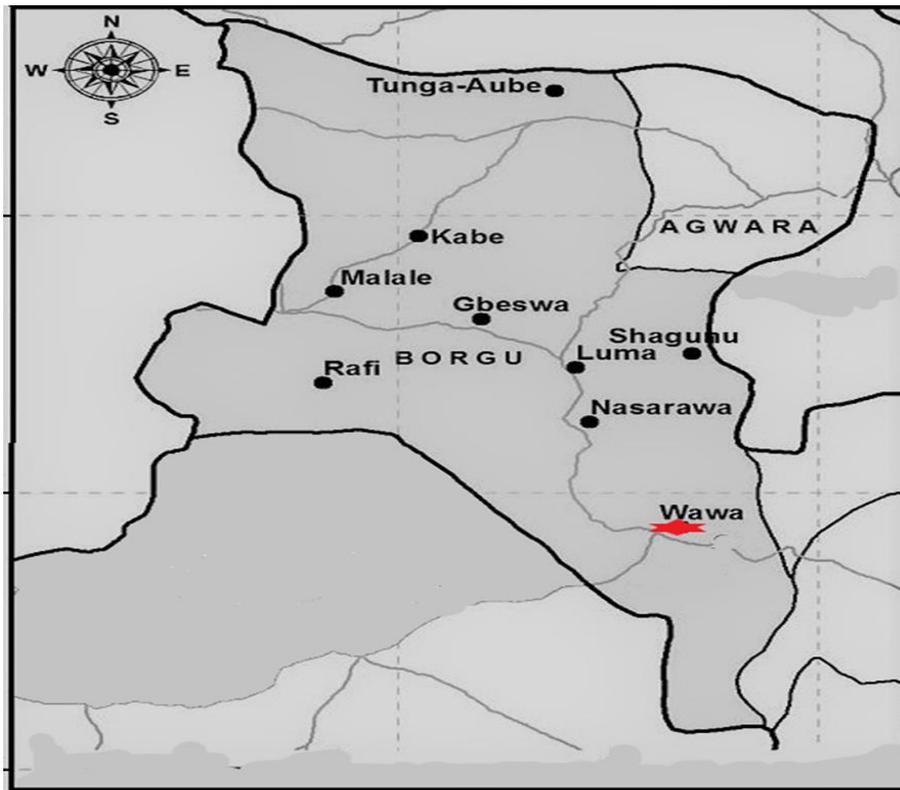


Figure 1: Map of Borgu L.G.A. Showing the Major Towns Including Wawa (the study area).

S/N	SAMPLING LOCATION	CODE
1.	Central Primary School, Wawa.	BH A
2.	Basic Health Centre, Wawa.	BH B
3.	Saidu Abubakar Memorial Central Mosque, Wawa.	BH C
4.	Customs Barracks, Wawa.	BH D

Table1: Sampling Locations and their Code

2.2. Sampling

2.2.1 Sample Collection and Preservation

Four samples of borehole water (coded BH A - BH D) were collected from different locations across the entire study area in triplicate. The water was allowed to run for a few minutes before collection in order to obtain a uniform flow rate [12]. Three water samples were collected from each borehole at intervals of four hours, between the hours of 8.00 am to 4.00 pm. The samples were collected in new and cleaned polyethylene plastic bottles. The samples were covered in black polyethylene bags to prevent growth of algae and stored in a Haier thermocool chest freezer at a temperature below 4°C, to prevent growth of microorganisms. Some parameters like pH, electrical conductivity and temperature were determined immediately during each sampling period due to their low stability while the remaining parameters were determined in the laboratory [13]. The samples were preserved by acidifying with 2 mL concentrated nitric acid so as to prevent metal adsorption onto the inner surface of the container [14]. Samples were collected between 7th -10th April, 2021.

2.3 Methodology

2.3.1 Temperature and pH

An ATC digital pen-type portable temperature/pH meter [(model PH-009 (III)] was used to measure temperature and pH *in situ*. The meter was switched on and standardized with a buffer solution. The meter was then immediately introduced into the water sample and measurement was taken after a stable reading was observed. The probe was then rinsed with distilled water before taken another measurement. The probe was also recalibrated after ten runs [15].

2.3.2 Electrical Conductivity (EC)

The electrical conductivity of the water samples was measured with a conductivity meter (model DA-1) *in situ*. The meter was switched on and 0.01 mol/dm³ solution of potassium chloride was used to standardize the probe. The probe was thoroughly rinsed with distilled water and then immersed directly into water sample and each measurement was taken. The probe was thoroughly rinsed with distilled water after each measurement [16].

2.3.3 Alkalinity

Alkalinity was determined by taking 100 mL of the sample, followed by the addition of 2 drops of phenolphthalein indicator. A color change was observed followed by titration with 0.1M HCl until the color changed from pink to colorless [13]. Calculation;

$$\text{Alkalinity in mg (CaCO}_3\text{)/L} = \frac{A \times M \times 50,000}{\text{Volume of sample}}$$

Where: A= Volume of acid used., N= Molarity of standard acid

2.3.4 Turbidity

The turbidity of the water samples was measured using a digital turbidimeter (2100AN HACH model). The meter was standardized with a distilled water, and then 10 mL of water sample was placed in the sample cell in the turbidimeter. The turbidity reading of each sample was then recorded [17].

2.3.5 Total Dissolved Solids (TDS)

The total dissolved solid was determined using a conductivity meter, the programme menu of the conductivity meter was switched to total dissolved solid, 100 mL of the water sample was measured into a beaker and the probe was introduced into the sample. The results of total dissolved solids were displayed and recorded [13].

2.3.6 Total Hardness (TH)

The EDTA titration method was used in determining the total hardness of the samples. The sample was shaken thoroughly. Out of the sample collected, 25 mL was taken and diluted with 50 mL of distilled water and transferred quantitatively into a clean 250 mL Erlenmeyer flask. Then 2 mL of buffer solution (NH₄Cl –NH₄OH) was added, followed by two drops of Erichrome Black indicator and the sample titrated with 0.01M EDTA solution that had been standardized using the standard calcium solution. The formation of blue color indicated the end point, titre value was recorded [17]. Calculation;

$$\text{Total hardness in mg (CaCO}_3\text{)/L} = \frac{A \times B \times 100}{\text{Volume of sample}}$$

Where: A= Volume of EDTA used for titration, B= Molarity of the EDTA titrant.

2.3.7 Digestion of Water samples for Heavy Metals Analysis

This involved transferring 100 mL of the water sample into a 250 mL beaker, followed by the addition of 5 mL concentrated HNO₃. The mixture was heated on a hot plate and allowed to evaporate to about 20 mL. The beaker was allowed to cool and another 5 mL of concentrated HNO₃ was added and heated to evaporate again. The mixture was cooled, filtered and transferred to a pre cleaned 100 mL plastic bottle. It was then diluted to the mark with distilled water. A blank was also digested with the same procedure, as stated above [18]. The solution was used for heavy metal analysis using the Microwave Plasma Atomic Emission Spectrophotometer (MP-AES) 4210 model at Centre for Dryland Agriculture (CDA), Bayero University Kano.

III. RESULTS AND DISCUSSION

3.1 Results

Results are expressed as mean ± SD of the three replicate analyses as follows.

Samples	Temp. (°C)	pH	EC (µS/cm)	Alkalinity(mg/L)	Turbidity (NTU)	TDS (mg/L)	TH (mg/L)
BH A	32.10±3.04	6.90±0.03	320.00±5.57	153.58±3.71	0.76±0.01	205.49±3.60	233.25±3.46
BH B	33.83±4.36	7.35±0.07	216.67±7.02	159.42±1.42	0.85±0.01	104.47±4.15	225.03±1.59
BH C	32.17±1.86	7.03±0.03	114.67±3.51	101.17±2.43	1.33±0.01	73.65±1.83	290.69±2.60
BH D	31.30±2.10	6.95±0.09	218.33±7.64	146.83±1.62	0.83±0.01	139.97±5.23	236.03±2.33

Table 2: Mean and Standard Deviation Values for the Physicochemical Parameters Analyzed in the Water Samples

Samples	Zinc (mg/L)	Cadmium (mg/L)	Iron (mg/L)	Copper (mg/L)	Lead (mg/L)
BH A	0.11±0.01	0.001±0.0003	0.73±0.04	0.16±0.01	0.008±0
BH B	0.16±0.07	0.001±0.0001	0.58±0.02	0.12±0.02	0.008±0.0001
BH C	0.32±0.2	0.002±0.0002	0.71±0.13	0.17±0.03	0.009±0.0001
BH D	0.07±0.03	0.001±0.0002	0.84±0.13	0.13±0.02	0.007±0.0001

Table 3: Mean and Standard Deviation Values for the Heavy Metals Analyzed in the Water Samples

3.2 Discussion

This study determined some physicochemical parameters and some heavy metals of water in selected boreholes in Wawa town, in Borgu local government area of Niger state, Nigeria. All of the parameters analyzed were all detected.

The high temperature obtained from the samples could be attributed to the time and season of sample collection which was throughout the whole day and during the dry season. The temperature of drinking water is often not a major concern to consumers especially in terms of the quality. The quality of water with respect to temperature is usually left to the individual’s taste and preference. [19] reported high value of temperature which was attributed to the environmental temperature as well as other climatic conditions prevailing in the study area at the time of sample collection. Higher water temperature increases chemical reactions in the aquifer such as weathering of rocks which leads to the release of the chemical contaminants in water and decreases the level of dissolved oxygen in aquatic level.

The results obtained for the pH level of the water samples were within the acceptable limit of WHO and NSDWQ standard of 6.5 – 8.5. However, [20] recorded pH values ranging from 6.20 to 7.88 and concluded that pH is generally not considered to have a direct impact on humans. However long-term intake of acidic water can lead to mineral deficiencies. Because virtually all groundwater come from precipitation that soaks into the soil and passes down to the aquifer, low pH could be an indication of acidic rain.

The measurement conducted for the electrical conductivity of the water samples indicates that all examined water samples had values which did not exceed the permissible limit of WHO (1000 $\mu\text{S}/\text{cm}$) and NSDWQ (1000 $\mu\text{S}/\text{cm}$) for drinking water and as such, have no potential health risk to the consumers.

From the analyzed results, the alkalinity level of all the samples was within the permissible limit of WHO (500 mg/L) for drinking water. However, [13], reported that the alkalinity value in water provides an idea of natural mineral salts present in the water. The main species that contribute to alkalinity includes bicarbonates, hydroxides, phosphates and borates.

The turbidity values recorded in all the boreholes sampled were below the WHO and NSDWQ maximum permissible limit of 5 NTU and therefore do not have any potential health risk to the consumers. Generally, borehole water usually has low turbidity value since surface water that percolate as groundwater would have undergone natural filtration through the soil as it percolates into the aquifer. Although, [20] reported turbidity of 6.12-60 NTU in groundwater and suggested that the source of the high turbidity is most likely due to those generated as water moves through the loose soils of the area into the groundwater supply, as well as a high likelihood of mud and silt being washed into the groundwater.

From the analyzed results, all the borehole water samples recorded total dissolved solids values within the acceptable limit of WHO and NSDWQ standard for drinking water. These results are in agreement with a study conducted by [21] in India. However, [22] deduced that high level of total dissolved solids in groundwater may be due to dissolution of weathered materials from rock formation.

The hardness levels of the water samples were also analyzed and presented in Table 2. [23] classified water in terms of softness and hardness (in mg/L) as follows: 0-60 soft, 60 – 120 moderately soft, and 121 – 180 moderately hard and above 180 is hard. Considering this classification, it can be deduced that almost all the water samples analyzed are hard, but safe for drinking and other domestic purposes. However, the hardness could be removed by simple boiling, addition of chemicals e.g. washing soda, sodium hydroxide, and ion exchange method.

Research has recorded approximately 0.05 g/kg of zinc to be present naturally in the earth crust [24]. From the analyzed samples, the maximum and minimum zinc levels were 0.32 mg/L (BH C) and 0.07 mg/L (BH D) (Table 3). All examined samples revealed zinc concentration below the permissible standard values of 3 and 5 mg/L set by the [2] and the [1] respectively. This could be associated to the fact that the zinc in its natural mineral form (sphalerite) does not dissolve into underground water bodies via leaching in all examined locations [25].

The presence of cadmium in groundwater occurs via leaching when in contact with soil contaminated with discharges from mining, paints, electroplating, petrochemical, plastics and fertilizer industries [26]. All of the cadmium concentrations detected in the water samples were below the permissible value (0.003 mg/L) specified by the WHO and NSDWQ and this could be attributed to galvanized steel pipe corrosion used in conveying water from the ground level to surface level as reported by [27] or leaching of soil which has been contaminated with discharges from plastics and fertilizers into the underground water. Epidemiological studies have shown that long-term exposure to cadmium could cause kidney damage, lung cancer, high blood pressure and bone defects. However, excess cadmium can be removed or reduced from drinking water with a sodium form cation exchanger, reverse osmosis or electrodialysis.

All of the borehole water samples analyzed had iron concentration below the [1] and [2] maximum permissible limit. The concentration of iron detected in all the samples may be due to the presence of iron bearing minerals in the rocks as they interact with the underground water as well as the pipes used in the construction of the boreholes, as suggested by [28].

Copper was detected in all of the water samples but none was at a level above the permissible limits of [1] and [2]. The copper detected in the water samples may have been derived from rock weathering or corrosion of brass and copper piping [30]. However, when excess copper is present in water (above the permissible level), gastrointestinal disorder occurs after a long period of exposure [29].

Of all heavy metals, lead is the most significant due to its toxic and harmful instinct even at very small concentrations [31]. It can accumulate in body tissue posing threat to human health. From the examined samples at different locations, lead concentrations of all samples were below the permissible value of 0.01 mg/L set by the [1] and [2]. The presence of lead in water beyond the permissible level could result in hypertension, interference with Vitamin D and calcium metabolism, brain development hindrance in fetus and young children, damage to tissues and organs in humans and many more. Water softener, activated carbon filtration and distillation are some means of removing or reducing lead from drinking water.

IV. CONCLUSION

This study assessed the physicochemical parameters and heavy metals content of some borehole water samples collected from Wawa town, in Borgu local government area of Niger state, Nigeria. The study revealed that majority of the physicochemical parameters are within the WHO and NSDWQ permissible limits for drinking water. All of the heavy metals contents were also within the permitted level set by WHO and NSDWQ.

However, frequent monitoring of these water sources is recommended over time as high potential health hazards may occur among the inhabitants of the study area due to the consumption of the water especially in the cases of lead if they are used for drinking and other domestic purposes without treatment and bioaccumulate beyond the tolerable concentrations in the body.

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AUTHORS

First Author- Sufyan Chiroma Salihu, MSc. Analytical Chemistry, Bayero University, Kano. sufyanchiromasalihu@gmail.com

Second Author- Mohammed Salisu Musa, PhD Analytical Chemistry, Bayero University, Kano. m_smusa@yahoo.com

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www.ijsrp.org

Third Author- Shehu Turaki Aliyu, BSc. Zoology, Federal Polytechnic, Daura. aliyushehaturaki@gmail.com

Fourth Author- Hashimu Abdulmumini, BSc. Applied Chemistry, Kebbi State University of Science and Technology, Aliero. hashimbgere@gmail.com

Correspondence Author- Sufyan Chiroma Salihu, sufyanchiromasalihu@gmail.com , sufyanchiromasalihu@yahoo.com ,
+2348072829690

Effects Of Unclean Water On The Structural Elements

Mohammad Nwaf Saleem AlHusein

Mu'ad Bin Jabal Municipality, Ministry of Local Administration, Irbid, Jordan.

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Abstract- The impact of various types of mixing water on the compressive strength of concrete was illustrated in this study. It illustrated how contaminants like sodium salts, manganese, tin, zinc, copper, and lead affected concrete's compressive strength. The effects of the presence of some other impurities like silt and suspended particles on concrete strength were also addressed. Monitoring chemical features aids in determining whether the water complies with legal requirements and is secure for use by humans and the environment. Furthermore, different chemical properties can help in determining the impacts of unclean water on the structural elements. The first part of this paper discusses the physical features of water quality, chemical features of water, and expert water testing and analysis amenities. The second part of this paper addresses the effects of various sources of water on concrete strength.

Index Terms- Concrete; Chemical properties; Impurity; Water.

I. INTRODUCTION

In order to assist environmental consultants in ensuring that the water complies with legal criteria and is secure for both humans and the environment. Element's experts evaluate the physical and chemical characteristics of water quality. Physical qualities of water consider the sample's temperature, color, flavor, and odor. However, water's chemical makeup includes elements like pH and dissolved oxygen. Monitoring these features aids in determining whether the water complies with legal requirements and is safe for use.

II. PHYSICAL FEATURES OF WATER QUALITY

To identify whether the water is polluted or not, it is crucial to continuously evaluate the physical characteristics of water quality. Physical traits can be identified using:

Color: Polluted water may be colored; pure water is colorless. Additionally, color can reveal organic materials. 15 TCU (True Color Unit) is the highest permissible limit for the color of drinking water.

Turbidity: Clear, light-unabsorbing water is the opposite of turbidity. Turbidity in the water may be a sign of water contamination.

Taste and Odor: The taste and odor of clean water are always undetectable. Any taste or smell could be an indication of water pollution.

Temperature - Determining whether or not water is drinkable does not directly depend on its temperature. However, the temperature is a crucial physical component that affects water quality in natural water systems like lakes and rivers.

Particles - If water is filtered to eliminate suspended solids, the amount of dissolved solids is indicated by the solid that is still present in the water. Living things as well as industrial items are adversely affected by dissolved solids in water that are greater than 300 mg/l (Tiwari & Prakash, 2021).

III. CHEMICAL FEATURES OF WATER

Analyzing the chemical characteristics of water involves measuring variables like pH and dissolved oxygen:

Water's pH, which ranges from 0 to 14, is used to gauge how acidic or alkaline it is. The scale used for measurement is a logarithmic one. In fact, it is defined as the negative logarithm of hydrogen ion activity, expresses the level of activity or alkalinity of water at room temperature (T°C) and pressure. The pH of the system affects tastes and odor issues and is related to the majority of reactions in gas/water/rock systems. The amount of bicarbonate and carbonate ions in water has an impact on the pH value. All water samples have pH values that are within the ideal range (6.5-8.5). The World Health Organization (WHO) in 2006 states that certain water samples are classified as alkaline water and the others are nearly neutral (Beyene, Aberra, & Fufa, 2019). Since it contains CO₂ and SO₂, rain has a naturally acidic pH of roughly 5.6, whereas pure water has a pH of 7 (neutral). It was determined using an acidity index paper or a pH electrode meter (Kumaragamage, Warren, & Spiers, 2021).

The quantity of free, non-compound oxygen that is present in water or other liquids is known as dissolved oxygen. Due to its impact on the aquatic life present in a body of water, it is a crucial factor in determining the quality of the water.

IV. EFFECTS OF DIFFERENT SOURCES OF WATER ON CONCRETE STRENGTH

Concrete must have water as a necessary ingredient. A cement paste is created when water and a cementitious substance are combined during the process of hydration. The cement paste fills any gaps in the aggregate, binds it together, and promotes greater flow. A stronger, more resilient concrete will result from using less water in the cement paste, whereas a more fluid concrete with a larger slump will result from using more water.

When making concrete, impure water might lead to issues with setting or early building failure (Abrams, 1924). Additionally, it has been discovered that impurities in water samples used to mix concrete might weaken concrete, particularly its compressive strength (Balapour et al., 2020). In a similar manner, water used to cure concrete might reduce its strength. Ineffective bonds between the aggregates and matrix are likely to be prevented by impurities and harmful elements that are primarily brought from water used in concrete mixing. Sometimes the contaminants make the aggregate less durable (Chaabene, Flah, & Nehdi, 2020).

Concrete (commonly Portland cement and other cementitious materials like fly ash and slag cement), aggregate (typically a coarse aggregate made of gravels or crushed rocks such as limestone or granite, plus a fine aggregate such as sand), water, and chemical admixtures are the main ingredients in concrete, which is a building material (Huang et al., 2019). After mixing with water and installation, concrete solidifies and hardens as a result of a chemical process called hydration. Water and cement interact, fusing the other elements together and eventually forming a substance like stone.

Concrete can be made in a variety of ways by changing the ratios of the primary components. The resulting product can be customized to its use by changing the material quantities or by substituting the cementitious and aggregate phases with others that have different strengths, densities, or chemical and thermal resistance qualities. The mix design is determined by the type of structure being constructed, the method of mixing and delivering the concrete, and the placement of the concrete to create the structure.

Looking for alternative sources of water to utilize in the manufacturing of concrete is necessary due to the current water constraint in different areas. Determining whether water is suitable for mixing concrete is important. It is not always true to make the assumption that water that is fit for drinking is also fit for building concrete (Vaur, 2018). Even while other requirements meant to assure the water's fitness for batching new concrete demand that it be clean and devoid of harmful materials, these requirements might not be the best way to judge whether water is suitable for use as mixing water. Some waters have been found to generate concretes of acceptable quality even when they don't match these requirements (Ghrair, Heath, Paine, & Al Kronz, 2020).

Only comparative tests have been devised to now in order to evaluate the acceptability of mixing water. In general, comparison tests call for comparing the strength of the concrete

made with the ambiguous water to the strength of the concrete made with water that is known to be suitable. The cement suggested for usage in the construction projects should be utilized to make both concretes. According to the American Standard ASTM C 94, mortar strengths made using test water at age 28 must be at least 90% as strong as cubes made with distilled water. And in this paper, same methodology was used (Huang et al., 2019).

When determining if water used to make concrete is suitable, two factors should be taken into account. Two questions need to be answered: the first is whether the contaminants in waste water from dubious sources would damage the qualities and properties of concrete, and the second is the level of impurity that may be accepted.

Different influences impact the strength of concrete; some of which comprise:

4.1 THE PRESENCE OF IMPURITIES

The compressive strength of concrete is impacted by the presence of contaminants, harmful compounds, and organic matter in the fine and coarse aggregates used in concreting. For instance, it has been discovered that impurities like mica in fine aggregate greatly impair the compressive strength of concrete.

4.2 THE WAY THE CURING PROCESS IS CARRIED OUT

Correctly cured concrete prevents cracking where the surface dries out too quickly and increases strength and lowers permeability. Due to the exothermic setting of cement, caution must also be taken to prevent freezing or overheating. Scaling, decreased strength, weak abrasion resistance, and cracking can all result from improper curing.

4.3 THE CURING PROCEDURE AND THE QUALITY OF THE CURING WATER

During the curing process, physical and chemical qualities are developed. Mechanical strength, low moisture permeability, chemical stability, and volumetric stability are a few other characteristics.

4.4 THE RATE OF HYDRATION

Concrete hydration is an exothermic reaction, which releases heat. The heat of hydration is what is known as this heat. The environment in which this reaction occurs controls the concrete's rate of hydration and, consequently, its strength. For example, cement needs a controlled, moist atmosphere to develop strength.

4.5 THE PRESENCE OF REINFORCEMENT BARS IN THE CONCRETE

When reinforcement bars are present in the concrete, the tensile strength of the concrete is improved. Concrete is frequently reinforced with materials that are strong in tension because it has a relatively high compressive strength but a much lower tensile strength (often steel).

4.6 THE METHOD USED TO MIX THE CONCRETE

For example, separate paste mixing, has shown that the compressive strength of the finished concrete can be increased by

blending cement and water into a paste before adding aggregates. For instance, it has been discovered that Fast-energy mixed concrete (HEM concrete) is made by mixing cement, water, and sand at a high speed with a net energy expenditure of at least 5 kilojoules per kilogram of the mix. It is then combined with aggregates in a standard concrete mixer after being added to a plasticizer additive.

V. CONCLUSION

This study was conducted to find out how different types of mixing water affected the qualities of concrete, particularly compressive strength. The following conclusions may be drawn: The quantities of contaminants in various water sources vary, and these impurities typically have a big effect on how strong concrete is. Regardless of the sources used during mixing, concrete gets stronger as it ages in the curing process.

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AUTHORS

First Author – Mohammad Nwaf Saleem AlHusein, Mu'ad Bin Jabal Municipality, Ministry of Local Administration, Irbid, Jordan., Email: malhusien0@gmail.com

The length and breadth of Rongmei scattering in the three state of North East India, namely Assam, Manipur and Nagaland.

Philip Kamei

Assistant Professor. Women's college Silchar, Assam, India

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Abstract- The Prelude to Zeliangrong People, It is said by historian that these people lived in Makhel. The stone inscription lay down that gave about ramting (kabin a cave) where they live long enough numbering in average 6000 families on average. The Makhel fall under senapati district of the Manipur state, the reason for vacating makhel is unknown; it is likely natural disaster like famine, acuteness of Water or dispute among the community. The Rongmei people had been mentioned in the touring diary of Lord Cornwallis. In broader perspective belong to Zeliangrong. The Zeliangrong embrace of three groups of People. The Zemi were the eldest among the fraternity, second liangmei and the youngest among the group were Rongmei people. Earlier puimei (kacha-Naga) were in the fold of Zeliangrong. They work out of this family. According to the British documentation Puimei were considered as "koupui" The liangmei Language and the Zeme Dialect often found when the Rongmei used while enchanting during the death of a person. When pray before rituals arrival of Christian, our forefather worships heavenly God who gives them paddy (rice). The Rongmai were living in Cachar (Silchar), viz. Kaguailong (fatak Bazar), Naga Punjee Meherpur Silchar 15, Tarapur, Binakandi, the Rongmai out here in Barack Valley follows Tingkao Ragoung Chap-Riak; let's say the worshipper of Judaism, Seven day's Day Adventist and Baptist together with other denomination like Free Church of India (FCI), Evangelical Free Church of India (EFCI). The totality of Christianity who worship Jesus our Lord and God stated by Thomas who does not believe about the news of Christ Resurrection, Jesus came and saw

the wound and Thomas worship and spoke out my Lord and my God.

Apei Rani Gaidinliu got a chance for Garlanding to M.K. Gandhi after India got Independence. She was a devout follower of Apou Jadongnang the freedom fighter of Nagas, He dream of "Naga Raj" The Nagas will become a "King one day" (out of the hand of British Clutches). He often visited the Bhuvon Hill to get knowledge to develop a religion and a reformer. So it does when India got Independent in 1947. Whose motives not to pay house tax as well as pothang (work without pay). British when they reached one village to go to another village then force Men fork to carry their luggage etc. To shorten it Haipou Jadonnang is a great social reformer, He asked all his brethren spreading in North East. He tries to bring unity among differences especially to the Zeliangrong people in order not to pay house tax anymore to Britishers living in India prior to Independent of India and to unwilling and rigid when ask for pothang. The earthlier settlement of Zeliangrong are mentioned written by historian and stone inscription making a dais.

Index Terms- Zeliangrong, house tax, koupui, pothang, reformer, freedom fighter, Makhel, Ramting Kabin

AUTHORS

First Author – Philip Kamei, Assistant Professor., Women's college Silchar, Assam, India

Reduction in Manufacturing Cycle Time cum Cost propels Productivity and Business growth in Aerospace Industries.

Sita Ram Sahni¹ & Dr. Kamal Vagrecha²

¹Research Scholar, Indira Gandhi National Open University, New Delhi, India:

²Professor, School of Mgt. Studies, Indira Gandhi National Open University, New Delhi, India.

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Abstract- The manufacturing cycle time as well as cycle cost reduction of detailed and critical components which induces the opportunities of productivity and leads for business growth in aerospace industries. It can emerge as economy growth for nations. Major portion of budget of any country goes for purchasing, research, development and modernization of aircraft, helicopter, rockets, missiles etc. It is therefore required to focus to reduce manufacturing time cum cost of detailed and critical components for aerospace flying machines. This field creates an environment for revenue generation in our economies as well. The cost effective manufacturing of aerospace flying machines lead for cascading development in aviation industries. At low cost manufacturing generates more production of aerospace machines by immense engagement and effective utilization of men, machines, materials for revenue generation and stopping steep drainage of cash flow from economy of nation. This research will revolutionize to aerospace industrialists and manufacturers by focusing on, time reduction, cost reduction, quality improvement for high business growth in manufacturing. The growth in business can be done by enhancing productivity with respect to lowering manufacturing time and lowering manufacturing cost of aircraft, helicopters, satellite, rockets, space shuttle etc. The effectiveness of time reduction and cost reduction of detailed and critical components are the prime concerned parameters for productivity enhancement as well as business growth in aerospace manufacturing industries.

Index Terms- Manufacturing cycle time, Cycle cost reduction, Critical components, productivity, sustainability, aerospace industries.

I. INTRODUCTION

Aerospace industries are the industries of aircraft, helicopter, satellite, rockets, missiles, space shuttle etc. These industries manufacture the detail parts and critical components of aerospace machines which are assembled to fabricate the flying machines. Manufacturing in less time propel the cost reduction and enhance the productivity and business growth in aerospace segment. Manufacturing cycle cost is based on time elapsed at the rate of cost per unit time to manufacture, to move, to be in queue and to be inspected through manufacturing processes and value added in raw material. Manufacturing cycle time reduction is a very much challenging task for aviation and aerospace manufacturing organization. It has a confluence of

many intricacies, factors, complex interaction of time elapsed in operations. If labour time be reduced, the delivery time also will be intently reduced, by reducing of different machining operations time. Reduction in operation time will lead reduction in delivery of helicopters, aircraft, satellite, rocket to our customers. This research will give a direction and guidance to manufacturers and industrialist as to how reduce the manufacturing time and cost under operations of machine, inspection, movement, queuing during manufacturing for detail and critical components of aircraft, helicopter and other aerospace flying machines. Cycle time consists of set up time, machine processing time, quality inspection time, transportation or move time and waiting time for loading in machine to machine.

The possibilities of manufacturability will be enhanced by emerging technology and new breakthroughs as artificial intelligence, robotics, Internet of Things, autonomous vehicles, 3-D printing/ additive manufacturing etc. They collect huge amounts of data from smart sensors through cloud computing for manufacturing of critical components and Industrial internet of things-IIoT which helped the manufacturing system to improve the efficiency of manufacturing design, machinability, supply chain of raw material and semi-finish components on machines and manufacturing production by time reduction and cost reduction. The applications of Industry4.0 and lean that have changed the manufacturing world. We have used it for aerospace manufacturing components also and found the results in data analysis later. A reduction in time and cost can emerge the opportunities for enhancing the productivity and emerging global business of aerospace manufacturing sector.

Productivity is the reduction of wastage in resources of men, machine, material, method, money, space etc in functional and operational premises. It is the ratio of output and input in same parameter of resources as man performance or man efficiency in term of man hour or standard man hour and machine performance or machine efficiency or machine utilization in term of utilized time w.r.t available standard time. We are more focused and concentrated in manufacturing time and cost reduction through optimizing the processing time, movement time, queuing time, inspection time during manufacturing. We have reduced both time and cost during manufacturing process and have improved the quality also.

Rational of study: At present scenario, the operational cycle time of components of helicopter, aircraft, satellite and rockets is very challenging. The components which are installed for functioning in different critical stage of helicopter, aircraft, aviation machines under critical conditions of functional run. Critical components are long cycle items; it takes more time to manufacture than other components. The significance of Critical components is much higher than other components with respect to functional sustainability and bear ability. More than 50% of total time of any aerospace flying machine is concentrated in manufacturing of critical and long cycle components; these are very high in weight, huge in volume and big in dimension & size. Thus operational cycle time is directly involved as a high gradient factor in term of time elapsed for aerospace flying machines. These components are very important during manufacturing because these have to work under high tension, compression, rotary dynamics and thrust condition. So its cost-effectiveness manufacturing is also required essentially to propel aerospace business. Every nation in the world is currently fighting with challenges in aerospace manufacturing. Every country has more and more demand of aerospace flying machines as aircraft, helicopter, satellite, rocket, space shuttle etc. Our aerospace industries are not able to match the supply of requisite demand of customers as of different nations. We know even all world class aerospace manufacturers as Boeing, Air bus, Euro copter, Bell, Rolls Royce, Lockheed Martin, Bombardiers, HAL etc. are far behind of their demand to supply to their customers. This is because of not able to manufacture these detailed and critical components on time as per demand of assembly line and spare demand for maintenance.

The raw materials which are loaded on machines to machining, manufacturing, fabricating as per design and drawing of intricate dimension with tolerance. As we know manufacturing depend on their manufacturing cycle time, manufacturing cycle cost, quality, risk to design and re-design for manufacturability as of having different contours and profiles with sophisticated dimension and tolerance. Component's manufacturing is the back bone of aerospace industries. The reduction in manufacturing time and manufacturing cost with maintaining the standard aerospace quality to mitigate the risk during manufacturing in material flow line. It is a propelling force for productivity of flying machines such as helicopters, aircrafts, satellite, rockets, space shuttles etc in aerospace manufacturing industries.

Literature Review: A lot of literature review has been done on manufacturing time, cycle time, lead time reduction as:

This framework provides an easy tool to industrial practitioner; they can use to determine a course of action to reduce manufacturing throughput time per part in their own plants by Danny

J. Johnson, 2003 [1]. The framework is detailed to provide a direction and guidance to manufacturers to reduce throughput time. A flexible manufacturing system (FMS) consists of a set of workstations, capable of performing a number of different operations, interconnected by a transportation mechanism, (Joseph G. Kimemia, 1983 [2]). The setup time of machine, processing time on part, and move time of material or work in progress are independent of each other (i.e., a reduction in move time does not affect setup time or processing time per part, and so on), changes in any of these components of times, can affect the waiting time by Hyer and Wemmerlöv 2002 [3]. Waiting time is usually the largest of the four components, accounting for as much as 90% of manufacturing lead time in some systems by Houtzeel 1982 [4]. In Setup Time Reduction, the dedication of Workstation and family scheduling can also reduce the number of setup and its setup time of machines. Further information on improving setup procedures can be found in works by (Shingo, 1985 [5]). In Arrival variability, when workstation's machine utilization is low then departure variability is reduced as by increasing the number of identical resource at the workstation by Hopp and Spearman, 2001 [6]. By applying 5s, waste can be reduced. Waste could be in the form of scrap, defects, excess raw material unneeded items, old broken tools, and obsolete jigs and fixtures by Monden, 2012 [7]. The establishment of quality improvement efforts during manufacturing sector are delineated by Juran, 1999 [8]. Review on Cycle Time Reduction in Manufacturing Industries by Hiten Patel & Sanjay C. Shah, 2014 [9]. The initiation of effective preventative maintenance programs can be implemented for machines availability by Schonberger, 1996 [10] Reductions in manufacturing throughput time increases

flexibility and respond to customer orders supply on time by Raj Mohan R & V.Senthil Kumar, 2013 [11]. Time to be measured as per operation or activities where machine and man are working, Taylor, 1985 [12]. "Industry 4.0 is the fusion of these technologies [AI, big data, IoT] and their interaction make the Fourth Industrial Revolution", World Economic Forum Klaus Schwab.[13]. Cost reduction by work study, method study,time study, bottlenecks of work study and work sampling or activities sampling are used in textile industries where similar machines, similar works on similar tasks are employed, Gopalakrishnan,

P. P. (1992),[14].Today global competitive environment has enforced manufacturing practitioners to deliver low-cost, high-quality products. Ghodsi, R. (2012),[15].Costing the value stream through lean manufacturing, Patrix, J. L. (2013)[16]. Overall Equipment Effectiveness is used as the measure of success of TPM implementation and losses for associated equipment effectiveness All the pillars of TPM are implemented in a phased manner eliminating the losses and thus improving the utilization of CNC machines. Singh, R. (2013),[17].Global market and increased competitiveness have driven companies to seek methods and tools that make them more competitive and have forced the manufacturing systems to able to react to demand changes to improve the production system through the reduction of time and costs. Helleno, A. L. (2015),[18].The extensive field of cost estimation for aerospace composite production, describing the basic methods of how to perform cost estimation and introducing some of the existing models for aerospace composite manufacturing with several strength, Ch. Hueber, K. H. (2016),[19].Aviation capital assets are characterized by huge Capital, long pay-off period, deep technology and maintenance intensive over their life cycle. Capital Investment Strategies for Target Revenue Generation under Performance Based Contracting for Aviation Assets through use of evolutionary algorithms, Vagrecha., G. S. (2016), [20]. The optimization in VSM is often verified by computer simulation (CS) before actual implementation in the factory. The two approaches imply in a different underlying way as a deterministic flow of material against a conceptual model of production stochastic queuing network. Dario Antelli, D. S. (2017),[21]. Product, operation, and route flexibility, as well as the starting-up and development flexibility assurance methods are described. The manufacturing systems classification based on the combination of different flexibility forms and its level is provided. Kapitanov, A. (2017),[22]. Lean manufacturing is an optimum approach for the reduction and elimination of waste within an organization. K.P. Lusiba, M. D. (2018),[23]. MOVE Measure was the new metrics that determined the transportation efficiency in terms of availability, performance and quality, all the factors being expressed in percentage. Cornelia, M. (2018),[24]. Line balancing was done to improve the cycle efficiency by reducing the no of work stations and thereby decreasing the manpower required. Sreekumar. (2019),[25]. The role of Industry 4.0 technologies on the relationship between lean production (LP) and operational performance improvement within Brazil, a developing economy context. LP practices help in the installation of organizational habits and mindsets that favor systemic process improvements, supporting the design and control of manufacturers' operations management towards the fourth industrial revolution era. Tortorella, G. L. (2019),[26].The applications of Additive Manufacturing (AM) have been grown up rapidly in various industries in the past few decades. Among them, aerospace has been attracted more attention due to heavy investment of the principal aviation companies for developing the AM industrial applications. Annamaria Gisarioa, M. K. (2019),[27].

GAP-1- Most authors have done work in different field such as automobile, steel plant, supply chain etc but not much in aerospace manufacturing as per available literature.

GAP-2: Being critical aerospace components, many more processes are involved than manufacturing of other sectors as automobile, agriculture, steel plant, food processing etc

GAP-3: There are not much available literatures which are focusing on time –cost conversion in aerospace field and also for critical components manufacturing area. This is for conversion of time into cost of activities/operations in manufacturing management system as on material flow from raw material loading on machine to finished product.

Research objective:

- 1) Analysis of manufacturing cycle time and cost for each operation.
- 2) Analysis of manufacturing cycle time of a component along all operations.
- 3) Analysis of manufacturing cycle cost to manufacture the entire components operations wise.
- 4) Analysis of queuing time and queuing cost.
- 5) Analysis of processing time and processing cost.
- 6) Analysis of inspection time and inspection cost.
- 7) Analysis of move or transportation time and transportation cost.

Research Methodology/ Data Collection/ Proposed Tool and Analysis:

Data collected for components of an aerospace machine of ABC aerospace industry and apply different approaches and methodologies towards objective of research.

Approaches/Tool/ Methodologies:

-) Lean Manufacturing concept (5'S & 8-Waste)
-) GT-Group Technology
-) U-cell formation
-) Toyota production system
-) Industry4.0 (Robotics, automation, IIOT used on advance machines through satellite servers for manufacturing).

-) CAD/CAM/CAE application
-) TPM- Total production maintenance
-) Resource effective utilization

Correct scheduling, material planning and operational planning is required to reduce the preparation time. More quantity of same kind of components in size and profile whose operation is same or similar, which have less number of batches and set up times are required to design to use for similar manufacturing processes. It may lead to consume less operational cycle time by self-inspection of machine operator, inspection done by machine itself as CMM-co-ordinate measuring machine, one piece flow concept, U-cellular concept in cell, a progress-person are available for immediate movement of parts/materials etc. It helps to reduce queuing time. An inspector at last of U-cell is arranged to inspect final product as well.

On above fixed condition, we have observed the existing manufacturing cycle times which are reduced to as arrived manufacturing cycle time against all operation and activities through observation before tool applied and after tool applied on conventional machines. The tool technology and concurrent method engineering are applied to reduce the operation cycle time by using high version of machines which uses industry 4.0 tools, server data and cloud computing data. Unit set up time is reduced by advance programming in machines. Manufacturing operation time is reduced as per feasible design with ease manufacturing for complicated contour and profile of components. We have used below formula to find unit set up time during manufacturing. It will be used to calculate unit set up time of machines and found value which are in data table.

Manufacturing unit set up time = $\frac{\{(\text{Programming time} + \text{tool set up time}) \times \text{No of batches change}\}}{\text{Total quantity}}$.

We have used the above formula in data collection, data analysis and interpretation of results. It is developed as below analytical logic.

- 1) Unit set up time is reduced, if quantity is increased,
- 2) No of set up's time is reduced, if we use CNC machine instead of conventional machine,
- 3) Programming time is reduced, if we use CNC machine instead of conventional machine/ Numerical controlled machine.
- 4) No. of passes based on material grains and its dimensional size for cutting or machining. It is required for rough cutting and achieving final dimension as per drawing. The more pass is required for achieving final dimension of critical components.

The philosophy of productivity can be improved by creative and innovative design with low cost manufacturing with high quality and low rejection of detailed and critical components. Each and every renovating and innovative step are advancing productivity in aerospace manufacturing and growing business of aircrafts, helicopters, satellites, rockets, space shuttles etc. All requisite influencing factors are as time, cost, quality, risk mitigation which thrust productivity and business growth in competitive market of aerospace sector across the world. Most effective utilization of resources as men, machines, materials, money, process, methods with latest and cutting edge technologies thrust to the manufactured aerospace flying machines business.

It addresses to objective of research in aerospace industries with efficient and effective utilization of tools and techniques. The entire requisite as of Self-reliance, contemporary concurrent engineering tools and techniques, technology and skill men power with self-ability will increase levels of aerospace manufacturing capability. The creative design, least space utilization for installation of machine etc. that can also add value to yields high rate of revenue generation. We are using different technical method to improve productivity via value stream mapping of man, machine and process of machining operations. We are highly focused on time utilization of men and machines properly by job analysis, job evaluation, merit of methods, men and machines. The technology based methods which are as CAD, CAM, CAE, JIT, GT, TQM and Robotics etc. It helped in cost effective manufacturing and high rate of manufacturing production. The higher productivity will ensure the stability of aerospace and aviation industries in future. The higher volume of production increases rate of production and high revenue generation through business. The time reduction and cost reduction of components manufacturing will be happened by applied tool technology, high version machines and skilled man power.

We have applied different tools to enhance the productivity and business growth as below.

- Suitable product design for high vision so that not happen frequent product change.
- Standardization of material and product.
- Optimal machining parameter of machines is as speed, feed and depth of cut.
- Proper machine layout and plant layout to restrain unnecessary and avoidable movement of machine and material.
- Visionary, standardized method, standardize process to manufacture the components.
- Product varieties should be limited because if demand fails, it cannot run through high salvage cost of labour and material due to their non-matured design and non-standard process of manufacturing.
- Industry should run through not shortage of material, jig and fixture etc.
- High reliable manufacturing machine, associated devices to avoid frequent failure of machines in manufacturing management system.
- Control the idleness of men and machines, power failure of electricity, mechanical break and electrical break down of machines.
- Energy saving in machine shop means not consume energy unnecessary as a waste.
- Hygienic, ergonomic and safety covered manufacturing and working environment.

Data are collected at machine shop from ABC aerospace companies, associated suppliers & vendors and are morphed. The following data are taken for manufacturing of Rod Piston which is a critical component of hydraulic system for pressure transmission to operate and close to the system. It is used in the most of systems of aerospace, aviation and aeronautical machines. Therefore a similar part family components can be manufactured as per optimized way to reduce total cost of aerospace machines and this could be cost effective and time reductive way in manufacturing process by manufacturers across world and tools can be applied for any components.

1. Rod Piston : Conventional machine +Tools apply)

Machines, Bench	Operations	Set up time (Min)	After tool apply, Set up time (Min)	Machine run time (Min)	After tool apply, Machine run time (Min)	Existing Manuf Time = Set up time + Machine run time (Min)	Arrived Manufacturing & operation after tools Improvem ent in Existing manufacturing system) (Min)	Difference between Existing and Arrived time	MHR or Machine Rate (Rs/Hr)	Existing Manufacturing cost= Existing manufacturing time (in Hrs) X MHR (in Rs) Existing operationa l cycle cost (In Rs)	Arrived Manufacturing cycle cost= Arrived operational time X MHR (in Rs)	Cost reduction = [Existing cost - Arrived cost] (In Rs)	% Cost reduction = [(Existing cost)/ Existing cost]* 100 (In %)
Cold Saw Lath	Cut as per requisite length	30	20	6	5	36	25	11	246	148	103	45	31
Conventional Lath	Hold in chuck and turn as per IS.	60	45	26	16	86	61	25	246	353	250	103	29
Conventional Lath	Hold in soft jaw and turn as per IS.	60	46	35	20	95	66	29	246	390	271	119	31
Deep hole drill	Gun drill of different dia as per IS	75	55	60	45	135	100	35	552	1242	920	322	26
Conventional Lath	Hold in soft jaw and form changes as per IS.	60	48	50	35	110	83	27	246	451	340	111	25
Conventional Lath	Hold in soft jaw and turn as per IS.	60	47	105	85	165	132	33	246	677	541	135	20
Conventional Lath	Hold between centers and turn as per IS	60	46	35	25	95	71	24	246	390	291	98	25
Conventional Lath	Hold in soft Jaw and turn as per IS.	60	49	10	8	70	57	13	246	287	234	53	19
Center hole Grinder	Clean Centers as per IS.	60	44	11	7	71	51	20	591	699	502	197	28
Cylindrical grinding	Grind as per IS	60	48	120	90	180	138	42	591	1773	1359	414	23
Drilling m/c	Load in drill Jig and carry out as per IS.	60	45	32	22	92	67	25	224	343	250	93	27
Bench	Form chamfer as per IS.	10	8	50	40	60	48	12	80	80	64	16	20

Vertical Milling	Hold in fixture and mill slot as per IS.	60	46	20	15	80	61	19	254	339	258	80	24
Bench	Deburr and mixed up steps.	5	4	35	21	40	25	15	80	53	33	20	38
Center hole Grinder	Clean center and facilitate further operations.	60	48	15	9	75	57	18	591	739	561	177	24

Vertical Milling	Hold in fixture and mill as per IS.	60	47	12	8	72	55	17	254	305	233	72	24
Bench	Deburr and mixed up the sharp edges in the slot.	60	45	20	14	80	59	21	80	107	79	28	26
Center hole Grinder	Clean centers.	60	46	15	9	75	55	20	591	739	542	197	27
Cylindrical Grinding	Hold in split bush and grind.	60	47	165	140	225	187	38	591	2216	1842	374	17
Cylindrical Grinding	Hold in split bush and grind as per IS.	60	48	30	21	90	69	21	591	887	680	207	23
Bench	Debur and break sharp edges.	10	8	20	12	30	20	10	80	40	27	13	33
Bench	Part numbering	5	4	3	2	8	6	2	80	11	8	3	25
TOTAL		1095	844	875	649	1970	1493	477		12266	9388	2878	23

We have done data analysis from tables and modeling charts to see the result as per objective as below:

Table-1

	Time & Cost
Set up time (Min)	1095
After tool apply, Set up time (Min)	844
Machine run time (Min)	875
After tool apply, Machine run time (Min)	649
Existing Manufacturing Time= Set up time + Machine run time (Min)	1970
Arrived Manufacturing time against m/c & operation after tools applying.(Improvement in Existing manufacturing system) (Min)	1493
Difference between Existing time and Arrived time	477
Existing Manufacturing cost= Existing manufacturing time (in Hrs) X MHR (in Rs) or Existing operational cycle cost (In Rs)	12266
Arrived Manufacturing cycle cost= Arrived operational time X MHR (in Rs)	9388
Cost reduction =[Existing cost- Arrived cost] (In Rs)	2878
% Cost reduction =[Existing cost- Arrived cost]/Existing cost]*100 (In %)	23

Chart-1

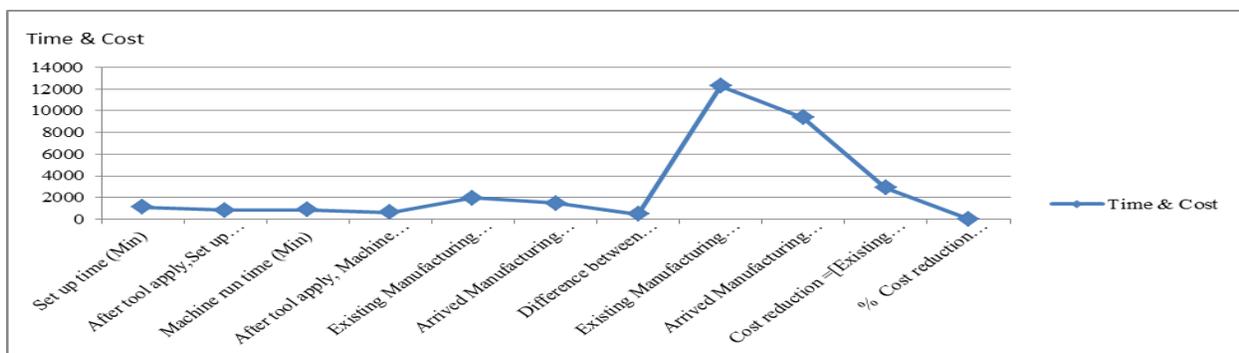


Table-2

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	Existing	Arrived after tool apply
Set up time (Min)	1095	844
Machine run time (Min)	875	649
Manufacturing Time= Set up time + Machine run time (Min)	1970	1493
Manufacturing cost= Existing manufacturing time (in Hrs) X MHR (in Rs) or Existing operational cycle cost (In Rs)	12266	9388

Chart-2

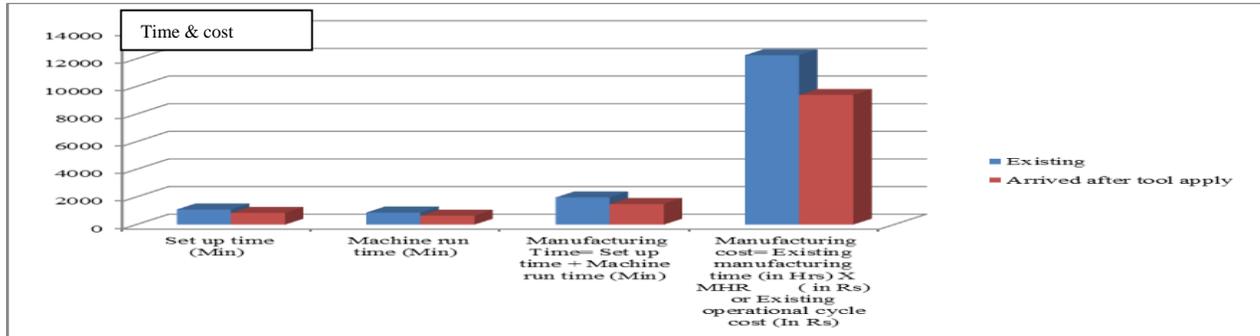


Table-3

	Time (Min)
Existing Manufacturing Time= (Set up time + Machine run time) (Min)	1970
Arrived Manufacturing time against m/c & operation after tools applying.(Improvement in Existing manufacturing system) (Min)	1493
Difference between Existing time and Arrived time	477
% of Average Time reduction = [(Existing time- Arrived time)/Existing time]*100 (In %)	24

Chart-3

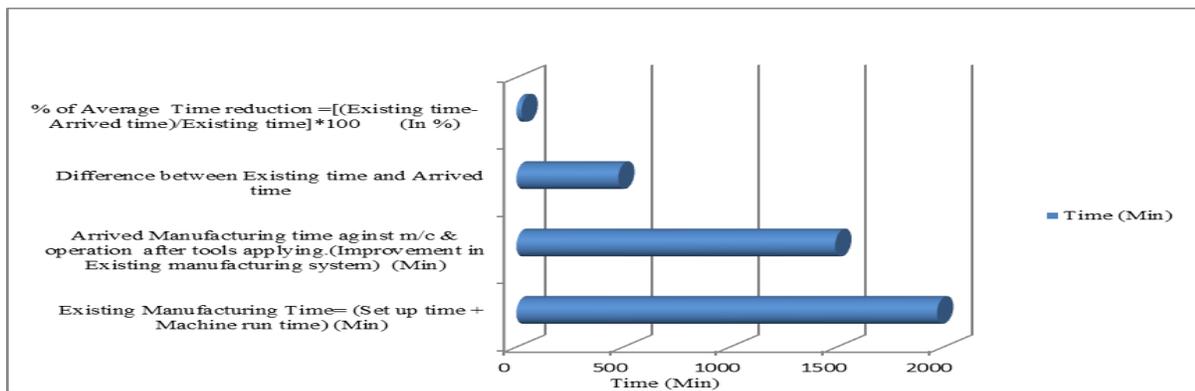
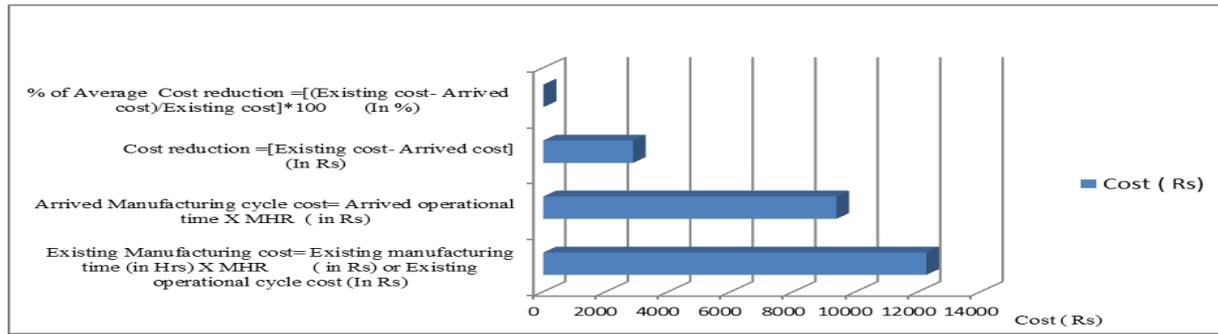


Table-4

	Cost (Rs)
Existing Manufacturing cost= Existing manufacturing time (in Hrs) X MHR (in Rs) or Existing operational cycle cost (In Rs)	12266
Arrived Manufacturing cycle cost= Arrived operational time X MHR (in Rs)	9388
Cost reduction = [Existing cost- Arrived cost] (In Rs)	2878
% of Average Cost reduction = [(Existing cost- Arrived cost)/Existing cost]*100 (In %)	23

Chart-4



We have measured the time and established a correlation with basic machining time by observation of activities as movement time (M=@30% of B.T), Queue time (Q=@25%of B.T), Inspection time (I=@20%of B.T).where B.T is basic time. This is based on after measuring the value and established the relation among them.

Table-5

Operations / Activities	Existing	Arrived after tool apply
Total Manufacturing operation Cycle Time= (Total machine set up time+ Total machine run time) (In Min)	1970	1493
Movement time= @30% of Basic total time (In Min)	591	448
Queue time or Waiting time = @25% of Basic time (In Min)	493	373
Inspection time = @20% of Basic time (In Min)	394	299
Total MCT (In Min)	3448	2613

Chart-5

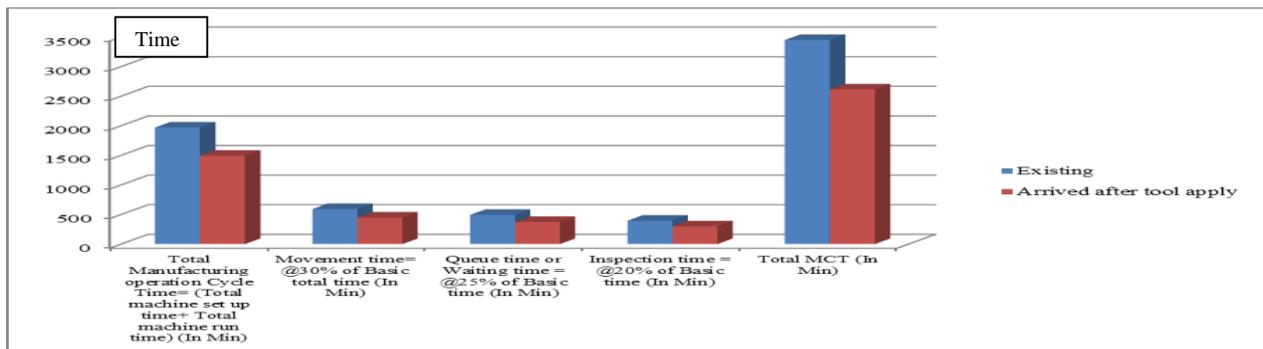


Table-6

Operations / Activities	Existing	Arrived after tool apply
Manufacturing Cycle Cost (MCC) (In Rs)	12266	9388
Movement Cost = Movement time/60 x SMHR @ Rs 1020	10047	7614
Queue Cost or Waiting Cost = Queue or Waiting time/60 x SMHR @Rs 1020 (In Rs)	8373	6345
Inspection Cost = Inspection Time/60 x SMHR @ Rs 1020 (In Rs)	6698	5076
Total MCC (Rs)	37383	28424

Chart-6a

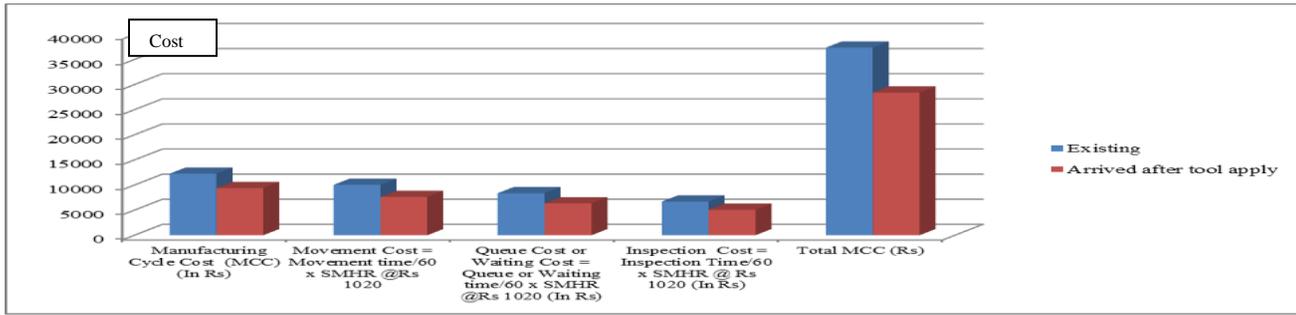


Table-7

Time & Cost	Existing	Arrived by tool apply
Total MCT (Min) = (Manufacturing time+ Movement time + Queue time + Inspection time)	3448	2613
Total MCC (Rs) = (Manufacturing operation cost + Movement cost + Queue cost + Inspection cost)	37383	28424

Chart-7

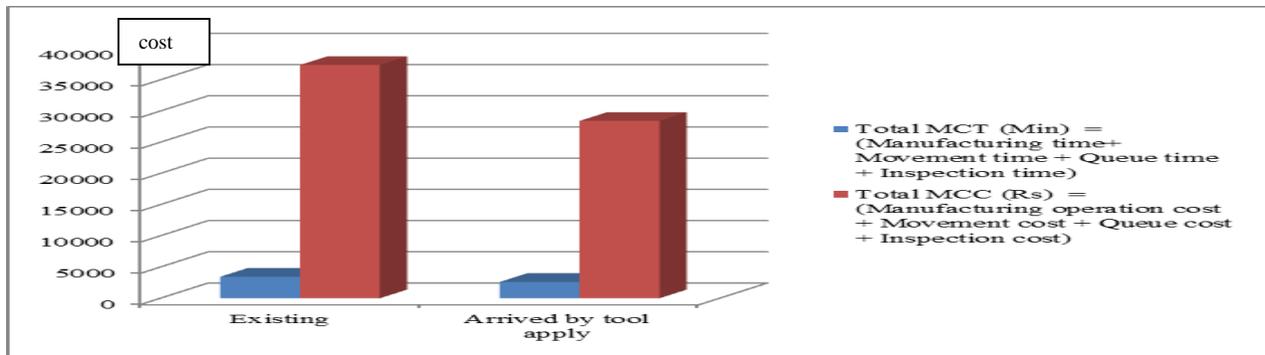


Table-8

Operations	Existing time (In Min)	Arrived Time after tools applying (In Min)	Existing cost (In Rs)	Arrived cost after tool apply (In Rs)
Total Manufacturing Time & Cost by Machines as (MCT & MCC) (In Min & Rs)	1970	1493	12266	9388
Movement Time & Cost (In Min & Rs)	591	448	10047	7614
Queue Time & Cost (In Min & Rs)	493	373	8373	6345
Inspection Time & Cost (In Min & Cost)	394	299	6698	5076
Total MCT & MCC (In Min & Rs)	3448	2613	37383	28424

Chart-8

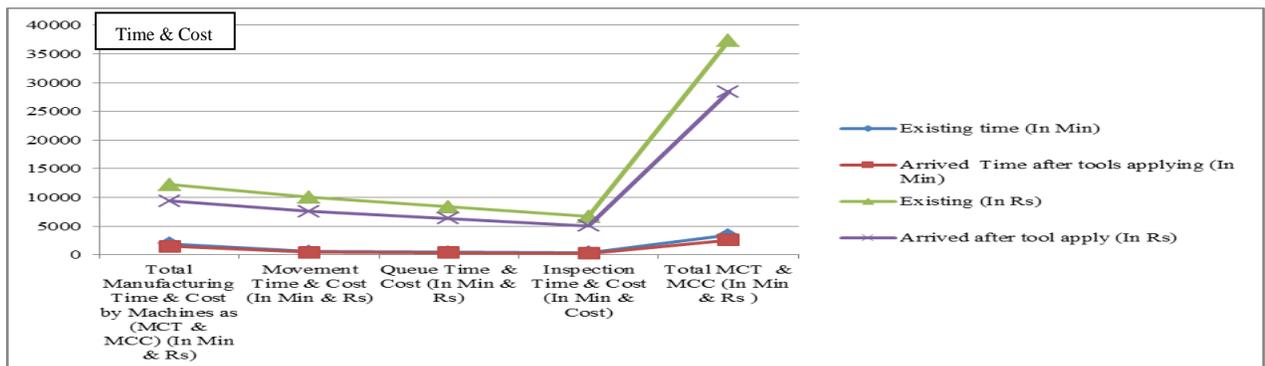


Table-9

Operations	Existing time (In Min)	Arrived Time after tools applying (In Min)	Existing cost (In Rs)	Arrived cost after tool apply (In Rs)
Total MCT & MCC (In Min & Rs)	3448	2613	37383	28424

Where- [MCT-Manufacturing Cycle Time, MCC-Manufacturing Cycle Cost] The productivity w.r.t time and cost is occurred as:

Productivity w.r.t time = [Existing Manufacturing Cycle Time/Arrived Manufacturing Time].

$$= 3448/2613 = 1.32 = [1+0.32].$$

It means manufacturing productivity is increased by 32% w.r.t time.

Productivity w.r.t Cost = [Existing Manufacturing Cycle Cost/Arrived Manufacturing Cost].

$$= 37383/28424 = 1.32 = [1+0.32].$$

It means manufacturing cost productivity is increased by 32%. In another word, we can say the amount of reduced time produces extra component by 32% so that the reduced cost can boost business growth by 32%. The amount of cost reduction in manufacturing enhance the revenue generation for extra portions towards business growth.

Findings/ Results/Inferences:

- 1) The manufacturing cycle cost is reduced.
- 2) The operational cycle time is reduced.
- 3) Enhanced productivity and business growth of components as well as integrated aerospace machines.
- 4) Reduced the idle time of man and machines during manufacturing activities and stages.
- 5) Man power is reduced for prefixed existing load on machines.
- 6) The movement of components is reduced.
- 7) To deliver the components as aerospace machines to customer on time or in less time.
- 8) Reduced the movement time and movement cost.
- 9) Reduced the queue time and queue cost.
- 10) Reduced inspection time and inspection cost.
- 11) Reduced total manufacturing cycle time and total manufacturing cycle cost.

Limitations:

- 1) High capital is involved to execute the layout change, revival of old machines and purchasing high capital machines.
- 2) Space constraint is there in cell or near to machine shop, to set up the low cost and small sized heat treatment shop and processing shop.
- 3) Skilled operators are required for CNC machine.
- 4) Heat treatment shop & process shop should be in order or just near to machine shop to reduce the movement time of material for concerned operation.
- 5) Provisioning of high cost machines.
- 6) Lack of budget allocations for new technology and advance machines.

Significance of study and Contribution to nature of research:

- 1) It gives a model of philosophy and awareness to focus on details/critical components to optimize entire activities during manufacturing w.r.t time & cost reduction, quality improvement and waste reduction.
- 2) Requirement of focusing on initial design phase of aerospace components w.r.t manufacturability which can refrain from 80% loss of cost by immature designed in aerospace sectors.
- 3) Cost reduction and time reduction is occurred.
- 4) Timely delivery of aviation components is possible to customers.
- 5) Quality can be enhanced by applying CAD, CAE & CAM technology.
- 6) To reduce and control the excess hours which are used in conventional machine or older machine of all kinds.
- 7) Improve productivity of aviation and aerospace machines production.
- 8) Lead time reduction for components and assembled aircraft/helicopter/satellites/rocket in industries.
- 9) Reduce engineering personal requirements in organization.
- 10) Reduced manufacturing cost of entire assembled flying machines or their detail components.
- 11) Enhanced the productivity and sustainability of business growth in aerospace industries due to manufacturing cycle time reduction and cost reduction of critical components and non-critical components.

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AUTHORS

First Author – Sita Ram Sahni, Research Scholar, Indira Gandhi National Open University, New Delhi, India

Second Author – Dr. Kamal Vagrecha, Professor, School of Mgt. Studies, Indira Gandhi National Open University, New Delhi, India

Drug Utilization Study On Antibiotics In The Department Of Medicine At A Tertiary Care Hospital: A Retrospective Observational Cohort Study

Dr. Anjana Ashokan¹, Dr. Keziah Ann Charly², Dr. Meenakshi Anand B³, Dr. Sakkeer Hussain⁴, Cijo George⁵

^{1,2,3,4} Pharm D, KVM College of Pharmacy, Kokkothamangalam, Cherthala, Kerala, India

⁵ Associate professor, KVM College of Pharmacy, Kokkothamangalam, Cherthala, Kerala, India

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Abstract- Objective: The aim of the study was to evaluate the utilization and prescription pattern of antibiotics in the department of general medicine for ensuring the rational drug therapy. **Method:** A retrospective observational cohort study was conducted over a period of six months in a tertiary care hospital enrolling 250 patients. Case records were retrospectively reviewed for the demographic data, clinical presentation, investigational management and outcomes. Data analysis were conducted using Microsoft Excel 2010, SPSS (Version 1.0.0.1406). **Results:** In the study most commonly prescribed antibiotics were cephalosporins / sulbactam followed by meropenem. Total 13 ADR were reported. The overall cost of prescription was reduced to 19.14% if the proposed alternate 1 category of brands were used and 33.17% reduction with alternate 2 category of brands, which would help in minimizing the patient expenditure.

Conclusion: This study provided an insight into the drug utilization pattern of Antibiotics and the rationality behind the antibiotic usage. ADRs are common occurrence, but are often not recognized, even if they are recognized they are underreported as many are unaware about the clinical importance. The total cost reduction of 19.14% and 33.17% with alternate brands of drugs shows that effective cost reduction strategies could reduce the cost of therapy which will in turn improve patient compliance and reduces the economic burden.

Index Terms- Drug utilisation evaluation, antibiotics, prescribing pattern, adverse drug reaction, Pharmacoeconomics.

I. INTRODUCTION

Drug utilization evaluation DUE is effective method of accessing the appropriateness of various medication used. DUE is a structured process to analyses the pattern of drug administration in various hospital settings. DUE will improve patient outcome by maintaining the interventions. Polypharmacy, irrational drug choice, incorrect drug dose, drug interaction re the contributing factor to increased morbidity, mortality and health care expenses. The antibiotics are the most commonly used class of drug in healthcare settings and they are really important to used optimally otherwise treatment outcome will interfere by resistant pathogen. The inappropriate use of antibiotics may leads increase the development of drug resistance, increased healthcare expenses and serious s adverse drug reaction. DUE can help to access the drug related problems, preventing the development of drug resistance organism and control Pharmacoeconomics of treatment. Therefore this study was planned to identify the prescribing pattern of antibiotic, adverse drug reaction of antibiotic and Pharmacoeconomics of antibiotic.

II. MATERIALS AND METHODS

Study Site: General Medicine Department.

Study Design: Retrospective observational study

Study Duration: 6 Months

Minimum Sample Size Required: 185

III. METHOD

The data was collected retrospectively for 6 months period from general medicine department. Case records was retrospectively reviewed from MRD for demographic data, clinical presentations, investigations, management, adverse reactions, Co-morbidities associated and any interventions. The case records were individually screened to access the prescription pattern of antibiotics. The adverse effect of antibiotic were monitored by collecting the ADR that is already reported and also suspected ADR accessed by clinical pharmacist while data collection.

The DDD is the assumed average maintenance dose per for a drug used for its main indication in adult. DDD/ patient per 100 days of 5 commonly prescribed antibiotics was calculated and it provides the estimate of drugs consumption in the general medicine department.

The cost minimization analysis of most commonly prescribed antibiotics in the general medicine department was accessed by analyzing the prescribed brands of antibiotics prescribed in the hospitals with other brands of the same antibiotics which is manufactured by top 10 pharmaceutical companies in India.

IV. STATISTICAL ANALYSIS

In this study, SPSS was used to compare the cost of prescribed antibiotics to alternatives of same class. Data analyzed using Microsoft excel 2010. Other statistical tools like ANOVA and Chi-square were also used in this study.

V. RESULTS

Among the study population 54% (n=135) were females and 46% (n=115) were males and majority of the patients were in the age group of 41-60years (n=91,36.4%) followed by 61-80 years (n=81(32.4%)). There was no significant difference in the antibiotic exposure (p=0.72316) with respect to age (P value = >0.05).

A total of 14 different types of diagnosis were subjected to antibiotic prescription. The respiratory tract infections (n=181, (58.76%)) was the most common diagnosis for which antibiotics prescribed, out of these 109 cases were COVID 19 followed by urinary tract infection (n=28, (9%)) (**Table no:1**).

The average number of antibiotics per prescription was 1.744 +/-0.875479 (Mean+/- SD). Parenteral antibiotics were mostly prescribed 70.64% (n=308) than oral Antibiotics 29.36%(n=128) (**Table no: 2**).

Among the antibiotics prescribed, Cephalosporin class of antibiotics (n=120,29%) was commonly prescribed followed by carbapenem (n=69, 17%), Macrolide (n=68, (16%)). Among cephalosporin antibiotics, third generation antibiotic Cefoperazone/sulbactam (n=86,(21%)) was widely prescribed followed by meropenem (n=69, (17%)), azithromycin (n=64, (15%)) (**Table no:3**).

13 ADRs were recorded in which 3 were reported ADRs (**Table no:4**) and 10 were suspected ADRs (**Table no:5**). A total of 10 ADRs were with Beta-lactams (Piperacillin + Tazobactam, Cefoperazone + Sulbactam, Ceftriaxone) (76.92%) followed by Macrolides (Azithromycin) 2(15.38%), Aminoglycosides (Amikacin) 1 (7.69%). Most ADRs reported were mild to moderate based on Hartwig scale and found to be possible based on Naranjo's scale. Chi- square test was done to find the association of ADRs with severity and preventability and the results shows that there was a no significant association between the severity. [$X^2(1,13) = 2.3593, P = 0.124541$] and preventability [$X^2(1,13) = 0.96515152, P = 0.325892$] in reported and suspected ADRs (**Table no:6,7**).

The most commonly prescribed 5 antibiotics were classified using the ATC classification system and drug utilization was measured as DDD/patient per 100 days. Cefoperazone+ sulbactam (J01DD62) was the most commonly prescribed antibiotic with DDD/patient per 100 days value (25.55) followed by meropenem (J01DH02) with DDD/patient per100 days value Of 23 (**Table no:8**).

Cost minimization analysis shows a potential reduction in cost of prescription (**figure no:1**), if there was an intervention. The overall cost of prescription was reduced to 19.14% if the proposed alternate 1 category of brands were used and 33.17% reduction with alternate 2 category of brands (**Table no:9**).

Table NO:1 INDICATION FOR ANTIBIOTICS PRESCRIBED

DISEASE	FREQUENCY	%FREQUENCY
Respiratory tract Infection	182	59.0%
Cellulitis	14	4.5%
Renal Disease	14	4.5%
Urinary tract Infection	28	9%

CNS Disorder	6	1.9%
GIT Disorder	25	8.1%
Acute Labyrinthitis	2	0.6%
Gingivitis	1	0.32%
Dengue	18	5.8%
Hepatic Disease	5	1.6%
Leptospirosis	3	0.9%
Sepsis	3	0.9%
CVD	7	2.2%
Total	N=308	100%

TABLE NO: 2 WHO PRESCRIBING INDICATION OF ANTIBIOTICS

PRESCRIBING INDICATORS	RESULT	WHO STANDARD VALUE
Average number of Antibiotics per prescription *	1.744+/- 0.875479	1.6-1.8
Percentage of antibiotics prescribed by generic name*	7.79%	100%
Percentage of antibiotics prescribed by brand name*	92.20%	0%
Percentage of antibiotics from essential medicine list*	81.4814%	100%
Mono therapy of antibiotics	48.4%	<30%
Percentage of antibiotics with injection*	70.64%	20.0-26.8

*WHO core drug indicators, *Mean+/-SD. All other values are represented in percentage*

TABLE NO: 3 COMMONLY PRESCRIBED ANTIBIOTICS

ANTIBIOTICS	FREQUENCY	RELATIVE FREQUENCY
Amoxicillin + Clavulanic acid	8	1.92%
Piperacillin + Tazobactam	51	12.28%
Azithromycin	64	15.42%
Cefoperazone + Sulbactam	86	20.72%
Meropenem	69	16.62%
Levofloxacin	12	2.89%
Amikacin	37	8.91%
Cefoperazone +Tazobactam	1	0.24%
Moxifloxacin	6	1.44%

Cefuroxime	21	5.06%
Clarithromycin	4	0.96%
Linezolid	15	3.61%
Ceftriaxone	3	0.722%
Nitrofurantoin	1	0.24%
Sulfamethoxazole + Trimethoprim	3	0.72%
Clindamycin	5	1.20%
Ofloxacin	1	0.24%
Norfloxacin	7	1.68%
Cefpodoxime	3	0.72%
Doxycycline	2	0.48%
Crystalline Penicillin	2	0.48%
Cefixime	2	0.48%
Cefotaxime	2	0.48%
Cefepime	1	0.24%
Cefalexin	1	0.24%
Rifaximin	6	1.44%
Mupirocin	2	0.48%
Total	N=415	100%

TABLE NO:4 REPORTED ADVERSE DRUG REACTION

Drug	Dosage form	Reaction	WHO CAUSLITY	NARNJO	Severity	Preventability
Amikacin	Injection	Elevated Creatinine	Possible	Possible	Mild	Probably Preventable
Cefoperazone+ Tazobactam	Injection	Rashes	Possible	Probable	Moderate	Definitely Preventable
Piperacillin + Tazobactam	Injection	Rashes	Possible	Probable	Moderate	Probably Preventable

TABLE NO:5 SUSPECTED ADVERSE DRUG REACTION

Drug	Dosage Form	Reaction	WHO CAUSALIT Y	NARANJO	Severity	Preventability
Piperacillin +Tazobactam	Injection	Anemia	Possible	Possible	Mild	Probably Preventable
Azithromycin	Oral	Liver Enzyme Elevation	Possible	Possible	Mild	Probably Preventable
Cefoperazone +Sulbactam	Injection	Anemia	Possible	Possible	Mild	Probably Preventable
Ceftriaxone	Injection	Rashes	Possible	Possible	Moderate	Definitely Preventable
Piperacillin+ Tazobactam	Injection	Elevated BUN	Possible	Possible	Moderate	Probably Preventable

Cefoperazone Sulbactam	+Injection	Elevated Creatinine	Possible	Probable	Mild	Probably Preventable
Cefoperazone Sulbactam	+Injection	Elevated Total Count	Possible	Probable	Mild	Probably Preventable
Cefoperazone Sulbactam	+Injection	Decreases Hb	Possible	Possible	Mild	Probably Preventable
Cefoperazone +Sulbactam	Injection	Diarrhea	Possible	Possible	Mild	Probably Preventable
Azithromycin	Oral	Liver Enzyme Elevation	Possible	Possible	Mild	Probably Preventable

TABLE NO:6 ASSOCIATION OF SEVERITY OF ADR BY CHISQUARE TEST

	MILD	MODERATE	TOTAL
REPORTED ADR	1	2	3
SUSPECTED ADR	8	2	10
TOTAL	9	4	13
CHI-SQUARE TEST			
PEARSON CHI-SQUARE	df	P-VALUE	
2.3593	1	0.124541	

TABLE NO:7 ASSOCIATION OF PREVENTABILITY OF ADR BY CHISQUARE TEST

	MILD	MODERATE	TOTAL
REPORTED ADR	2	1	3
SUSPECTED ADR	9	1	10
TOTAL	11	2	13
CHI-SQUARE TEST			
PEARSON CHI-SQUARE	df	P-VALUE	
0.9652	1	0.325892	

TABLE NO:8 ATC CODE AND DDD/PATIENTS OF MOST COMMONLY PRESCRIBED 5 ANTIBIOTICS

DRUG	ROUTE	DDD (gram)	PDD	ATC CODE	DDD/PATIENT	DDD /patient per day	DDD/ patient per 100 days
PIPERACILLIN TAZOBACTAM	PARENTERAL	14	12.32	J01CR05	1.0420	0.1780	17.80
CEFOPERAZONE SULBACTAM	PARENTERAL	4	4.25	J01DD62	1.248	0.2555	25.55
MEROPENAM	PARENTERAL	3	4.24	J01DH02	1.68	0.2336	23.36
AZITHROMYCIN	PARENTERAL ORAL	0.5 0.3	0.05 0.84	J01FA10	0.956	0.23119	23.119
AMIKACIN	PARENTERAL	1	0.34	J01GB06	0.152	0.0443	4.43

FIGUR NO:1 PERCENTAGE COST REDUCTION COMPARISON

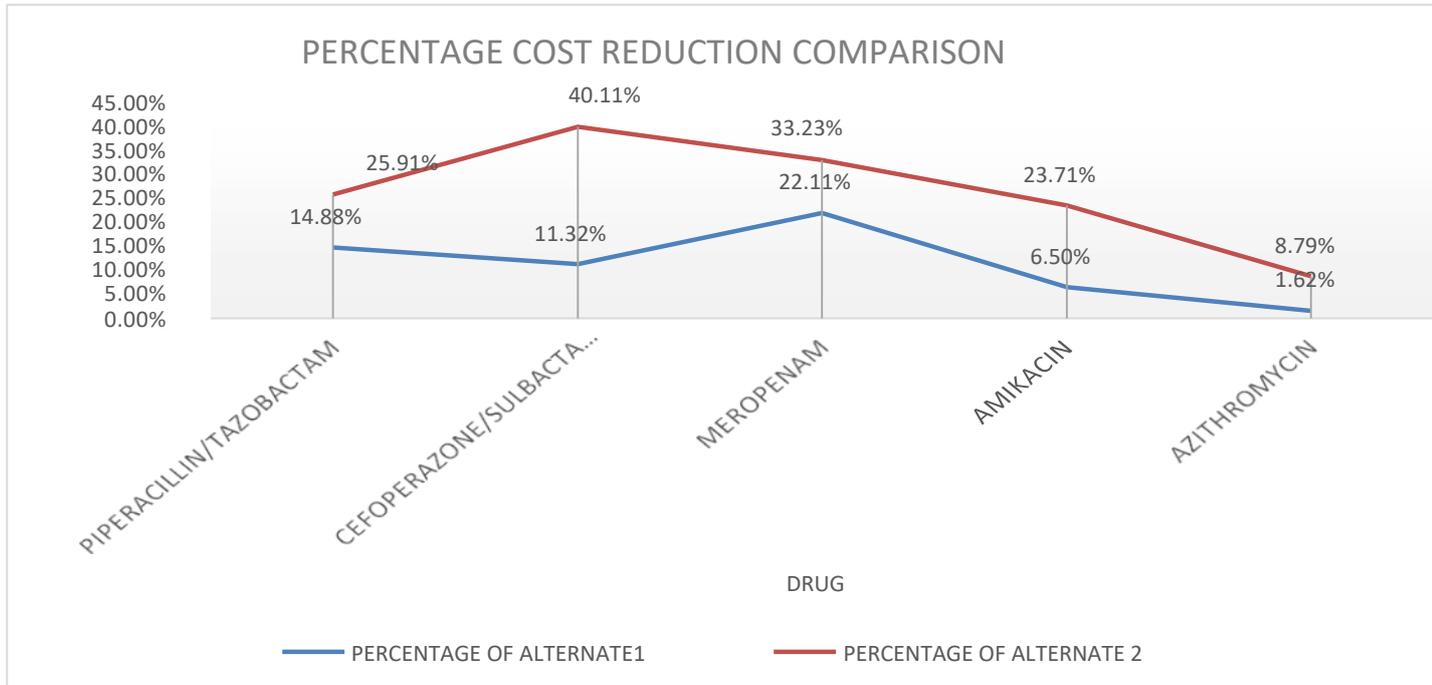


TABLE NO:8 COST MINIMISATION ANALYSIS OF ANTIBIOTICS BY ANOVA

DRUG	Percentage of alternate 1 from actual cost	Percentage of alternate 2 from actual cost	
Piperacillin + Tazobactam	14.88%	25.91%	
Cefoperazone + Sulbactam	11.32%	40.11%	
Meropenem	22.11%	33.23%	
Amikacin	6.5%	23.71%	
Azithromycin	1.62%	8.79%	
Total	19.154%	33.17%	
	Mean Square	F	P-value
Between Groups	0.087385	13.13068	0.000952
Within Groups	0.006655		

VI. DISCUSSION

The current study reveals that majority of the patients (n=91,36.4%) were in the group of 41-60 year, followed by 61-80 year (n= 8,32.4%). Similar study conducted by Hussain M et al (2014) also found that most of prescriptions were in age group of 46-60 years. [6]

In current study, number of antibiotics prescribed were compared with age groups and found that most of the patients belongs to 41-60 years of age. Majority of them were prescribed with 1-2 antibiotics and also compare with groups. The study reports that difference in number of antibiotics consumption was found to be statistically significant (F (2,9) =11.61822, P=0.00321).

The current study report shows total of 14 different types of diagnosis were subjected to antibiotic prescription. The respiratory tract infections (n =181,58.76%) was the most common diagnosis for which antibiotics prescribed, out of these 109 cases were COVID 19 followed by urinary tract infection (n=28,9%). Similar to the study conducted by Chem ED et al (2018), Respiratory tract infection was the main diagnosis for which antibiotics were prescribed. Similar study by Lim Y et al (2012) have also reported respiratory tract infection as the most common indication for antibiotic prescription. [7, 8]

A total of 19 different types of comorbidities were observed from Sample. Out of which 97(32.9%) was diabetes mellitus followed by hypertension 84 (28.5%), hypothyroidism 25 (8.5%). Similar study conducted by Pushpalatha S et al (2020) found that most of the patients had diabetes mellitus and the study conducted by Gowthami et al (2016) was also found to have almost same results. [9,10]

The reports on the antibiotic frequency in patient with comorbidity, it was observed that 1-2 antibiotics were prescribed in 132(83.54%) and 3-4 antibiotics in 24 (16.18%) and 5-6 antibiotics in 2 (1.265 %) patients with comorbid condition. In case of patients without comorbid condition 1-2 antibiotics were prescribed in 72 patients (78.26%) followed by 3-4 antibiotics were 16 (17.39%). Therefore, we can observe that the antibiotics frequency in patients with comorbid condition exceeds the patients without comorbid condition. Similar study conducted by Ternhag A et al (2014) found that comorbidity was a strong factor that determine the number of antibiotic prescriptions. [11]

The Cefoperazone /Sulbactam (n=86,20.72%), Meropenem (n=69,16.62%), Azithromycin (n=64,15.42%), Piperacillin/Tazobactam (n=51,12.28%), Amikacin (n=37,8.91%) were the five most frequently prescribed antibiotics. In contrast, a study conducted by Meher B. R et al (2014) shows piperacillin/tazobactam was the most commonly prescribed antibiotics. [12] The Cephalosporin class of antibiotics were the most commonly prescribed (n=120,28.91%) followed by carbapenem(n=69,16.62%), macrolide(n=68,16.38%), penicillin(n=61,14.69%). This observation was similar to a study conducted by Venugopal D et al (2014) which also found that cephalosporins were mostly prescribed to inpatients. [13]

The average number of antibiotics per prescription ranges from 1.722+/-0.8755279(mean+/-SD). A high rate of prescribing antibiotics using brand name was observed in this study. The average percentage of antibiotics prescribed by generic name, brand name was 7.79%, 92.20% respectively. The percentage of antibiotics prescribed from essential medicine list was found to be 81.4814%. The percentage of parenteral antibiotics use was 70.64% and the study was compared with study by Kanishk K et al (2018) where it was reported that the average number of prescriptions was 8.44. Percentage of drugs prescribed by generic name was 33% of drugs with essential drug list was 66.16. [14]

The majority of the antibiotics prescribed were in the Watch followed by Access, Reserve. Of 25 antibiotics prescribed, 7 were Access,15 is Watch, and 1 Reserve. High consumption of watch-group antibiotics was observed in the study. Similar observation was reported by a study by Nguyen NV et al (2020). [13]

The maximum number of ADRs were reported with Beta-lactams (Piperacillin Tazobactam, Cefoperazone + Sulbactam, Ceftriaxone) 10 (76.92%) followed by Macrolides (Azithromycin) 2(15.38%), Aminoglycosides (Amikacin) 1 (7.69%) which was similar to a study conducted by Dhar K et al (2015) which noted that most ADR were reported by ceftriaxone and therapeutic Class of Antibiotics Implicated to cause ADR was beta lactams. [15]

Out of 13 ADR, 3 were reported (23%) by clinicians (**Table no:4**) and 10 were possible ADR suspected by Student Investigators (**Table no:5**). This observation indicates the role of clinical pharmacist in identifying suspected ADRs. Active involvement of clinical pharmacist and Pharm D students in medication review helps in improving therapeutic outcomes.

An assessment of ADR by WHO causality assessment scale showed possible ADR among the patients which was similar to a study conducted by Dhar K et al (2015) also showed that majority of ADR were possible. Preventability of ADRs was assessed using the modified Shumock and Thornton method. Using the scale, results revealed that 85% ADRs were probably preventable while 15% were definitely preventable. The causality assessment of reported ADRs as per the Naranjo scale and revealed that 69% were possible, 31% were probable, 0% were definite and unlikely. These data correlated with the study of Starveva et al (2008), Priyadharssini et al (2011) which showed that majority of them were possible followed by probable. [16,17]

In this study, it is observed that in reported ADR mild and moderate were 1 and 2 respectively while in case of suspected ADR mild and moderate were 8 and 2 respectively. The result of chi-square shows that there was no significant association between severity and ADRs [$X^2(1,13) = 2.3593, P = 0.124541$]. The result of chi-square test on association between preventability and ADR showed that there is no significant association [$X^2(1,13) = 0.96515152, P = 0.325892$].

The most commonly prescribed 5 antibiotics were classified using the ATC classification system and drug utilization was measured as DDD/patient per 100 days. Cefoperazone+ sulbactam (J01DD62) was the most commonly prescribed antibiotic with DDD/patient per 100 days value (25.55) followed by meropenem (J01DH02) with DDD/patient per 100 days value of 23. In contrast, a study conducted by Patel SR et al (2015) shows that Cefoperazone + sulbactam was the most commonly prescribed antibiotics with DDD/patient per 100 days value of 11.86 followed by amoxicillin + clavulanic acid with DDD/patient per 100 days value of 5.42.

The actual antibiotic cost reduction found in total antibiotics with respect to alternate 1 and 2. The substantial reduction in cost of prescription can be done by performing cost minimization analysis (CMA) for antibiotics. Cost minimization analysis shows a potential reduction in cost of prescription, if there was an intervention. The overall cost of prescription was reduced to 19.14% if the proposed alternate 1 category of brands were used and 33.17% reduction with alternate 2 category of brands. The result could be compared with a study conducted by Sathish VD et al (2019) which observed that 18.4% cost reduced from actual cost and 4.29% overall cost reduction of the prescription.^[18]

The percentage of cost reduction was analyzed and observed that the antibiotic piperacillin + tazobactam had a cost reduction of 14.8% and 25.91% when we use alternate brands 1 and 2 respectively. The antibiotic Cefoperazone + Sulbactam had cost reduction of 11.32% and 40.11% respectively. The antibiotic Meropenem had cost reduction of 22.11% and 33.23% respectively. The antibiotic Amikacin had cost reduction of 6.5% and 23.71% respectively. The antibiotic Azithromycin had cost reduction of 1.62% and 8.79% respectively.

Careful assessment of antibiotic brands has the potential to reduce the cost of antibiotics. Further evaluation and interventions should also consider health outcome such as morbidity, quality of life and mortality.

The influence of CMA in antibiotic were studied using ANOVA. The difference between the alternate 1 and alternate 2 are statistically significant. ($F(2,12) = 11.61822, P\text{-value} = 0.000952$). Similar result was reported by a study conducted by Giwa A et al, (2008).^[19]

VII. CONCLUSION

The purpose of the study was to assess the drug utilization and prescription pattern of antibiotic usage. In our study, 250 prescriptions were analysed according to WHO indicators; ADRs were analysed and cost minimization analysis was done. Cefoperazone /sulbactam was the most commonly prescribed drug. A total of 13 ADRs were found, reported (3) and suspected (10) and were assessed using WHO causality, Naranjo, severity and preventability scales. ADRs are common occurrence but they are not often recognized. Even if they are recognized they are underreported as many are unaware about the clinical importance. The total cost reduction of 19.14% and 33.17% with alternate brands of drugs shows that effective cost reduction strategies could reduce the cost of therapy which would in turn improve patient compliance and reduces the economic burden.

Our results shows that an active intervention by a clinical pharmacist in process of antibiotic prescription will improve the rational use of antibiotics by reducing the cost.

The clinical pharmacist can provide their services by doing clinical interventions, inspecting patient care area and nursing station regarding antibiotics. To maintain a professional competence pharmacist should play an active role by obtaining patients medication history and also maintain accurate reports of antibiotics as a part of DUE to reduce morbidity and mortality and economic burden of therapy. Therefore, Implementation of multidisciplinary healthcare team including clinical pharmacist (Pharm D) will be beneficial to achieve the rational use of medicine, increase patient safety and to contribute for cost reduction related to medical prescribing.

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AUTHORS

First Author – Dr. Anjana Ashokan, Pharm D, KVM College of Pharmacy, Kokkothamangalam, Cherthala, Kerala, India
Second Author – Dr. Keziah Ann Charl, Pharm D, KVM College of Pharmacy, Kokkothamangalam, Cherthala, Kerala, India
Third Author – Dr. Meenakshi Anand B, Pharm D, KVM College of Pharmacy, Kokkothamangalam, Cherthala, Kerala, India
Fourth Author – Dr. Sakkeer Hussain, Pharm D, KVM College of Pharmacy, Kokkothamangalam, Cherthala, Kerala, India
Fifth Author – Cijo George, Associate professor, KVM College of Pharmacy, Kokkothamangalam, Cherthala, Kerala, India

The Effect Of Moral Obligation, Quality Of Service, And Tax Sanctions On Taxpayer Compliance

Abdi Ibrahim., daryanto Hesti Wibowo.

Se, Ak, CA, ACPA, Institute of Social Sciences and Management STIAMI

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Abstract- Compliance in calculating and paying taxes owed, and compliance with payments that need to be socialized continuously to fulfill tax obligations in accordance with applicable rules and regulations. The moral obligation of the taxpayer means that the taxpayer is aware of his tax obligations and arises a feeling of responsibility and is voluntary to pay off his tax obligations. Good service quality from officers raises the intention of taxpayers to pay taxes and affects taxpayer compliance. Tax sanctions are a preventive tool so that taxpayers do not violate tax norms, so that taxpayers become more obedient to existing rules. The purpose of this study is to partially and simultaneously examine the effect of moral obligation, service quality, and tax sanctions on taxpayer compliance at the Pare- Pare Tax Service Office. The novelty of this study compared to previous research looks at internal factors (moral obligations) and external (quality of service and tax sanctions) that affect taxpayer compliance at the Pare Pare Tax Service Office. This research approach uses a quantitative approach. The data collection technique was carried out using a questionnaire method distributed through *google form* and the sample was determined by the Slovin formula so that the total respondents were 99. The data analysis technique used in this study was multiple linear regression analysis. The conclusion of the study shows: 1) moral obligation has a positive and significant effect on taxpayer compliance, 2) service quality has a positive and significant effect on taxpayer compliance, 3) tax sanctions have a positive and significant effect on taxpayer compliance, and 4) moral obligation, service quality, and tax sanctions simultaneously affect taxpayer compliance

Index Terms- moral obligation, service quality, sanctions, taxpayer compliance.

I. INTRODUCTION

Taxes are a very important source of state revenue in supporting financing development. Taxation is one of the most important drivers of economic activity in Indonesia. This can be seen from the increasing target of state revenues originating from tax. Mardiasmo (2016) adds the notion of tax is the people's contribution to the state treasury based on the law (which can be enforced) without getting direct performance rewards (contra-achievement) and which is used to pay for general expenses. To

increase revenue from the tax sector by changing the tax collection system from an official assessment system to a self-assessment system. The implementation of the self-assessment system will be effective if the condition of voluntary compliance in the community has been established. To achieve the tax target, it is necessary to continuously grow awareness and compliance of the taxpayer community to fulfill tax obligations in accordance with applicable regulations. The contribution of taxes in the State Revenue and Expenditure Budget (APBN) is increasing every year. This shows that the role of taxes is getting bigger in the APBN. One of the ways taken is by monitoring the compliance of taxpayers in carrying out their tax obligations. This supervision of tax compliance needs to be improved by, among others, conducting selective examinations of taxpayers (Agita and Noermansyah, 2020). The problem of the level of taxpayer compliance is a problem of concern in the field of taxation. In Indonesia, the level of taxpayer compliance can still be said to be low. The low level of taxpayer compliance to fulfill their tax obligations is very concerning when compared to the level of business growth in Indonesia (Yusro and Kiswanto, 2014). Compliance is one of the important foundations in the development and smoothness of the success of the *self-assessment system* itself. The level of taxpayer compliance can be influenced by three main factors, namely the moral obligation of the taxpayer, service quality and tax sanctions.

The first factor in this study focuses on moral obligations, where it looks at the internal side of the taxpayer itself, how taxpayers have awareness of tax obligations and a feeling of responsibility and voluntary responsibility arises to pay off their income tax obligations in accordance with the rates specified in Law 36 Year 2008 concerning Income Tax. The public must be aware of their existence as citizens who always uphold the 1945 Constitution as the legal basis for state administration. The second factor that will be examined regarding matters that will affect taxpayer compliance is the quality of service. Efforts to increase taxpayer compliance can be done by improving the quality of good service to taxpayers. Increasing the quality and quantity of services is expected to provide taxpayer satisfaction as customers, so that compliance in the field of taxation is also increasing. The last factor that will be discussed in the study This is to see the external impact given by *tax authorities* on the sanctions that will

be given if the taxpayer does not carry out his tax obligations. Taxsanctions are a preventive tool so that taxpayers do not violate tax norms (Mardiasmo, 2016:59).

This study uses a sample of KPP Pratama Pare-Pare as research respondents because according to existing data, taxpayers in the KPP have increased but are not in line with the fulfillment of their tax realization targets. In addition, this study looks at from two sides, namely the internal side and the external side of the taxpayer itself. Moral obligation is an internal side that affects taxpayer compliance while the quality of service and tax sanctions is an external side that affects taxpayer compliance.

II. RESEARCH METHODS

In this study, the research method used is quantitative research because this study uses data collection methods by distributing questionnaires (Sugiyono, 2018). After the data is collected, it will be processed using the SPSS for Windows (Ghozali, 2016). The population, in this case, is an individual

taxpayer who is required to register an annual tax return in 2020, amounting to 874 people at the KPP Pratama Pare Pare. The *non-probability sampling technique* used is *purposive sampling*, the research sampling technique using the Slovin formula so that the total sample in this study is 100 respondents.

III. RESULTS AND DISCUSSION

Table 1. shows the results of classical assumption testing, in this study classical testing was carried out in four ways. Starting from the normality test, continued with the multicollinearity test, the heteroscedasticity test, and finally the autocorrelation test. Where the test results show that the data is normally distributed because the test results are $0.501 > 0.05$. The multicollinearity test showed that there was no multicollinearity as indicated by the *tolerance* for each beas variable greater than 0.10 and the VIF value less than 10. The test results also showed a significance value of RES2 above 0.05, meaning that it was free from heteroscedasticity.

Table 1.
Classic Assumption Test Results

Variabel	Normalit as	Multikolinearitas		Heteroskedastisitas
		Tolerance	VIF	
Moral Obligations (X1)	0.501	0.494	2.034	0.279
Quality Service (X2)		0.344	2.906	0.802
Tax Sanctions (X3)		0.492	2.034	0.510

Sumber: Processed Data, 2022

From table 2. below, it can be seen that the results of regression analysis obtained coefficients for the liability variable

morale is 0.567, for the service quality variable is 0.072, for the tax sanction variable is 0.536 with a constant of 0.475.

Tabel 2.
Multiple Linear Regression Analysis Results

Variabel	Koefisien Regresi	Signifikansi
Moral Obligations	0.567	0.000
Quality Services	0.072	0.043
Tax Sanctions	0.536	0.000
Konstanta: 0.475	$Y = 0.475 + 0.567X1 + 0.072X2 + 0.523X3$	
Adjusted R Square: 0.761		

Sumber: Processed Data, 2022

Based on the multiple linear regression equation in Table 2., the regression line equation is obtained which provides information that: = 0.475 means: the constant coefficient value of 0.475 indicates that if the value of the moral obligation variable (X1), service quality (X2) and the tax penalty (X3) is zero, then the value of Taxpayer Compliance (Y) is 0.475. $X1 = 0.567$ means that if the value of moral obligation (X1) increases by 0.567 then Taxpayer Compliance (Y) increases by 56.7 percent. $X2 = 0.072$ if the value of service quality (X2) increases by 0.072 then Taxpayer Compliance (Y) increases by 7.2 percent. $X3 = 0.536$ if the value of tax sanctions (X3) increases by 0.536 then Taxpayer Compliance (Y) increases by 53.6 percent. From the above

equation, it can be explained that the pattern of influence of the variable moral obligation (X1), service quality (X2), and tax sanctions (X3) on the taxpayer compliance variable (Y) is positive. The positive regression coefficient indicates a unidirectional effect, where if the moral obligation (X1), service quality (X2), and tax sanctions (X3) increases, it will be followed by an increase in Taxpayer Compliance.

The coefficient of determination which has a function to explain the extent to which the independent variables are capable of moral obligation (X1), service quality (X2), and tax sanctions (X3) on the dependent variable (taxpayer compliance). The results of statistical processing assisted by the SPSS 22 program show that the independent variable is able to explain the dependent

variable by 76.1 percent, while the remaining 23.9 percent is explained by other variables that are not included in this model (not studied).

Based on the test results, the t -count 6.782 with a significance of $0.000 \leq 0.05$. This means that H1 is a positive and significant moral obligation on taxpayer compliance at KPP Pratama Pare-Pare. In addition, based on Table 4.11, the partial effect given by moral obligations on taxpayer compliance is 56.7 percent. People who are aware of their existence as citizens who always uphold the 1945 Constitution as the legal basis for the administration of the State, with a moral obligation, will encourage someone to comply in their tax reporting. The results of this study are in line with research conducted by Artha and Setiawan (2016), which in their research provides empirical evidence that moral obligations have a positive effect on taxpayer. Taxpayers who have moral obligations mean having their own awareness without coercion on their obligations to pay off their tax debts, this voluntary awareness will increase taxpayer compliance with the tax burdens that must be paid off. Therefore, the high moral obligation of taxpayers will increase the compliance of taxpayers themselves.

Based on the results of the tests carried out, the t -count was 0.753 with a significant value of $0.043 \leq 0.05$. This shows that this research is able to provide empirical evidence that service quality has a positive and significant effect on taxpayer compliance at KPP Pratama Parepare. In addition, based on Table 4.11, the partial effect of service quality on taxpayer compliance is 7.2 percent. Service is not infrequently a measure of the success of an agency in meeting the wishes of the community. Good service quality can increase taxpayer compliance. Taxpayers in fulfilling their tax obligations are influenced by intentions, where this intention will arise if the expectations of the services provided by the tax officer are in accordance with the expectations of the taxpayer. So if the quality of service provided by KPP is good, it will encourage taxpayers to comply more with their tax obligations. The results of this study are in line with the research conducted by Sarifah et al. (2020) which in his research found that service quality has a positive and significant effect on taxpayer compliance.

Based on the data analysis that has been carried out, the t -count 6.782 with a significance value of $0.000 \leq 0.05$. This means that this study proves that the existence of tax sanctions has a positive and significant effect on taxpayer compliance at the KPP Pratama Pare Pare. In addition, based on Table 4.11, the partial effect of tax sanctions on taxpayer compliance is 53.6 percent. Tax sanctions are a guarantee that the provisions of the legislation will be obeyed or obeyed, in other words, tax sanctions are a deterrent so that taxpayers do not violate tax norms. One way to avoid tax sanctions is to pay taxes on time and do not exceed the stipulated time. This is what drives taxpayer compliance to increase. Taxpayers will fulfill their tax obligations if they perceive that tax sanctions will harm them more. The more violations committed by taxpayers, the more severe the sanctions that will be received.

Looking at the results of data analysis, the calculated t -count 105,222 with a significance value of $0.000 \leq 0.05$. These results show empirical evidence that moral obligations (X1), service quality (X2), and tax sanctions (X3) have a positive and significant effect together on taxpayer compliance at KPP Pratama Pare Pare. In

addition, based on Table 4.12, the simultaneous effect shown by moral obligation (X1), service quality (X2), and tax sanctions (X3) on taxpayer compliance is 76.1 percent. Moral obligations are morals owned by individuals such as ethics, principles of life, feelings of guilt in carrying out their tax obligations but not everyone has them. Moral obligation is one of the internal factors that can affect taxpayers in fulfilling their tax obligations, with good moral principles, taxpayers will be more obedient in paying taxes. In addition, good service quality will be able to increase taxpayer compliance. Taxpayers in fulfilling their tax obligations are influenced by intentions, this intention arises when the taxpayer feels the service quality of the officers is in accordance with their expectations. Coupled with the existence of tax sanctions that make taxpayers respect and comply with tax rules. Taxpayers who are aware of the existence of tax sanctions where if the taxpayer does not fulfill their tax obligations will be more detrimental to themselves, of course, they will understand more about their tax obligations. Therefore, these three things, namely moral obligations, service quality, and tax sanctions affect the willingness of the taxpayer to pay off his tax debt which affects the taxpayer's compliance in paying his taxes.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this study, there are several conclusions that can be conveyed in this research. First, moral obligation partially has a positive and significant effect on taxpayer compliance at KPP Pare. High moral taxpayers will voluntarily report their taxes so as to increase taxpayer compliance. Second, the quality of service partially has a positive and significant effect on taxpayer compliance at KPP Pratama Pare Pare. If the quality of service received by taxpayers is in accordance with their expectations, it will increase taxpayer compliance. Third, partial tax sanctions have a positive and significant effect on taxpayer compliance at KPP Pratama Pare Pare. Taxpayers who understand that tax violations will be subject to sanctions will be more obedient to their obligations to pay off their tax debts. Fourth, moral obligation, service quality, and tax sanctions have a positive and significant effect simultaneously on taxpayer compliance at KPP Pratama Pare Pare. Awareness of taxpayers voluntarily through morals, feeling happy to get service quality as expected, and awareness of tax sanctions can increase taxpayer compliance.

Some suggestions that can be submitted by researchers based on the conclusions that have been presented are as follows: (1) KPP Pratama Pare Pare more often conducts socialization of tax obligations that must be fulfilled by taxpayers, so that taxpayers' voluntary awareness of fulfilling their obligations arises on moral (ethical) grounds. the taxpayer concerned. (2) KPP Pratama Pare Pare provides more complete information regarding the use of *e-forms* because quite a number of taxpayers give low scores on understanding the use of *e-forms*.

(3) KPP Pratama Pare Pare should be more aggressive in conducting socialization regarding the sanctions received by taxpayers if they do not pay off their tax debts (especially interest penalties). (4) The understanding of taxpayers regarding Law 36 of 2008 regarding income tax is further enhanced by providing information or socialization of the regulation by the KPP Pratama Pare Pare.

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AUTHORS

First Author – Abdi Ibrahim., Dr. Daryanto Hesti Wibowo, Se, Ak, CA, ACPA, Institute of Social Sciences and Management STIAMI, Telp author: +62811925661; abdiibrahim22@yahoo.co.id.

Sculptures of Navadurga of National Museum: Illustrative Terracotta Art of Nepal

Lok Nath Dulal, PhD

Associate Prof. Department of Culture
TU, Padma Kanya M. Campus
dulaloknath@gmail.com

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Abstract: *This paper deals with the terracotta sculptures of Navadurga of National Museum. According to Hindu religious texts Shailaputri, Brahmacharini, Chandraghanta, Kusmanda, Skandamata, Katyayani, Kalaratri, Mahagauri and Siddhadatri are the nine manifested forms of goddess Durga or Gauri or Parvati, especially worshipped during the festival of Navaratri where each of the nine manifested forms is consecutively venerated throughout all the nine nights. There are some noteworthy illustrations of Nepalese terracotta art in different museums in Nepal. Out of them, Navadurga icons of national museum are considered as the important specimen in terms of religion, culture, style, skill and technology. In these terracotta images the figures of Shailaputri, Brahmacharini, Chandraghanta, Kusmanda, Skandamata, Katyayani, Kalaratri, Mahagauri and Siddhadatri have been sculptured very beautifully. This paper has been prepared to explore the authentic facts regarding on what are the major iconographic features of the sculptures? and to examine why these sculptures are considered as the importance terracotta art heritage of Nepal? It is based on qualitative approach because it has been prepared on the basis of qualitative data rather than quantitative one. Researcher has used both primary and secondary data in this study. Primary data have been collected by doing field survey in national museum while essential secondary information were collected from journals, books and electronic versions of different sources.*

Key words: Philosophy of Navadurga Cult, Forms, Sculptures, Features, Terracotta Art Heritage.

Introduction

The religious sect which gives high priority and emphasizes to worship the goddesses as the sources of supreme power is called Shaktism. History of this sect can be traced back till to the prehistoric period in the world. The findings images of Venus from *Laussel*, *Kostenki* and *Brassemouy* (Burkitt, 1992, pp. 141-143) are known as the authentic evidences to prove its antiquities. In eastern society and culture *Rigved* is recognized as the oldest literature and source, which mentions the names like *Usha*, *Sabita*, *Shachi* and *Waka*. Later on, since the late Vedic, Sutra, Smriti and Epic period the worship of Shakti was still become popular and developed as a separate cult in Hinduism in Indian sub-continent.

Gradually, in the process of development of religious beliefs, faiths, feelings and emotion different sub-sects like *Saptamatrika*, *Asthamatrika*, *Navadurga* and *Dasa Mahabidhya* have come into existence within Shaktism. According the Hindu Mythology, *Durga* is collective power of nine goddesses who killed the demons including *Mahisasur* and victory over evil power. Then she becomes identified as the goddess *Mahisasurmardani*. While she was fighting with demons, the colour of her face gradually changed into blackish in nature, then due to this event she also known as goddess *Kali*.

As per the Pauranic literature for the purposes of killing, victory over demons power and finally establishing peace and welfare in the divine world, goddesses were evolved in different forms such as *Saptamatrika*, *Asthamatrika* and *Navadurga*. To fulfilling the prescribed goals, during the field of battle goddesses *Navadurga* killed the demons like *Madhukaitab*, *Mahisasur*, *Sumbhanisumbha*, *Chamunda*, *Raktabij*, *Kolasur*, *Lavanasur*, *Gayasur* and *Tarakasur* (Jadhari, 2072, pp. 30-31). After victory over evil power people started to pay and offer obligation to them which caused to be the origin of different sub-sects including *Navadurga*.

From the very early *Durga* had been worshipped as a powerful goddess in the forms of group in Nepalese society and culture. *Navadurga* is her collective name and identity where *Shailaputri*, *Brahmacharini*, *Chandraghanta*, *Kusmanda*, *Skandamata*, *Katyayani*, *Kalaratri*, *Mahagauri* and *Siddhadatri* are included (Sharma, 1999, p. 427). Especially, during the Dashain festival she is paid special honor and worship including animals sacrifice within different communities in the various parts of Nepal (Khatiwada, 2074, p. 608). For paying respect to them, special *Navadurga* dance was brought into practice to perform on the occasion of Dashain festival during the regime of King Raya Malla in *Bhaktapur* (Parajuli, 2063, p. 149).

In Nepal to pay obligation and worship people started to create images of the goddess *Navadurga* from earlier. In this process inhabitants of this holy land have started to use terracotta as the constructions materials of art from the early history of culture and civilization. Though, there were several terracotta images and utensils moulded and constructed through the ages. From the archaeological sites of *Lumbini* and *Kapilvastu* some of the important terracotta specimens were collected during the process of archaeological explorations and excavations, which are displayed in archaeological museum in *Kapilvastu* and National Museum in Kathmandu as well. Thus, along with other deities' goddess *Navadurga* also started to depict on the terracotta sculptures. Today, they finds in an individual and group as well. Among them, this research paper has based and discussed only to the images of goddesses *Navadurga* of national museum.

Problems and Objectives

There are several studies have been conducted concerning on sculpture arts of Nepal, but specific studies on terracotta sculptures of *Navadurga* of national museum, has still not been properly carried out. Due to lacking of adequate studies and researches, several aspects of sculptures of *Navadurga* still remain unexplored. This is considered as the huge problem and research gaps in the field of academia. Specially, what are the major iconographic features of the sculptures? and why these sculptures are considered as the important terracotta art heritage of Nepal? are the major problems which inspire to the researcher. Therefore, to address them, researcher has prepared this research paper with the specific objectives such as to explore and analyze the major iconographic features and examine to them as the important terracotta art heritage with the authentic facts.

Review of Literature

The theoretical foundation is an important tool and lens through which a researcher evaluates the research problem and research questions as well. Reviewing the literature is only one approach of constructing solid theoretical foundation. On the basis of above mentioned doctrine the following literatures have been reviewed in this paper.

Regmi (1966, pp. 927-929) in his book 'Medieval Nepal Part II', has mentioned about the terracotta work including different sculptures, dolls, tympanum and other decorative objects. In his studied he also described the terracotta images of goddesses *Navadurga* of national museum very shortly. Oldfield's (1974) book 'Sketches from Nepal' deals with different aspects of goddesses *Navadurga* dance which is directly related to the *Durga puja* festival in the Kathmandu Valley, but, he is remained behind to explore and highlight their iconographic approaches.

Levy (1990) wrote a book entitled 'Mesocosm, Hinduism and Organization of the Traditional *Newar* City in Nepal' is based on field work which has conducted research on *Newar* community of *Bhaktapur* city. Levy has mentioned about the tale or legend of the origin of Nine *Durga* especially in *Bhaktapur*. But, his study is remained behind to address the sculptures of goddesses *Navadurga*. Chhetri & Rayamajhi (2056, pp. 185-192) wrote a book entitled 'Nepali Kala, Vastukala ra Pratimalakshana' which deals with different aspects of Nepalese arts and architectures including terracotta work. Meanwhile writers slightly describe about the terracotta sculpture of goddesses *Durga* of national museum, but detail study regarding on iconographic features of such sculptures have still remained non touch issues.

Shrestha (2060) wrote a book entitled 'Bhaktapur ko Navadurga Gana' which deals with different aspects of goddesses *Navadurga* including their name and forms, origin, dance except their sculptures. But, Shrestha has still remained behind to explore and highlight the iconographic features of the sculptures in detail. Shrestha (2066) has written an article entitled 'Mrinmayakala: ek sihabalokan' in the Journal Voice of Culture (vol. V) which deals with different aspects of terracotta art. She has mentioned the history of terracotta art in the world and in Indian subcontinent. In this respect, researcher highlights the terracotta sculptures including goddesses *Navadurga* of national museum and other forms of art in the article, whereas detail study through the perspective of iconography is still remained behind to cover.

Dulal's (2019) doctoral study on cultural tourism of *Bhaktapur* explored and highlighted several tangible and intangible cultural tourism products including the temples of goddesses *Durga* and their dance as well. But, His study has also not emphasized to explore and analyze the iconographic features of such goddesses.

National Museum (2019, pp. 41-45) published an informative handbook entitled 'Art Heritage of National Museum Part II' which deals with more than twenty art objects display in different sections of museum including *Navadurga* sculptures. There can find some valuable descriptions of goddesses *Navadurga* including their names, forms and iconography as well. But subtle study regarding the issues such as philosophy, legends of origin and iconographic features are still remained unexplored. Pokharel (2077) has written an article entitled 'Shaktika Shrota Navadurgaharu' in the Journal Nepalese Culture (vol. XIV) which deals with different aspects of goddess *Navadurga* especially the concept, philosophy, legends of origin, various names and forms of goddesses *Navadurga* but she has remained behind to discuss about the sculptures of such deities of national museum.

A part from above mentioned literatures Pandey's (1981-82) The terracotta of Nepal, Rajabhandari's (1989) Nepalako Mrinmaya kalako pariprekchhyama Chendeswori mandir sthit mrinmaya murtiharu, Khatri's (2054) Nepalka Darmika Mata ra Samajika Samrachana, Chhetry & Khatiwada's (2054) Hindu Samaj ra Dharma, Jadhari's (2072) Mahakali Naach are also reviewed as the quite useful sources for generating basic information especially about the philosophy of goddesses *Navadurga* and terracotta art of Nepal.

Finally, among the above mentioned literatures only a very few have studied about the terracotta sculpture of goddesses *Navadurga* of national museum while many have been unable to explore and highlight it. The literatures that have not been able to explore to the issues, although are quite helpful to generate the conceptual ideas regarding the origin and historicity, philosophy of goddesses *Navadurga*, traditions and practices of molding terracotta images in the world and Nepal as well.

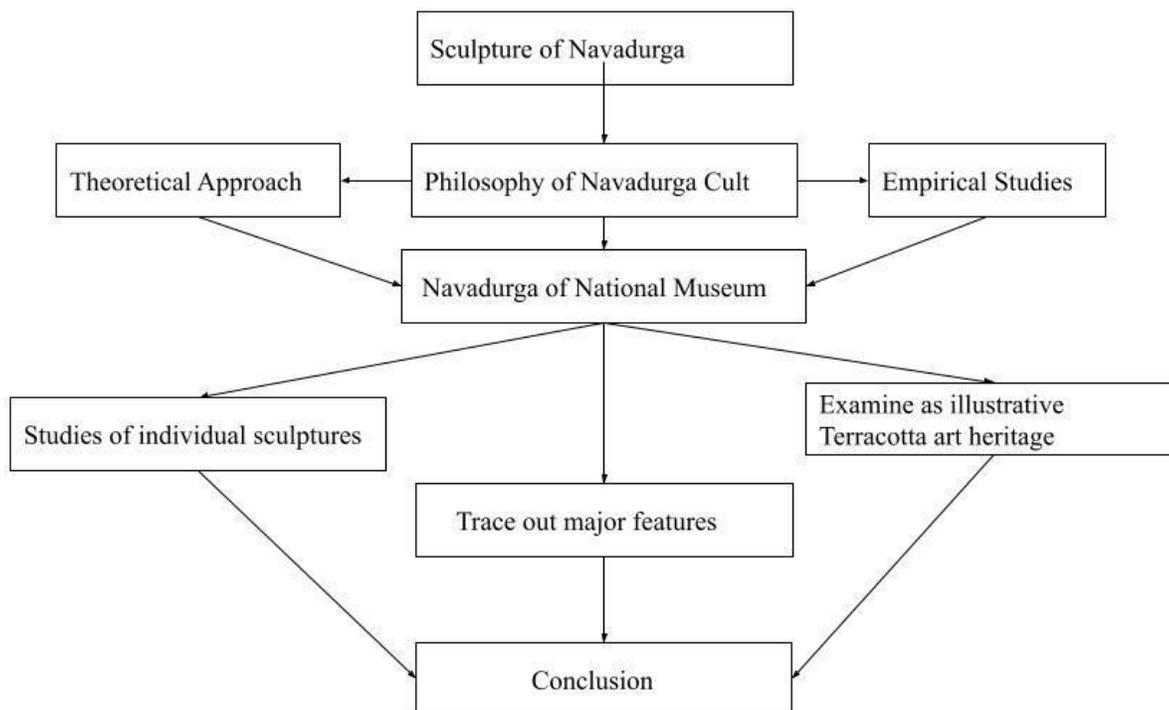
Methodology

The qualitative data regarding on philosophy and iconographic features of *Navadurga* sculpture has been used more than the quantitative one. Therefore, this study is based on qualitative research design. Researcher has applied both primary and secondary

data to explore its objectives and to generate valid information. Field work is the main source for primary data through which the iconographic features of *Navadurga* have been collected. During the field survey researcher has applied observational and interview methods. Similarly, the required secondary data especially on the philosophical aspects of *Navadurga* were collected by reviewing the relevant literatures.

Conceptual Framework

Along with the identification of the philosophy of *Navadurga* and iconographic features of its sculpture by applying theoretical approach and empirical studies this paper helps to examine them as the illustrative terracotta art heritage of Nepal. For addressing the above mentioned research gaps and problems as well as fulfilling the determine objectives this paper has been prepared by adopting the following conceptual framework:



Findings and Discussion

During the field survey, researcher has applied observation and interview method for gathering primary data especially iconographic features of *Navadurga*. Similarly, researcher has used literature review method for generating secondary information such as the concept, origin and development and the philosophical aspects of *Navadurga*. After gathering data and information they were analyzed on the basis of research problems and objectives very subtly. Finally, the findings, discussion and conclusion of the study have been presented after analyzing and examining philosophy of *Navadurga* cult, sculptures of *Navadurga* of national museum, major features of such sculptures and as the illustrative terracotta art heritage as the main issues of the paper.

Philosophy of Navadurga Cult

Kena Upanisad mentions to the *Uma* and *Haimawati* as the second names and forms of Durga. Sankhyayan Shrutuasutra imagines to *Durga* as the consort of *Rudra* whereas Bodhhayan Darmastra describes to the goddess *Durga* as the forms of *Amba*, *Aarya*, *Mahavainavi* and *Mahakali* (Shreewastav, 1990, p. 199). Similarly, Skanda Puran highlights while goddess killed the demon *Durgamam*, son of the demon *Ruru*, than she was identified as the name of *Durga* (Joshi, 2070, p. 423).

Through the perspective of religion as per the Vedic Literatures, *Moharatri*, *Sukharatri*, *Shivaratri* and *Kalaratri* are known as the main and popular four nights for Hindu Pantheon. Among them, *Kalaratri* is associated with the goddesses *Navadurga* during this occasion they have got special honor and worship as the powerful deities (Pokharel, 2077, p. 98). *Durga-puja*, held annually in her honor, is one of the greatest festivals of northeastern India as well (<https://www.britannica.com>, retrieved 10/5/2021).

The practice of goddess *Navadurga* worship is an ancient tradition in India and Nepal as well. In the Kathmandu Valley, especially in *Bhaktapur*, for the victory in battle and to protect and maintain peace in the city, Nine *Durgas* were venerated as the guardian deities during the medieval period. In 12th century A.D. *Bhaktapur* was more protected cities of Kathmandu Valley. Thus, in this context the then king *Ananda Deva* decided to construct a palace named *Tripur* and changed his capital into the *Bhaktapur* city. According to the chronicle records, king *Ananda Deva* has constructed the temples of eight mother goddesses in peripheral four directions and four corners and a temple of *Navadurga* in the middle part of the city (Shrestha, 2060, pp. 17-18). Formally, after establishment of their temples, then the different forms of goddesses have been worshipping as the deities of protectors of the city and city dwellers.

There are number of variants of the tale or legend regarding on the origin of Nine *Durga* especially in *Bhaktapur*. According to a legend, long ago, during the king of *Gunakamadeva* the Nine *Durga* were inhabited in *Jwala* forest, northeast from the city. They used to catch and kill people and drank their blood as sacrifice to themselves. One day an *Achaju* a priest name *Sunanda* was captured and was being prepared to be killed. *Achaju* was not just an ordinary man, he had a great knowledge about *tantras* and *mantras*, which helped him to bound the goddesses *Durgas*. He kept them in his room in a secure chest and periodically looked and worshipped them. Thereafter, the Nine *Durgas* have started to worship and perform dance in *Bhaktapur* (Levy, 1992, pp. 503-504).

Nava Durga dance is directly related to the *Durga puja* tradition in the Kathmandu Valley. It is highly popular dance of *Bhaktapur*, which was begun by the son of the king *Rayamalla* while he heard about the dance of *Nava Durga* in the midnight in *Bhaktapur*. Within a year, it has been performed about forty times only in *Bhaktapur* city by the performers of *Gatha* or *Banamali* people belongs to *Jyapoo* group. It begins from *Nava Durga* temple of *Ganchhetol* (Oldfield, 1974, pp. 295-297).

There are many temples of goddesses *Durga* in and around the *Bhaktapur* core which are generally belonged to medieval period. According to the description of *Vamsabali* the king *Ananda Deva* established the nine Goddesses such as *Brahmayani*, *Maheswori*, *Kaumari*, *Bhadrakali*, *Barahi*, *Indrayani*, *Mahakali*, *Mahalaxmi* in the eighth different directions and corners. And remaining one i.e. *Tripurasundari*, the consort of *Bhairav* in the middle especially at *Tulachhetol* in 930 B.S. *Magha Krishna Pratipada* (Dulal, 2019, p. 208).

There is no exact name of the deities. As per the time and places *Navadurgas* are known as the different names both India and Nepal. Including only one from the goddesses *Tripurasundari*, *Mahisasurmardini*, *Batsaladevi*, *Jayabageswori* and *Guheswori* within *Asthamatrika*, the cult of *Navadurga* is formed in Nepal (Allen, 1975, pp. 48-50). *Aparajit Prichha* an important iconographic text mentions *Mahalaxmi*, *Nanda*, *Kshemsankari*, *Shivaduti*, *Mahachanda*, *Bhramari*, *Sarbamangala*, *Rewati*, *Harashiddhi* as the nine forms of goddess *Durga*. While Aagam scripture includes *Nilkanthi*, *Kshemsankari*, *Harashiddhi*, *Rudransha Durga*, *Vana Durga*, *Agni Durga*, *Japa Durga* and *Vindyabasini Durga* within it (Shreewastav, 1990, p. 130).

In this context, some sources mention that *Brahmayani*, *Maheshwari*, *Kaumari*, *Vaishnavi*, *Varahi*, *Indrayani*, *Mahakali*, *Mahalaxmi*, *Tripurasundari*, *Rudrachanda*, *Prachanda*, *Chandogra*, *Chandanayaka*, *Chanda*, *Chandavati*, *Chandarupa*, *Atichandika*, *Ugrachanda*, *Jaya*, *Vijaya*, *Ajita*, *Aparajita*, *Jammane*, *Tammane*, *Mohini*, *Aakarshini*, *Siddhichanda* are the different names which popularly worshipped as the forms of goddesses *Navadurgas* (<https://english.onlinekhabar.com>, retrieved 10/5/2021).

Once upon a time when Sage *Markandya* requested Lord Brahma to tell about a device that was unknown by all and that would protect the mankind, *Brahmajii* told that such kind of device that existed was only a goddess amour (Devi Kawacha). He added that this amour was extremely disclosed, sacred and of a protective nature. It consist nine icons of goddesses such as *Shailaputri*, *Brahmacharini*, *Chandraghanta*, *Kusmanda*, *Skandamata*, *Katyayani*, *Kalaratri*, *Mahagauri* and *Siddhadatri* within it which called *Navadurga* (Vasistha, 2057, pp. 45-46). *Navadurga* are nine manifestations of goddess *Durga* in Hinduism, especially worshipped during the festival of *Navaratri* where each of the nine manifested forms is consecutively venerated throughout all the nine nights. As per the Pauranic literatures *Shailaputri*, *Brahmacharini*, *Chandraghanta*, *Kusmanda*, *Skandamata*, *Katyayani*, *Kalaratri*, *Mahagauri* and *Siddhadatri* are the nine manifested forms of goddess *Durga* or *Gauri* or *Parvati* (Chhetry & Khatwada, 2054, p. 101).

Sculptures of Nava Durga of National Museum

From the different pre-historic sites of Europe, Africa and Asia plenty of stone sculptures and other forms of art such as Venus of *Laussel*, *Kostenki* and *Brassempouy*, horse head from *Mas d' Azil*, engraving on bone from *Creswell Crags*, fish palette from *Grotte de Rey* etc. have been discovered (Burkitt, 1992, pp. 141-143). No doubt, the findings of such historical evidences strongly support to prove history of sculpturing art is old as the history of human beings. It means, the tradition of sculpturing stone art has been evolved from the pre- historic culture. As the tradition of creating stone sculptures, the terracotta art was also existed from the Neolithic age in the world and Nepal as well (Pandey, 1981-82, p. 1). It is justified through the findings of hand axes and other different art objects which have been displaying in National Museum.

In the context of Nepal, the terracotta art became more popular medium during the Lichchhavi period. The descriptions of inscriptions and archaeological findings from *Dhumbarahi* and *Handigaon* excavations suggest that this form of craftsmanship was existed and practiced during the regime of Lichchhavi rulers. This practice still not only becomes popular during the early and late medieval period although even today. Therefore, there can observe several terracotta images in the museums and elsewhere as well. Rest of them, through the religious, craftsmanship and cultural perspectives the sculptures of goddesses *Navadurga* of national museum are considered significant one.

Regmi (1966, p. 927) and Pandey (1981-82, p. 10) recognized as the images of mother goddesses *Asthamatrika* to the so-called terracotta sculptures of goddesses *Navadurga* of national museum. Among them, *Vaishnavi*, *Indrani*, *Parvati* and *Kumari* distinguished as benevolent goddesses are also represented here in terrific forms like *Chamunda*, *Kali* and *Varahi* (Pandey, 1981-82, p. 10). In this respect Regmi (1966, p. 228) mentions that:

This beautiful art objects created during the regime of the King Jitmitra Malla (1673-1696 A.D.) of Bhaktapur. One of his inscriptions notes (NS 797 Bhadra Sudi Ditiya Stella at Etachok) which pride the repair work done in Etachok, west of Mulchock, where he made strutting with carved images of the *Asthamatrika* group of female deities and got drawn in illustrations over the surface of the wall on the east.

The names of *Navadurga* seem slightly different and varied on the basis of context, place and communities which clearly observe in Bhaktapur as well. By adding to the goddess *Tripurasundari* with *Asthamatrika*, the people of Bhaktapur were worshipped as the forms of goddesses *Navadurga* from the very early days (Shrestha, 2060, pp. 17-18). Therefore, it might be possible that because of the collection from Bhaktapur, the goddesses of *Navadurga* of national museum named as *Asthamatrika*. What so ever, there are nine manifestations of Goddesses in the national museum which might be the sculptures of *Navadurga*. Such name is also used by museum itself and its records as well. Hence, as per the records of museum, researcher has used the name goddess *Navadurga* to identify and denote the same female deities in this paper.

According to legend, *Durga* was created for the slaying of the buffalo demon *Mahisasura* by Brahma, Vishnu, Shiva, and the lesser gods, who were otherwise powerless to overcome him. Embodying their collective energy (*shakti*), she is both derivative from the male divinities and the true source of their inner power. She is also greater than any of them. Born fully grown and beautiful, *Durga* presents a fierce menacing form to her enemies. She is usually depicted riding a lion and with 8 or 10 arms, each holding the special weapon of one of the gods, who gave them to her for her battle against the buffalo demon (<https://www.britannica.com, retrieved 10/5/2021>).

Durga Saptashati is an important text mentions *Chamunda* riding on the dead evil spirit, *Varahi* riding on a buffalo, *Indrani* riding on an elephant, *Vaisnavi* riding on a *garud*, *Maheswori* riding on a bull, *Kaumari* flying on the peacock, *Laxmi* sitting on a lotus, *Iswori* riding on a bull and *Brahmi* riding on a duck with different attributes on the hands and ornaments as well (Vasistha, 2057, pp. 47-48). Although, the name of the deities and sculptures as well of national museum observe slightly different then the iconographic features mentioned above in the Durga Saptashati. The identity and iconographic features of an individual sculptures as follows:

Shailaputri

Shailaputri represents *Parvati* in her stage of childhood. *Shailaputri* literally means the daughter of the mountain *Shailai* i.e. daughter of the Mountain King, Lord Himalaya and Queen *Menavati* (Pokharel, 2077, p. 101). After self immolation in her form as Sati; the Mother Goddess took birth in the house of king of Mountains, as the daughter of Lord Himalaya. Since her birth, she experienced a feeling of attachment towards Lord Shiva. Goddess *Parvati* had taken her birth as an ordinary woman to attain the position of a goddess in her journey to become one with Lord Mahadev. She is that incarnation of a little daughter who makes a family, her parents happy, joyous and proud of her (<https://english.onlinekhabar.com, retrieved 10/5/2021>). She is worshipped on the first day of the *Navaratra*.

Iconography mentioned that goddess *Shailputri* is milk white in complexion, with three content eyes as well as a calm mien. She is adorned by light ornamentation on her limbs and was clothed in red and pink robes. She is depicted with two hands with a trident in her right hand and lotus flower in the left. She is seated upon the behind of a holy mount white Nandi i.e. bull (<https://english.onlinekhabar.com, retrieved 10/5/2021>).



Sculpture of

Shailaputri (National Museum, 2019, p. 41).

The above presented image of *Shailaputri* belongs to 17th century CE. It is displayed in the terracotta section of National Museum. According to the records of National Museum it is measured 65 cm and 47 cm in length and breadth respectively (National Museum, 2019, p. 41). The sculpture of *Shailaputri* seems slightly different than the iconographic features mentioned above. Goddess *Shailaputri* is standing on the two demons. She is sculptured with four heads and ten hands as well. Among ten hands, the upper right raising on the chest level and holds a demon skull whereas other holds sword, arrow, bell and remaining last one is holding a bundle of a demon. Similarly, upper left hand is taking into the chest level and presenting fearlessness posture while other carries shield, bow, mace and remaining last one is holding a bundle of hair of a demon. Plain nimbus, decorated crown on the head, round shaped earrings on the ears, rosary bead on the neck, bangles on the wrist, armlets on the arms, specific garments on the lower part of the body are the major ornaments and garments seemed to have been used in the figure.

Bramacharini

After the *Shailaputri* form, Mother Goddess took birth at the home of *Daksha Prajapati*, as his daughter, Sati, who was born to marry Shiva. *Brahmacharini* represents *Parvati* in her phase of asceticism. *Parvati* had attained this epithet due to her performing austere and harsh penances to have Lord *Mahadev* as her husband for years. This unmarried form of the Mother Goddess is worshipped as *Brahmacharini*. This form of her is close to her because as *Parvati*, she had been meditating to become one with Shiva again as *Shakti*, ensuring that her motive is complete. For her to be *Brahmacharini*, not only did *Parvati* wake up *Mahadev* from his penances, but rather, this form of hers was awakened within her in which she'd broken the rules of living life as an ordinary human (<https://english.onlinekhabar.com>, retrieved 10/5/2021).

She is a student and a disciple who makes it her mission to attain the goals of her life through the harsh period of her education and continuously active to enlightenment to the universe regarding the great pleasure forms of the Lord Brahma. Therefore, she identified as the goddess *Brahmacharini* (Pokharel, 2077, p. 101). She is worshipped on the second day of Navaratra festival.

Iconographic science mentioned that *Brahmacharini* is of a fair complexion, with three content eyes as well as a calm mien. She is dressed as a female ascetic and is adorned by dried up *Rudraksha* beads and flowers as her ornamentation. She walks on bare feet, carrying a pray rosary beads (*Japamala*) in her right and a *Kamandalu* i.e. water utensil in her left hand (<https://english.onlinekhabar.com>, retrieved 10/5/2021).



Sculpture of

Brahmacharini (National Museum, 2019, p. 42).

The above mentioned sculpture of *Brahmacharini* belongs to 17th century CE. It is displayed in the terracotta section of National Museum. The records of National Museum informed that it is measured 61 cm and 44 cm in length and breadth respectively (National Museum, 2019, pp. 41-42). The sculpture of *Brahmacharini* observes slightly different what the iconographic features are mentioned above. Goddess *Brahmacharini* is standing on the two demons. She is sculptured with four heads and ten hands as well. As *Shailaputri*, the upper right raising on the chest level and holds a demon skull whereas other holds sword, arrow, bell and remaining last one is catching the foots of the demon. Similarly, upper left hand is taking into the chest level and presenting fearlessness posture while other carries shield, bow, mace and remaining last one is holding a bundle of hair of a demon. Ornaments, garments and other features of the goddess remained same with the features of *Shailaputri*.

Chandraghanta

Chandraghanta represents the married form of the mother Goddess following on from *Shailaputri* and *Mahagauri*. After getting married to Shiva, Goddess *Mahagauri* started adorning her forehead and also holds on the hand as an attribute with a half moon shaped like bell (Ghanta) due to which, she became known as Goddess *Chandraghanta* (Pokharel, 2077, p. 101). *Parvati* was given this title by Lord *Mahadev* himself, due to her wish to have Lord *Chandradev*, the Moon God, to adorn her as an ornament on her forehead, as her Lord adorned him upon his crown of matted hairs. On fulfilling her wish, *Mahadev* transformed her bridal guise into a new form with a new name. As she's now adorned by the digit of the crescent moon on her forehead, *Parvati* will be known the entire world over as *Devi Chandraghanta*. She is also that aspect of a woman who is independent and fights to establish justice, peace and makes her voice heard to bring about positive changes (<https://english.onlinekhabar.com>, retrieved 10/5/2021). She is worshipped on the third day of *Navaratra* festival.

Iconography mentions *Chandraghanta* is gold complexioned, with three bloodshot eyes and a calm face. She is adorned by heavy ornamentation on her limbs and was dressed in red apparel. She wears the semi- circular moon on her forehead which looks like the bell i.e. *Ghanta* and hence, her name. She is depicted with ten hands carrying with lotus flower, arrow, *Dhanush* and *Japa Mala* (pray bead) and *Abhayamudra* i.e. fearlessness posture in her right hands. While she holds *Trishul* (trident), *Gada* (mace), *Khadga* (sword) and *Kamandalu* (donation pot) and remaining one is showing *Varadamudra* i.e. blessing posture in her left hands. She mounts on the fierce tigress (<https://english.onlinekhabar.com>, retrieved 10/5/2021).



Sculpture of *Chandraghanta* (National Museum, 2019, p. 42).

Above mentioned sculpture of *Chandraghanta* belongs to 17th century CE. It is displayed in the terracotta section of National Museum which is slightly different what the iconographic features are mentioned above. According to the records of National Museum it is measured 62 cm and 50 cm in length and breadth respectively (National Museum, 2019, p. 42). Goddess

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Chandraghanta is standing on the two demons keeping middle another one. She is sculptured with four heads and ten hands as well. In this figure the upper right raising on the chest level and holds a demon skull whereas other holds sword, *japamala* (prayer bead), bell and remaining last one holds a bundle of hair of the demon. Similarly, upper left hand is taking into the chest level and presenting fearlessness posture while other carries shield, bow, mace and remaining last one is holding a bundle of hair of a demon. Ornaments, garments and other features of the goddess remained same with the features of *Shailaputri*.

Kusmanda

Kushmanda represents *Devi Parvati* in her stage of discovering that she is none other than *Mahashakti*. After their marriage, Lord *Mahadev* made Goddess *Parvati* know the fact of her true existence. This form of her is known the world over as *Kushmanda*, as she holds within her, many endless powers of the world. Lord *Mahadev* had helped her realize the fact that she's not just a human; she is a Goddess, who is the Mother of the World and all of creation, as she produced the three planes through her golden womb. She's that aspect of woman who brightens up the lives of those around her by her glee. After taking the form of *Siddhidatri*, the Mother Goddess started living within sun thereby liberating the Sun's energy to the universe. Since then, this form of goddess has been known as *Kusmanda*, namely for her power and capability to live inside the Sun (<https://english.onlinekhabar.com>, retrieved 10/5/2021).

Hindu philosophy believes that there are three great energies in the world that are spiritual, universal and supernatural which known *Kusma*. Goddess can adorned and kept all these energies within her and gives salvation to the universe through these energies. Because of it she is known as the goddess *Kusmanda* (Pokharel, 2077, p. 101). The word '*Kushmanda*' also means '*kubhindo*' or ash gourd. Therefore, this vegetable is offered to this goddess as a sacrifice. This goddess is called *Kushmanda* as it is believed that she created this universe by her smile (<https://english.onlinekhabar.com>, retrieved 10/5/2021). She is worshipped on the fourth day of *Navaratra* festival.

Iconographic science mentioned that *Kushmanda* is of a gold complexion, with three peaceful eyes and a calm mien. she rides on a lioness and has eight hands. She carries a *Kamandalu*, *Dhanush*, *Gada* and *Kamal* in the right and *Amrita Kalash* (pot of nectar), prayer beads, *Gada* and *Chakra* in her left. She is adorned by ornaments on her limbs and was dressed in pink and yellow vestments. She is mounted upon the back of a tiger.



Sculpture of *Kusmanda* (National Museum, 2019, p. 42).

The above presented sculpture of *Kusmanda* belongs to 17th century CE. It is displayed in the terracotta section of National Museum which is slightly different what the iconographic features are mentioned above. The records of National Museum informed that this sculpture is measured 66 cm and 50 cm in length and breadth respectively (National Museum, 2019, pp. 42-43). Goddess *Kusmanda* is standing on the two demons. She is sculptured with four heads and ten hands as well. In this figure, the upper right hand raising on the chest level and holds a demon skull whereas other holds sword, arrow, bell and remaining last one holds a bundle of hair of an evil. Similarly, upper left hand is taking into the chest level and presenting fearless posture while other carries shield, bow, rope and remaining last one is holding a bundle of hair of an evil. Ornaments, garments and other features of the goddess remained same with the features of *Shailaputri*.

Skandamata

Skandamata represents *Devi Parvati* in her stage of motherhood. *Skandamata* is known as mother of the goddess of war, Lord *Skanda* i.e. *Kartikeya*. *Parvati* was kept away from nurturing her child from the six *Krittikas*. As the seed of the energy that *Shiva* and *Parvati* created, fell to a sleeve of reeds, it was split into six infants, as they're found by six women, and after working out a fair resolution, as *Shiva* and *Parvati* merged the six babies into one infant with six faces, he would be known to all as *Shanmukha* (six-faced) and as being the mother of this unique child, *Parvati* will be known as *Skandmata*. Also, as the baby *Shanmukha Skanda* had been found by the six *Krittikas*, he will be known as *Kartikeya*, as he's their kid as well as *Shiva* and *Devi's* kid. *Skandmata* is maternity, affection, and love in a woman. Though any child may be biological, adopted, or through surrogacy, she is still a mother (<https://english.onlinekhabar.com,download 10/5/2021>). She is worshipped on the fifth day of *Navaratra* festival.

As mentioned by the iconography *Skandamata* is of a gold complexion, with three eyes as well as a calm mien. She is adorned with light ornamentation on her limbs and is dressed in orange and yellow apparels. She mounts on the ferocious lion. She is depicted with four hands which carries six-headed infant *Kartikeya* i.e. *Skanda* on her lap and presents fearlessness gesture through in right and lotus on her left hands.



Sculpture of *Skandamata* (National Museum, 2019, p. 43).

The above presented image of *Skandamata* belongs to 17th century CE. It is displayed in the terracotta section of National Museum which is slightly different what the iconographic features are mentioned above. According to the records of National Museum it is

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measured 66 cm and 50 cm in length and breadth respectively (National Museum, 2019, p. 43). Goddess *Skandamata* is standing on the two demons keeping her mount peacock on the middle. She is sculptured with four heads and twelve hands as well. In this figure, the upper right hand of *Skandamata* rising on the chest level and holds a demon skull whereas other holds sword, arrow, bell, rosary bead and remaining last one holds a bundle of hair of an evil. Similarly, upper left hand is taking into the chest level and presenting fearlessness posture while other carries shield, bow, hand axe, rope and remaining last one is holding a bundle of hair of an evil. Ornaments, garments and other features of the goddess remained same with the features of *Shailaputri*.

Katyayani

Once upon a time for the aim of performing duties of the Gods, goddess *Parvati* incarnated herself as the form of beautiful baby on the hermitage of sage *Katyayan*. Sage *Katyayan* enamored through the beauty of the lady. Then he adopted her as the daughter (Pokharel, 2077, p. 101). Later on *Katyayani* is known as the daughter of sage *Katyayan* and venerated as the goddess of destroy demon *Mahishasura*. She represents *Parvati* in her warrior stage. When the Gods invoked *Mahashakti* to protect them from demon *Mahishasura*, *Parvati* materialized from a sacrificial fire in the avatar of a ten armed Goddess, who is then known the world over as She is that incarnation of a woman who shows that she is not vulnerable when the question of protecting her is brought up, as even she can also protect men oftentimes. According to *Devi Mahatmya* (one of the Hindu Scriptures), it is believed that devotion to and worship of Goddess *Katyayani* lead to the easy attainment of virtues, prosperity, sensual pleasure, and salvation (*dharma-artha-kaama-moksha*) (<https://english.onlinekhabar.com, retrieved 10/5/2021>). She is worshipped on the sixth day of *Navaratra* festival.

As mentioned by the iconography *Katyayani* is of a molten gold complexion, with three staring eyes and a relaxing face. She is adorned by heavy ornamentation on her limbs and is dressed in green and pink vestments. She mounts on the magnificent lion with four hands. She carries lotus flower and sword in her left hands respectively and keeps her right hands *Abhaya* or fearlessness and *Varadamudras* blessing gesture.



Sculpture of *Katyayani* (National Museum, 2019, p. 43).

The above presented sculpture of *Katyayani* is belonged to 17th century CE. It is displayed in the terracotta section of National Museum which is slightly different what the iconographic features are mentioned above. The records of National Museum informed

that this sculpture is measured 60 cm and 45 cm in length and breadth respectively (National Museum, 2019, p. 43). Goddess *Katyayani* is standing on the two demons keeping another one in the middle. She is sculptured with four heads and twelve hands as well. In this figure, the upper right hand of *Katyayani* rising on the chest level and holds a demon skull and next one also raised into the shoulder with rosary bead whereas other holds sword, arrow, bell and remaining last one attacking to the demon laying on the middle by a huge trident. Similarly, upper left hand is taking into the chest level and presenting fearlessness posture and the weapon of next one is not seem clearly while other carries shield, bow, rope and remaining last one is holding a bundle of hair of an evil. In this figure goddess wear special huge skull garland on the neck and other ornaments and garments of the goddess remained same with the features of *Shailaputri*.

Kalaratri

Kalaratri represents *Parvati* in her phase of destruction and presents fiercest and the most ferocious form of the mother goddess, in which she manifests to destroy the demons *Sumbha* and *Nisumbha*. She is called the Goddess of time and death because she is above and beyond its reign as she controls the time in which someone's death arrives and she is beyond darkness (Pokharel, 2077, p. 101). She is also that aspect of a woman who is constantly enraged by injustices and fights them to save society as she is aggressive and can bring about destruction when her threshold is crossed. It is believed that she always grants her devotees with auspicious results. According to *Durgasaptashati*, a fierce flame of fire emanates from her nose (<https://english.onlinekhabar.com>, retrieved 10/5/2021). She is worshipped on the seventh day of *Navaratra* festival.

According to the iconography *Kalaratri* is of a pitch dark complexion and has a ferocious expression. She is adorned in electric ornamentation on her limbs and is clothed in red and black robes. She has three bloodshot eyes, unkempt hairs, and wears a garland of skulls around her neck, which shone like lightning. She rides on a donkey and depicted with four hands. She carries baby *Skanda* and presents fearlessness gesture through in right and lotus on her left hands. Her right hands are showing the *Abhaya* or fearlessness and *Varadamudras* blessing gesture while a sword and deadly iron hook in her left.



Sculpture of *Kalaratri* (National Museum, 2019, p. 43).

The above presented image of *Kalaratri* is known as one of the important specimen of 17th century CE. It is displayed in the terracotta section of National Museum which is slightly different what the iconographic features are mentioned above. According to the records of National Museum it is measured 66 cm and 46 cm in length and breadth respectively (National Museum, 2019, p. 44). Goddess

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Kalaratri is standing on the two demons. She is sculptured with four heads and twelve hands as well. In this figure, the upper right hand rising on the chest level and holds a demon skull whereas other holds sword, arrow, and bell. Similarly, upper left hand is taking into the chest level and presenting fearlessness posture while other carries shield, bow, rope and one is holding a bundle of demon hair. Remaining last two hands of both sides seem to hitting to the demons by huge two tridents with crossing mode. In this figure goddess wear special huge skull garland on the neck and other ornaments and garments of the goddess remained same with the features of *Shailaputri*.

Mahagauri

Mahagauri represents *Parvati* in her phase of recovery. Goddess *Shailaputri* at the age of sixteen was extremely beautiful and blessed with fair complexion. Once upon a time, due to her black complex, Lord *Mahadev* jokingly called Kali to the goddess *Parvati* which made her displeasure. Immediately she decided to sit extreme meditation with presence. Finally, she gets successes to change black complexion into white adding with extremely beautification. Later on, due to it, she was known as the goddess *Mahagauri* (Pokharel, 2077, p. 101). In this context, another legend mentions that after she embraced her form of Kali, *Parvati* returned to her normal form but with skin as black as night clinging on to her person. On Lord Brahma's direction, she immersed herself in the *Manasarovara* River and came back out afterward, radiant as the moon and shining brilliantly with her white garments and ornaments. This form of *Parvati* was known as the world over by the name of *Mahagauri*. She's also that avatar of a woman who is a homemaker, devoted wife, and a nurturing mother, as she is the only one who is the foundation of a family. Worshipping this goddess is believed to grant forgiveness to sinners (and purify them) and fulfills all the desires of the devotees (<https://english.onlinekhabar.com>, retrieved 10/5/2021). She is worshipped on the eighth day of *Navaratra* festival.

As mentioned by the iconography *Mahagauri* is of a bright white complexion, with three peaceful eyes as well as a calm expression. She is adorned by light white ornamentation on her limbs and is dressed in white clothes. She rides on the white bull with four hands. She carries *trisul* i.e. trident in one the right and depicted the *Abhaya* or fearlessness gesture in the other. Likewise, she holds a *damaru* (double drum) and depicts *kamandalu* in her other left hand.



Sculpture of *Mahagauri* (National Museum, 2019, p. 44).

The afore mentioned image of *Mahagauri* belongs to 17th century CE. It is displayed in the terracotta section of National Museum which is slightly different what the iconographic features are mentioned above. The records of National Museum informed that this sculpture is measured 64 cm and 48 cm in length and breadth respectively (National Museum, 2019, p. 45). Goddess *Mahagauri* is standing on the two demons. She is sculptured with four heads and ten hands as well. In this figure, the upper right hand rising on the chest level and holds a demon skull whereas other holds sword, *Japamal* (prayer bead) and bell whereas last on holding a bundle of hair

of the demon. Similarly, upper left hand is taking into the chest level and presenting fearlessness posture while other carries shield, bow, rope and last one is holding a bundle of demon hair. In this figure goddess wear special huge skull garland on the neck and other ornaments and garments of the goddess remained same with the features of *Shailaputri*.

Siddhidatri

Siddhidatri represents *Devi Parvati* in her stage of reaching her highest and supreme form, knowing who she is as she has been established as the complete manifestation of Goddess *Mahashakti*, thus reaching her status of becoming a Goddess. *Siddhidatri* is known as goddess of *Adi Parasakti*. In the beginning of the universe Lord *Rudra*, worshipped the unman fest form of the mother goddess, *Adi Prarashakti* for the creation. She has all the supernatural powers and is one with Lord Shiva as *Ardhanarishwara*. She's that avatar of a woman that represents the very source of life and provides education, teaching skills, and discipline into her kids. It is believed that Goddess *Siddhidharti* bestows her devotees with all kinds of supernatural powers (*siddhi*). As per *Markandeya Purana*, there are eight types of *siddhis* that include *adhima*, *mahima*, *garima*, *laghima*, *prapti*, *prakamya*, *ishitvo* and *vishitvo* (<https://english.onlinekhabar.com>, retrieved 10/5/2021). She is worshipped on the ninth day of *Navaratra* festival.

According to the iconography *Siddhidatri* is of a fair complexion, with three content eyes as well as a calm mien. She is adorned by light ornamentation on her limbs and was dressed in red and blue vestments. She is seated upon a fully bloomed lotus flower and rides on the lion with four hands. She carries *Gada* and Chakra in the right and lotus flower and *Shankha* on her left hands.



Sculpture of *Siddhidatri* (National Museum, 2019, p. 44).

The above presented image belongs to *Siddhidatri* of 17th century CE which is displayed in the terracotta section of National Museum. It is slightly different what the iconographic features are mentioned above. According to the records of National Museum it is measured 44 cm and 53 cm in length and breadth respectively (National Museum, 2019, p. 45). Goddess *Siddhidatri* is standing on the two demons and laying another one in the middle. She is sculptured with four heads and eight hands as well. In this figure, the upper right hand rising on the chest level and presenting fearlessness posture whereas other holds sword, bell and whereas last one is hitting by huge trident an evil of the middle part. Similarly, upper left hand is taking into the chest level holds a demon skull while other carries shield, bow, and hand axe. Ornaments, garments and other features of the goddess remained same with the features of *Shailaputri*.

Major features of the Sculptures

The terracotta sculptures of the Kathmandu Valley executed during the Malla period are of completely different style. There marked influence of contemporary stone art in the terracotta sculptures fashioned after the fourteenth century (Pandey, 1981-82, p. 10). But, in this respect some scholars believed that the terracotta art of medieval period seemed to observe influence like a copy pest of the stone sculpture of that period (Chhetry & Rayamajhi, 2056, p. 191). During the medieval period for making terracotta art objects artists have used especially *Gathicha*, *Pancha*, *Hakucha* and *Gija* types of clay-lumps (Rajbhandari, 1989, p.22).

As per the Hindu religion clay is the most important medium for molding the images. *Kalikagam* a Hindu religious scripture mentions that the clay of holy rivers and the top of the hills is highly preferable for molding the terracotta sculptures (Rao, 1985, p. 76). Similarly, Vidhyaswor *Samhita* of *Shiva Puran* gives emphasize to the clay of rivers, lakes and ponds for the creation of images (Dange, 1987, p. 875). Likewise, *Samrangana Sutradhara* mentions that the clay of ponds, water wells, rivers and the clay associated with the roots of the plants are considered more pure and prosperous for molding the terracotta sculptures (Bhattacharya, 1963, p. 43). The creators used exceptionally good, quality of clay and by means of a system of firing which produce a hard, smooth, shell-like surface, their masonry seems to defy all weathers besides displaying a most artistic coloring (Pandey, 1981-82, p. 12).

All these sculptures seem to mould similar manner. According to *Mahankal Samhita* these sculptures belong to *Bhadrakali Kalpa*. *Bhadrakali Kalpa* denotes the worshipping period of goddesses *Navadurga* which started from *Asminsukla Pratipada* and remains till to *Asminsukla Nawami* (Shrestha, 2066, p. 60). During the medieval period the clay objects were fully burnt in the fire. The baking was done within a brick structure, where the images were laid down on a straw pile and burnt smoothly for about a day and night (Pandey, 1981-82, p. 12). Thus, it is believed that the sculptures of goddesses *Navadurga* might be burnt similar manner as mentioned above. It is considered an important specimen where the images of *Shailaputri*, *Brahmacharini*, *Chandraghanta*, *Kusmanda*, *Skandamata* and *Siddhadatri* have been displayed. This is probably the first terracotta sculptures in Nepal which collectively display in national museum has revealed and examined the following features:

- Each sculpture has four heads, three on the bottom and one on the top layers depicting overlapping or superimposing with each others.
- Artists gave high priority to make beautification to obverse side then the reverse one which makes the sculptures facial oriented.
- Every image has decorated nimbus and head crown which helps to add the aesthetic beauty of the sculptures.
- Every sculpture has big eye bolls looks like terrific in nature which makes the images very ferocious.
- There seems multi heads and hands, maximum use of ornaments on the ears, neck, waist, wrist, and arms in the sculptures which indicate high tantric influence on the work of art.
- To left very few, ornaments, dresses and dress up of the sculptures observe very similar with each other.

- On the sculptures of *Shailaputri*, *Brahmacharini*, *Chandraghanta*, *Kusmanda*, *Skandamat* and *Siddhadatri* there is absence of skull garland while *Katyayani*, *Kalaratri* and *Mahagauri* do have such beads on the neck.
- To left very few regarding on size, forms and features all sculptures look like similar in nature and technology.
- To left very few, standing position, hands gesture and facial expressions of the sculptures also observe similar with each others.
- Lotus pedestal is seemed common platform of all sculptures.
- The images reveal that artists' select high quality of clay during the molding of the sculptures.
- All the sculptures are observed fully burnt objects.
- To left very few like heads and hands, all portions are seemed well preserve and conserve.
- The sculptures suggest that there is lack of adequate application and proper attention of the rules of iconographic sciences while creating them.
- Well representative specimens of religious and mythological legends especially the philosophy of goddesses *Navadurga*.
- This work of art represents the transformation of terracotta craftsmanship through the ages.
- It presents *Shailaputri*, *Brahmacharini*, *Chandraghanta*, *Kusmanda*, *Skandamata*, *Katyayani*, *Kalaratri*, *Mahagauri* and *Siddhadatri* as the goddesses belonged to Navadurga cult.
- Artists provide in depth artistic features while molding the sculptures.
- The artistic appeal and aesthetic emotions of the sculptures suggest that these are the master pieces and illustrative terracotta objects of 17th century CE of Nepal.
- As whole the sculptures prove without any doubt the fact of high and skillful quality, knowledge, technology and excellent terracotta workmanship of the artists' of late medieval period.

Illustrative Terracotta Art Heritage

Clay is very easily available thing which can found everywhere in different forms. It is also considered as an easily molding material for the purpose of art creation and craftsmanship. Artists can mould different shape and size to the clay according to their requirements. Therefore, clay was used as the construction material for creation of art objects from the very early. In this context Pandey (1981-82, p. 1) writes that:

As clay was freely available everywhere and with a slight tough of figures it could be easily molded to any shape, since beginning of Neolithic age. The people of Neolithic period frequently used it to make various kinds of utensils of their domestic use and figurines of human beings, the deities and the animals. Terracotta formed the most popular medium not only of the artistic expression but also for personal ornaments like beads, bangles and rings documentations like sealing's, children's toys and objects of domestic and ritualistic needs.

Terracotta in its varied uses and applications, thus affords us an idea of not only the artistic attainments of the people, but about their life and culture, and fashions of times in respect of dress, coiffures and jewellery (Mitra, 1972, p 100). The art and images of terracotta were started to be made in this sub-continent from the Indus Valley Civilization i.e. 2500 B.C., where there find the figurines depicting a wide range of subjects of human, animal and plant life (HMG, 1996, p. 100). According to *Markandeya Puran* as the other forms of art the sculpture of terracotta of goddess *Durga* has been molded from the Epic Period in Indian subcontinent (Agrawal, 1977, p. 321).

In Nepal, there can be find the terracotta images and dolls of 3rd to 2nd century BC from the archaeological sites of *Lumbini Zone*. The archaeological findings especially broken pieces of utensils, female figures, animal's figures, small dolls and other objects of *Lumbini*, *Kapilvastu* and *Banjarah* from Western Nepal are recognized as the authentic evidences to prove and trace the antiquity of terracotta workmanship of 3rd century BC (Rajbandari, 1989, p.16).

During the Lichchhavi period the Kathmandu Valley did the high priority as stone sculpture to the terracotta as well. The Lichchhavi inscription of 495 AD of *Patan Sankhamul Sikubahi* denotes the terracotta image of goddess Matrika, which is an authentic evidence to prove the tradition of moulding terracotta images in Lichchhavi period (Vajracharya, 2030, p. 211). The excavation of 1966 of *Dhumbarahi* and its findings like the figures of lion, elephant, horse, cow, buffalo belonged to 7th to 8th century CE (Banarjee, 1966, p. 28). Similarly, from the excavation of *Handigaon* the figures *Umamaheswor*, *Kuber*, a dancing couple, lion, elephant, horse and different types of utensils of Lichchhavi period have been discovered (Thapa, 2027, pp. 15-17; in Chhetry & Rayamajhi, 2056, p. 191).

Medieval period was prosperous era for the creation of terracotta figurines and domestic uses utensils. *Mahabuddha* temple of Patan, built in the thirteenth century CE by Abhayaraj Vajracharya on of the model of the *Bodhagaya* temple of Lord Buddha (Pandey (1981-82, p. 9). The temple entirely made of bricks is known as one of the excellent illustration of terracotta workmanship of early medieval Nepal. Each brick of its outer surface has the representation of a Buddha image; therefore, it calls as the temple of 'One Thousand Buddha Image' (Bernier, 1970, 91).

The image of *Dipankar* Buddha NS 502, find from *Itumbahal* is known as the oldest medieval terracotta sculpture of Nepal. Similarly, *Achhobhya* Buddha of Kathmandu *Mahavihar*, *Surashree Mahavihar*, *Ombahal*, *Maitreya* Buddha of *Yamaleswor Vihar*, *Amitabha* Buddha of *Patan Mahabauddha Vihar*, head of *Chamunda* and *Virupaksha* of *Patan Metal Work Museum* are known significant terracotta objects of medieval period (Chhetry & Rayamajhi, 2056, p. 191). The images of *Vishnu*, *Varun*, *Varaha*, *Kuber*, and *Durga* of *Dathu* temple of *Ranipokhari*, *Baban Bhairav*, *Matsya Avatar Vishnu* and *Navadurga* of national museum, the figures of *Shiva*, *Parvati*, *Vishnu Laxmi*, *Ganesh*, *Bhairav*, *Astamatrika*, *Varaha* and *Surya* of *Taleju Temple* of *Hanumandhoka*, *Anantanarayan Vishnu* of *Aryaghat* are also mentionable terracotta sculptures of Malla period (Pandey, 1981-82, pp. 10-11).

In this respect, the images of goddesses *Matrika* and *Bhairav* of *Chandeswori Banepa* are also known as the noteworthy terracotta sculptures of medieval period (Rajbandari, 1989, pp. 22-23). The images of *Nagas* and the *Naginis* of national museum are recognized as the art objects of Shah Period (Chhetry & Rayamajhi, 2056, p. 191). The tradition of moulding and creating terracotta sculptures and utensils still remaining into existence and practices in present day in society.

The above mentioned sculptures are equally important own to show the advance artistic knowledge, technology, skill and craftsmanship of the artists. Still, rest of them, the art appealing and aesthetic emotions, well representative specimens of religious and mythological legends, selection of high quality of clay, in depth artistic features while molding the sculptures, well combination of different physical portions and findings features mentioned above are the major indicators and measuring tools which can well judged and recognized the figures of *Navadurga* of national museum as the wonderful, illustrative and representative terracotta work of art of seventeenth century of Nepal.

Conclusion

Shaktism is a religious sect which gives high priority and emphasizes to worship the goddesses as the sources of supreme power. It was already existed from the prehistoric culture in the world. In eastern society and culture the practice of goddess worship was also evolved from the Vedic period. There are mainly four sub-sects such as *Saptamatrika*, *Asthamatrika*, *Navadurga* and *Dasa Mahabidhya* have come into existence within it. Among them, the tradition of goddess *Navadurga* worship seems very popular. As

per the Pauranic literatures *Shailaputri*, *Brahmacharini*, *Chandraghanta*, *Kusmanda*, *Skandamata*, *Katyayani*, *Kalaratri*, *Mahagauri* and *Siddhadatri* belonged to *Navadurga* family.

There are nine terracotta sculptures of goddesses *Navadurga* in national museum through the religious, craftsmanship and cultural perspectives these are considered significant specimens. This beautiful art objects created during the regime of the King *Jitmitra Malla* (1673-1696 A.D.) of Bhaktapur. Each sculpture has four heads, three on the bottom and one on the top layers depicting overlapping or superimposing with each others, there seems multi heads and hands, maximum use of ornaments, lotus pedestal is seemed common platform, used high quality of clay, fully burnt, represents religious and mythological legends, artistic appeal and aesthetic emotions, high and skillful quality, knowledge, technology and excellent terracotta workmanship of the artists are the major features of the sculptures. On the basis of the features, the sculptures of goddesses *Navadurga* of national museum can be judged and measured as the wonderful, illustrative and representative terracotta work of seventeenth century of Nepal.

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Preparation and Properties of Polypropylene/Polycaprolactone Blends Coated NPK Compound Fertilizer With Controlled-Release And Water-Retention On Some Application Media

D Akmal^{*1,2}, Jacky³, Febriyenti¹, Salman²

1. Faculty of Pharmacy, University of Andalas, Padang 25163, West Sumatra, Indonesia.
2. Laboratory of Biota Sumatra, University of Andalas, Padang 25163, West Sumatra, Indonesia.
3. Indonesian College of Pharmacy (STFI) Bhakti Pertiwi, Palembang, Indonesia

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ABSTRACT

Research has been carried out on coating conventional NPK fertilizers using Polypropylene + Polycaprolactone bioblend polymer by spray method with concentrations of 0.1%, 0.2%, 0.4%, 0.6%, 0.8% and 1%. The percentage of coating and coating efficiency are 10.65% and 91.02%, respectively; 11.76% and 91.30%; 13.89% and 92.72%; 15.58% and 93.51%, 17.96% and 94.62%; 9.36% and 87.75 %.

INTRODUCTION

Currently the use of Controlled-Release (CR) technology has become a trend and solution to answer the challenges of using fertilizers in the modern agricultural industry, especially in solving problems associated with conventional agrochemical applications (Akelah, A., 1996), the limitations of conventional fertilizers. make formulation scientists take advantage of opportunities to create innovations in agriculture, especially to make slow-release fertilizer innovations by modifying conventional fertilizers that have been circulating in the market into slow-release fertilizers by coating using natural, synthetic polymers or a mixture of natural polymers with synthetic polymers that can produce a polymer with new properties. Slow-release or controlled-release formulation technology is a technology that is often applied in the pharmaceutical field, the main purpose of which is to make the release of active ingredients on target at a controlled rate. The method that is often used in the manufacture of slow-release products is the coating method, especially the spray coating technique. In addition to the pharmaceutical sector, slow-release technology can also be used for applications in agriculture such as in the manufacture of pesticides and fertilizers, slow-release or controlled-release (Suharti, N., Salman, Muslim, S., Dwisari, D., Febriyenti, Idris, Akmal). , D, 2016; Costa, Cabral-Albuquerque, Alves, Pinto, & Fialho, 2013) .

In modern agriculture, fertilizer is one of the determinants of success and also has a role in increasing agricultural production and productivity, in agricultural practice it is often a problem, especially because the efficiency of absorption of fertilizer is very low. One type of fertilizer that is widely used is NPK fertilizer. Nitrogen (N), phosphorus (P), and potassium (K) are three essential elements for plants , which plants require in large amounts for adequate growth (Fageria, Baligar, & Clark, 2002) . The efficiency of fertilizers that can be absorbed by plants is only about 40-50% for nitrogen, 80-90% for phosphorus, and 50-70% potassium, the rest of the fertilizer used will be lost to the environment and cannot be absorbed by plants, this not only causes economic loss and resources but will result in very serious environmental pollution. One way to increase fertilizer efficiency is to make fertilizer slow-release or controlled-release so that fertilizer nutrients can be released according to the nutritional supply needs for plants. But in the manufacture of slow-release fertilizers, problems are often found, especially in terms of coating techniques, and coating materials, such as the coating materials used are not sufficient to provide a release profile as expected, in addition to the coating materials used also determine the selling price, the price of loose fertilizers. slowly circulating in the market sold at a price 5 to 8 times higher than the price of ordinary NPK fertilizer. (Akelah, 1996; Yang, Zhang, Li, Fan, & Geng, 2012 ; Wu, Liu, & Liang, 2008) .

Polymers with low prices are currently dominated by synthetic polymers such as polypropylene (PP) and polyethylene (PE). However, this synthetic polymer is not biodegradable, to make this polymer biodegradable, it can be done by mixing the synthetic polymer with other biopolymers or biodegradable polymers such as polycaprolactone. So that synthetic polymers that are not biodegradable can become biodegradable polymers. However, until now there has been no research report on the use of synthetic polypropylene polymers as a coating material for sustained-release NPK fertilizers, either single or pure use or the use of a mixture (*poly blend*) of this type of synthetic polymer as a coating material for slow-release NPK fertilizers. Therefore, in this study, researchers will be interested in examining the use of polypropylene and polypropylene/polycaprolactone blends . The

use of polycaprolactone as a polymer mixture of polypropylene aims to produce biodegradable polypropylene, mixing non-degradable polymers with biodegradable polymers produces a biodegradable polymer. Polycaprolactone is a semi-crystalline biodegradable synthetic polymer that is often used in the medical world, has compatibility and is non-toxic in human tissues and also to the environment, has a low melting point, which is between 58 to 64 °C, glass transition temperature (T_g) - 60 °C and the mean molecular weight of polycaprolactone varies from 3000 to 80,000 g/mol (Hayashi, 1994; Douglas, Andrews, Jones, & Walker, 2010; Martínez-Abad et al., 2013).

EXPERIMENTAL SECTION

Equipment and Materials

Ingredients : The ingredients used are NPK Yaramila fertilizer granules with a diameter of 2-4 mm, Polypropylene (PP), Polycaprolactone (PCL), Technical Xylen, Ammonium sulfate (Merck), Sodium hydroxide (Merck), Salicylic acid (Merck), Disodium hydrogen phosphate (Merck), Disodium dihydrogen ethylene diamine tetra acetate dihydrate / EDTA (Merck), Sodium hypochlorite (Merck), Sodium nitroprusside (Merck), Aqua DM.

Tool : Hotplate magnetic stirrer (Thermo Scientific) , UV-Vis spectrophotometer (UV-1700 PharmaSpec), analytical balance (Shimadzu AUX 220), *Fourier transform infrared spectroscopy* (PerkinElmer) , pH meter (Thermo Scientific), *scanning electron microscopy* (SEM) JEOL-JSM-6510LV , *spray gun* and pump, *coating pan* , glassware and other equipment.

Methodds

Preparation of NPK granules

NPK raw materials (standard) and has also met the provisions of the Indonesian National Standard (SNI) 2803:2010 for NPK granules . The results of the examination can be seen in Appendix 3, Table IV.1 and Table IV.2 .

Preparation of coating solution

Polypropylene as much as 0.1, 0.2, 0.4, 0.6, 0.8 and 1 gram according to table III.1 was dissolved with 100 mL of technical xylene then heated on a hotplate *magnetic stirrer* at a speed of 380 rpm until the polypropylene polymer granules dissolved . After that, 10 grams of dissolved polycaprolactone were added to each, then the solution was stirred using a magnetic stirrer at a speed of 380 rpm.

NPK Coating

The coating is carried out using the spray-coated method, where NPK fertilizers are coated by spraying with a previously prepared coating solution. Twenty-five grams of NPK fertilizer was put into a coating pan, while the coating solution was put in a solution container in a *gun spray* . Then the NPK fertilizer is sprayed with a coating solution, the rotation speed of the *coating pan* is adjusted, at the time of spraying it is also directly dried using a *heat dryer* with a coating pan temperature of around 40-60 °C. After the coating is complete, the fertilizer is again dried in the oven at a temperature of 70-80 °C for 1 hour to ensure that the solvent has evaporated and the fertilizer is completely dry.

Product Characterization Test

- Granule size distribution
- The morphology and surface characterization of the granules using *scanning electron microscopy* (SEM), This evaluation was carried out using a *scanning electron microscopy* (SEM) JEOL-JSM-6510LV.
- Fourier transform infrared spectroscopy (FTIR) analysis
This analysis was carried out using the PerkinElmer brand FTIR Universal ATR . type

Release test and determination of NPK levels :

- Release test on aqueous media
In this evaluation 5 grams of polymer -coated NPK was dissolved in 500 ml of distilled water . Samples were taken at an interval of 1-14 days , to be analyzed for nitrogen content (Tomaszewska & Jarosiewicz, 2004) ; (Chen et al., 2008) ; (Vashishtha, Dongara, & Singh, 2010) .
- Release test on slurry media
In this evaluation 5 grams of polymer -coated NPK was dissolved in 500 ml of mud water . Samples were taken at an interval of 1-14 days , to be analyzed for nitrogen content (Tomaszewska & Jarosiewicz, 2004) ; (Chen et al., 2008) ; (Vashishtha, Dongara, & Singh, 2010) .
- Release test on soil media
In this evaluation, 100 grams of dry soil were weighed. Then the dry soil is placed into a glass funnel that has been given a filter paper base. Then 3 grams of coated NPK samples were weighed. The weighed formula samples were then planted in dry soil on a glass funnel . The funnel is then placed in a glass bottle with a height of 27 cm. The soil in a glass funnel was moistened with 20 mL of distilled water, the wetting was carried out at a constant speed, namely at a water flow rate (flux) of 5 mL/minute. Where the highest rainfall in West Sumatra reaches 4000 mm / year, equal to 11.1 L per day / meter ² , equivalent to 11100 mL per day / meter ² or 7.71 mL per minute / meter ² (BMKG, 2014).
- Determination of NPK levels
Determination of total nitrogen content with this method is carried out based on the principle of the Berthelot reaction.

Reagent manufacture

- Preparation of N stock solution with a concentration of 2500 mg/L.
dissolved 11.793 grams of ammonium sulfate((NH₄)₂SO₄), with distilled water in a 1000 mL volumetric flask to the mark.

- b) Preparation of 10 mol/L . sodium hydroxide solution
 Dissolved 200 grams of sodium hydroxide (NaOH), with 400 mL of distilled water and let it cool and then add distilled water to make it 500 mL.
- c) Preparation of salicylate solution
 Dissolve 110 grams of salicylate (C₇H₆O₃) , in 105mL sodium hydroxide solution and add distilled water to make 250ml . (preferably made before use).
- d) Preparation of buffer solution pH 12.3
 dissolved 26.70 grams of disodium hydrogen phosphate dihydrate (Na₂ HPO₄ .2H₂ O), in a 2 liter volumetric flask, water. 10 mL of sodium hydroxide solution was added and diluted with the addition of distilled water to the limit mark , pH was measured and adjustments were made if necessary.
- e) Preparation of EDTA solution
 Dissolve 4 grams of disodium dihydrogen ethylene diamine tetraacetate dihydrate (Na₂ EDTA.2H₂ O) in 100mL of distilled water .
- f) Preparation of hypochlorite solution
 hypochlorite solution containing approximately 1 M sodium hypochlorite in 0.1 M NaOH, (must be purchased commercially) diluted 20 ml of this stock solution with distilled water to 100 ml (made fresh / *fresh* every day).
- g) Preparation of nitroprusside solution
 Dissolved 50 mg sodium nitroprusside dihydrate , Na₂ [Fe (CN)₅NO] .2H₂ O , in 100m distilled water , prepared prior to use .
- h) Mixed reagent I / *Mixed Reagent I*
 50 mL of salicylate solution (solution c) was mixed with 100 mL of nitroprusside solution (solution g) and added 5 mL of EDTA solution (solution e).
- i) Mixed reagent II / *Mixed Reagent II*
 200 mL of buffer solution (solution d) is mixed with 50 mL of hypochlorite solution (solution f).

Percent Coating

Coating efficiency can be determined by dissolving a known mass of product, M_{total} (g) in 100 mL of distilled water at room temperature (±24 °C, it must be ensured that the mass of NPK is below the saturation limit. To accelerate the dissolution of NPK polymer-coated granules) first crushed and then dissolved in distilled water. After the fertilizer is completely dissolved, then filtered using filter paper, it will obtain a residue (coating polymer) that is released from NPK. The residue is then washed with distilled water and then dried at a temperature of 120oC^{for} less over 4-6 hours, then weighed, M_{polymer} (g).

Coating efficiency is calculated by the equation:

$$\% \text{ penyalutan} = \frac{M \text{ residu polimer (g)}}{M \text{ total (g)}} \times 100 \quad (2)$$

Where: % coating is the percentage of polymer coated on NPK granules, M_{polymer} is the mass of polymer residue and M_{total} is the total mass (NPK + polymer) (Salman, 1988 ; Costa et al., 2013) .

Table 1 Coating polymer formula

Code Formula	Coating _	Coating polymer composition
		PP + PCL
F1	PP + PCL 0.1%	0.1
F2	PP + PCL 0.2%	0.2
F3	PP+PCL 0.4%	0.4
F4	PP + PCL0.6 %	0.6
F5	PP + PCL 0.8%	0.8
F6	PP+PCL 1%	1

RESULTS AND DISCUSSION

Granule size distribution analysis

The results of the measurement of the size distribution of granules, it is known that the granules are distributed with sizes ranging from 2 mm to 4 mm. The complete results can be seen in Table II.

Table II . Data on the measurement results of the size distribution of NPK granules.

Size range(mm)	Granule size distribution frequency (%)						
	NPK	F1	F2	F3	F4	F5	F6
2.0-2.2	5	3	2	1	2	1	0
2.3-2.5	12	6	7	9	9	10	9
2.6-2.8	10	8	9	10	9	12	11
2.9-3,1	6	10	9	11	11	14	10
3,2-3.4	8	10	11	6	9	6	9
3,5-3,7	3	10	9	8	7	5	8
3,8-4,0	6	2	3	5	3	2	3
Total	50	50	50	50	50	50	50

Morphology and characteristics of the coated NPK fertilizers

The results of the morphological examination using a *Scanning Electron Microscopy* (SEM) for NPK granules coated with a *bioblend polymer* Polypropylene + Polycaprolactone showed the morphology of NPK granules with a magnification of 100 0 times, the surface of the coating skin looked smooth, compact, and uniform, also appeared in some parts of the small granules. such as not fused , there are also pores in the NPK granules which are coated with a polymer solution . For more details can be seen in Figure I.

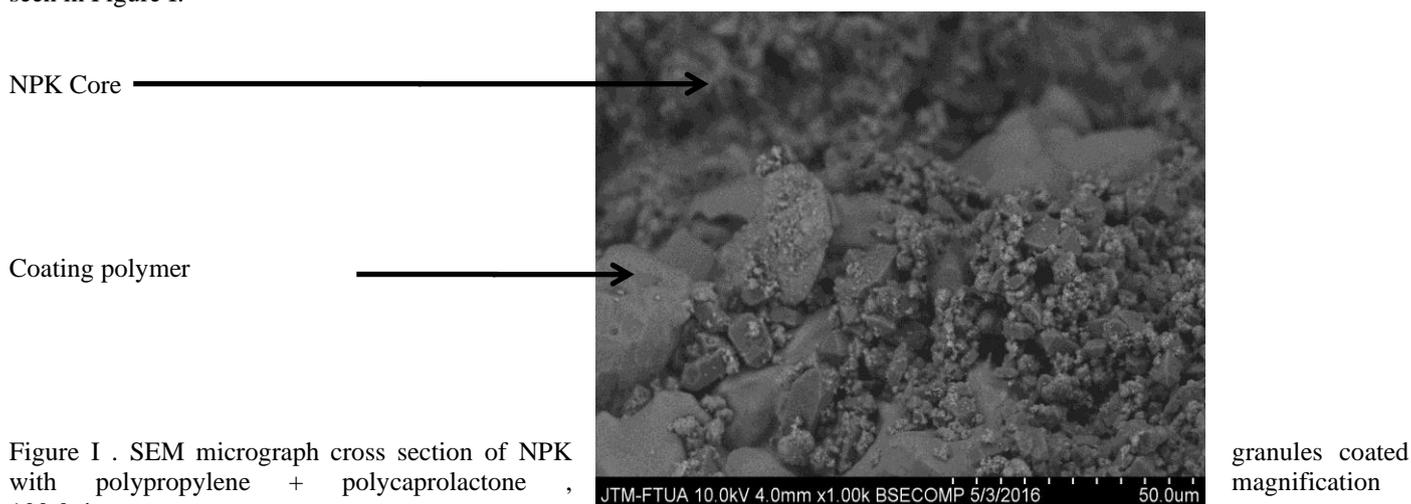
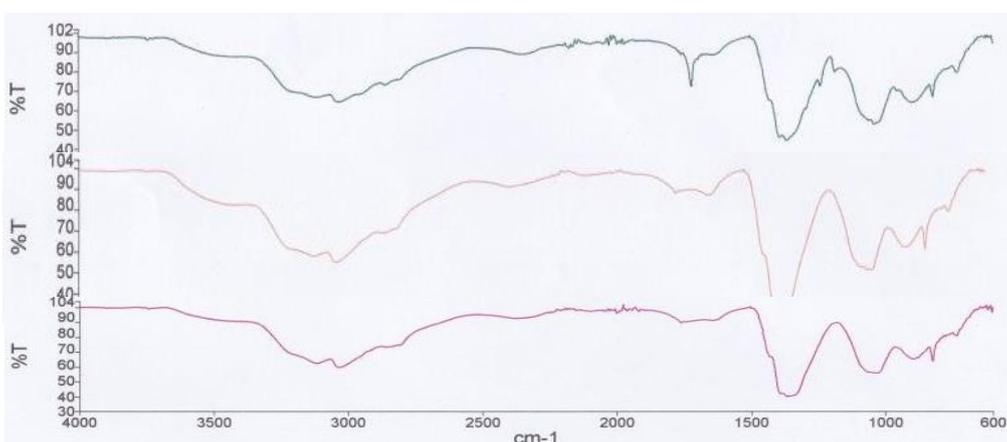


Figure I . SEM micrograph cross section of NPK with polypropylene + polycaprolactone , 100 0 times.

granules coated magnification

FTIR Analysis of Coating Shells

The spectrum of the FTIR test results from the NPK sample, polypropylene + polycaprolactone (*bioblend coated NPK*) , can be seen in Figure II.



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Figure 2 . FTIR spectrum *overlay* of pure NPK polypropylene, pure polycaprolactone, pure NPK and NPK coated with polypropylene + polycaprolactone.

Percent coating and coating efficiency

At a concentration of 0.1% + 10%, the coating efficiency is 10.65%, the coating efficiency is 91.02%, the concentration is 0.2% + 10%, the coating efficiency is 11.76%, the coating efficiency is 91.30%, the concentration is 0.4% + 10% obtained coating percentage 13.89% coating efficiency of 92.72%, concentration 0.6% + 10% obtained coating percentage of 15.58 % coating efficiency of 93.51 %, concentration 0.8% + 10 % obtained coating percentage of 17.96 % coating efficiency of 94.62 % while at a concentration of 1% + 10 % obtained coating percentage of 9.36% coating efficiency of 87.75 %. Details of the calculation of the percent coating measurement and the percent coating efficiency can be seen in Table III.

Table III . Measurement data of coating percent and coating efficiency

No.	Formula	Coating polymer weight (g)	Heavy NPK (g)	Percent Theoretical coating (%)	Initial weight of sample (g)	Weight of polymer residue (g)	Percent coating (%)	Coating efficiency (%)
1	PP+PCL 0.1 %	0.1 + 10	100	11.70	10	1.065	10.65	91.02
2	PP+PCL 0.2 %	0,2 + 10	100	12,88	10	1,176	11,76	91,30
3	PP+PCL 0,4 %	0,4 + 10	100	14,98	10	1,389	13,89	92,72
4	PP+PCL 0,6 %	0,6 + 10	100	16,66	10	1,558	15,58	93,51
5	PP+PCL 0,8 %	0,8 + 10	100	18,98	10	1,796	17,96	94,62
6	PP+PCL 1 %	1 + 10	100	10,70	10	0,939	9,39	87,75

CONCLUSION

From the results of the research that has been carried out, it can be concluded that : The results obtained from measuring the percentage of coating and coating efficiency are Polypropylene (PP) + Polycaprolactone (PCL) 0.1% concentration + 10% coating percentage 10.65 % coating efficiency 91 0.02%, 0.2% concentration + 10% coating percentage 11.76% coating efficiency 91.30%, concentration 0.4% + 10% coating percentage 13.89% coating efficiency 92.72%, concentration 0.6% + 10% coating percentage 15.58 % coating efficiency 93.51%, concentration 0.8% + 10% coating percentage 17.96 % coating efficiency 94.62 %, concentration 1% + 10% coating percentage 9.36% the coating efficiency is 87.75%.

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Profitability Analysis of Sugar Industry

Dr. Salma Banu

Assistant Professor of Commerce, University College of Arts,
Tumkur University, Tumakuru.

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Abstract

Every business is established to earn maximum return; therefore there is a need to evaluate profitability analysis of sample sugar factories in Karnataka. To know whether the profits earned by the sample factories is sufficient or not. Also to know whether sample sugar factories fulfil the requirements of shareholders and other stakeholders or not. Profitability analysis with reference to return on investment in sample sugar factories in Karnataka is undertaken. The study for this purpose evaluate the assets turnover ratio and also takes into account takes into account the profit margin of sugar factories.

Introduction

Profitability is ability of a business to obtain return on investment in such a way that which, meets all day to day expenses as well as handsome reserve of it must be kept aside to meet future contingencies and uncertainties. Profitability must be in a position to expand, diversify and modernize the business operations in future. It is profitability of a business which satisfies creditors and shareholders. If the profitability is good then company will be in a position to flourish the business otherwise the company will suffer from many problems.

The surplus available after meeting all direct and indirect expenses and also after meeting operational and non operational expenses and after paying dividend to the preference shareholders and equity shareholders. If the surplus is available it depicts the profitability of a business concerns. The reserve and surplus available makes an organisation financially sound and healthy.

Review of literature

Khudsiya Zeeshan, Syed Azhar, SSrinivasa Murthy¹, “ Profitability Analysis of Selected Private Equity Funds in India”, the study analyses the solvency and profitability of select private equity funds in India: Sequoia Capital India, Chrys Capital Everstone Capital Advisors Private, ICICI Ventures and West Bridge Capital. Solvency is determined by the debt to equity ratio, interest coverage ratio and proprietary ratio and profitability is determined using ratio such as return on total assets, return on investment and Earning per share. It can be concluded that there are significant differences in terms of the current ratio, debt to equity ratio, proprietary ratio and return on total assets ratio of select private equity funds in India, the test results also indicate that there is no significant difference in terms of return on shareholders funds return on investment and earnings per share. Hence, this ratio analysis is useful management tool to improve the understanding of financial results and Trends over time and can provide key indicators of organisational performance.

S.K. Tanwar, S.S. Chowhan², “ Liquidity Management and Profitability: A Study on Selected Public Sector Companies in India”, the present empirical study is designed to examine and analyse the industry practices in managing liquidity and profitability of the companies with the purpose of examining the performance of management in the area of financial management. The efficiency of

working capital management can be ensured by effective administration of various components of working capital inventory, receivables and cash. This study has attempted to examine efficiency and effectiveness of management in each of these cited areas. Inadequate amount of working capital is an indicator, and not an excuse, but by no means could be the cause of failure of business. The efficient and effective management of liquidity and profitability is, thus, crucially important for success of a business firm. Business firms need to optimise the use of available resources through efficient management of current assets and current liabilities. The present empirical study being designed with analytical approach (instrumental prospective) has dealt with primary and secondary data related to Working Capital Management in the selected public sector companies (such as Bharat Heavy Electricals Limited, Steel Authority of India Limited and Shipping Corporation of India, Shipping Corporation of India, have been collected from respective offices.

Ambika T³, “A Study on Profitability Analysis of Selected IT Companies in India”, The major objectives of the study are to examine and evaluate the financial performance and financial position of the selected IT companies. To analyse the profitability position of selected IT companies in India. To analyse the liquidity position of selected IT companies in India. To offer valuable suggestions for a better and improve the performance of selected IT companies in India. This study is explorative in nature and based on secondary data. The data for the study consists of various financial statements of selected Companies listed in Bombay Stock Exchange. The selected IT companies have been purposefully selected and used as sample for the study. In total, five companies are finally selected for research namely Tech Mahindra Limited, Infosys Limited, HCL Technologies Limited, Tata Consultancy Services Limited and Wipro Limited. The data has been collected from the official websites of the selected IT companies. The tools used for present study or ratio analysis mean and standard deviation. This study attempts to make to know the financial performance of selected IT companies in India and the overall performance are good.

Pandit Kumar Kanujiya⁴, “Analysis of Working Capital and Profitability: An Evident Study of Selected FMCG Companies in India”, in this research paper shows the relationship between Working Capital Management determinants on profitability. Working Capital Management is one of the preconditions for the financial management of any organisation or companies. This research paper the author’s aims maintaining an adequate amount of readily available cash resources in the business for carrying out the daily operations of the company. Profitability is dependent variables whereas determinants of working capital are independent variables such as average collection period, inventory turnover in days, average payment period were used to assess Working Capital Management, and return on total assets. In this study has considered sample of size of five FMCG companies in India over a five years period from 2013 to 2017. The analysis done by using OLS Regression show whether there is a significant relationship between these variables.

Senthil Kumar K., Sengottaiyan A⁵, “Determining the Profitability of Selected Textile Companies in India”, the objective of this study is to analyse the factors determining the profitability of selected textile companies in India and to suggest measures for effective operations and offer recommendations for the improvement of efficiency in textile industry. In the present study an extensive use of secondary data which are not gathered specially to meet the needs of the problem at hand. For this study, data have been collected for the period of fifteen years from 1997 to 2011. The published Annual reports from CMIE PROWESS database and other publications such as stock exchange official directory, Economics Times, Financial Express, RBI Bulletin and other periodical journals have also been used. The sample companies work KSL Industries Limited, Bombay Dyeing Company Limited, Skumars Nationwide Limited, Raymonds Limited, Vardhaman Textile Limited, Arvind Limited and National Textile Limited. The profit ratio is measured by sales will give a short term perspective of profitability because sales are annual flows. On the other hand, the return on assets will

gives long-term prospects of profitability. In this study, the ratio of return on capital employed is used as dependent variable in the specified model.

Research Gap

The above review of literatures reviewed, revealed that the study deals with solvency and profitability of select private equity funds of India, the solvency is determined by using debt-equity ratio, interest coverage ratio and proprietary ratio and profitability is determined using return on total assets, return on investment and Earning per share.

The study deals with liquidity management and profitability. The efficiency of working capital management can be ensured by effective administration of various components of working capital, inventory, receivables and cash. The efficient and effective management of liquidity and profitability deals with management of current assets and current liabilities.

The study deals with profitability analysis of selected IT companies in India. This study is explorative in nature and based on secondary data. The data for the study consists of various financial statements of selected Companies listed in Bombay Stock Exchange.

The study deals with analysis of working capital and profitability. The study shows the relationship between Working Capital Management and determinants on profitability. The profitability is a dependent variable, whereas working capital is an independent variable. The analysis done by using OLS regression show whether there is a significant relationship between these variables.

The last study deals with determining the profitability of selected textile companies in India. The objectives of the study are to analyse the factors determining the profitability of the selected textile companies and to suggest measures for effective operations and offer recommendations for the improvement.

It can be said that, various works have been undertaken on profitability analysis on equity funds, public sector companies, IT companies, FMCG companies and textile companies. But profitability analysis of sugar industry in Karnataka is scanty. Therefore there is a need to study the profitability analysis of select sample sugar factories in Karnataka. The study deals with return on investment in sample sugar factories in Karnataka.

Statement of the Problem

Profitability analysis with reference to return on investment in sample sugar factories in Karnataka is undertaken. The study for this purpose evaluate the assets turnover ratio and also takes into account the profit margin of sugar factories.

Objectives of the Study

- To evaluate the profitability with reference to return on capital in sample sugar factories in Karnataka.
- To offer suggestions.

Need for the Study

Every business is established to earn maximum return; therefore there is a need to evaluate profitability analysis of sample sugar factories in Karnataka. To know whether the profits earned by the sample factories is sufficient or not. Also to know whether sample sugar factories fulfil the requirements of shareholders and other stakeholders or not.

Scope of the Study

The study covers only select sugar factories in Karnataka and excludes all other public and co-operative sugar factories from the study. At the same time the period is confined to 10 years starting from 2005-2006 to 2014-2015, and the performance of selected factories before and after study period excluded.

Research Design

The study is nature of desk research.

Sources of Data: The data required for the study collected from secondary source. The secondary data obtained from the Annual reports of the selected factories; magazines, Government reports, newspapers, internet surfing etc.

Sample Design: As on October 2011, the population for the study comprises of 38 private sugar factories in Karnataka. With the use simple random sampling technique the researcher selected 10 Sugar factories in the Karnataka State. However due to non-cooperation of two factories (GEM and Jamkhandi Sugars Limited) in providing data they have been out of the study. This leaves eight factories as sample and represents the sugar industry. The sample factories are given below:

1. Parrys Sugars Limited (Parrys)
2. ShriPrabhulingeshwara Sugars and Chemicals Limited (Prabhulingeshwara)
3. Shree Renuka Sugar Limited (Renuka)
4. The Ugar Sugars Works Limited (Ugars)
5. Athani Farmers Sugar Factory Limited (Athani)
6. Davangere Sugar Limited (Davangere)
7. Sri Chamundeshwari Sugar Limited (Chamundeshwari)
8. Bannari Amman Sugars Limited (Bannari)

Here on words the sample factories are called in short names.

Tools of Analysis

The data collected analysed with the help of ratio analysis, trend analysis and statistical techniques wherever necessary to draw meaningful inferences.

Limitations of the Study

The figures taken from the annual reports have been rounded off to two decimals of rupees in Lakhs. The data available in financial statements have been translated into pre-designed the structure format so that a meaningful interpretation could be made through inter-firm and intra-firm comparison. The format in which data have been classified is selected after careful consideration of the operations of the sugar factories. Nevertheless, the limitations do in No way act as a deterrent in drawing effective and meaningful inferences from this study.

Analysis of Profitability with Reference to Capital Invested

Profit indicates the 'commercial ability' of a concern, but it does not indicate the level of efficiency of an undertaking. The efficiency of an undertaking cannot be judged by considering the volume of profits, without taking into account the size of investment. However, the degree of profitability helps in establishing a quantitative relationship between profit and volume of sales or the level of investment. To measure the efficiency of a concern, profit should be studied in relation to the amount of capital invested.

The most popularly used measure of profitability is to relate the profit output with the capital input and thus, compute the rate of return on capital invested. The return on investment is calculated as mentioned below:

$$\text{Return on Capital Invested (ROI)} = \frac{\text{Profit Before Interest and Taxes}}{\text{Total Assets - Intangibles}} \times 100$$

(or)

$$\text{Return on Capital Invested (ROI)} = \frac{\text{PBIT}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total Assets - Intangibles}}$$

(or)

$$\text{Return on Capital Invested (ROI)} = \text{Profit Margin} \times \text{Assets Turnover}$$

ROI is the result of the multiplication of the above two variables - profit margin and assets turnover, which by themselves are the products of a series of variables denoting various phases of business operations carried on during a given accounting period. Rapidity of the turnover of capital invested and profit margin are the two factors on which profitability of capital invested depends.

Return On capital invested (ROI) denotes how well the management has used the funds supplied by the creditors and owners. Apart from this, it shows earning power of the operating assets. The higher the ROI ratio, the more efficient the enterprise is in using the funds entrusted to it. This ratio provides an indication of the economic productivity of the capital. To put in nutshell, ROI is the key indicator of overall profitability of an enterprise.

The Du-Pont chart used by the (see Figure 1) Du Pont Company of the U.S. pioneered system ¹ of financial analysis, which has received widespread recognition and acceptance. This analysis of profitability with reference to capital employed has been applied for (ROI) in the present study.

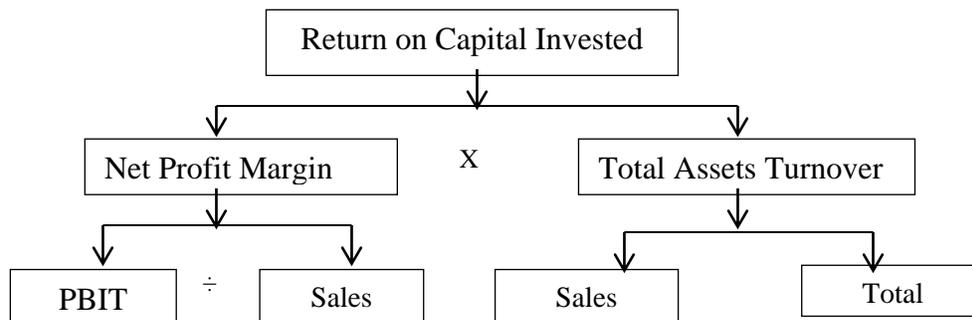


Figure 1 Du Pont Chart

The left - hand side of the Du Pont chart shows the determinants of net profit margin ratio and right hand side throws light on the total assets turnover. A comparison of the ratio of ROI of a firm with the individuals and the aggregate of similar firms over a period of time would provide sufficient insight into how efficiently the funds of owners and creditors are used. The overall profitability will improve if assets turnover or profit margin or both increase.

ROI in Sample Sugar Factories

Table-1 presents ROI and its components of combined position as well as individual factories. The ROI of sugar industry in Karnataka state had slid down from 12 Per cent in 2006 to one Per cent in the last year of the study period , on an average the

(ROI) being seven Per cent. In this context, it may be recalled that the standard norm is 10 - 12 Per cent, suggested by Winston and bring them.⁶Hence, the sugar industry profit performance was below the standard level. This clearly indicates that the sugar factories have enjoyed better returns on their resources during the years from 2006 to 2013, but afterwards the profit performance was totally uncomfortable.

Year-wise Analysis of ROI performance of sugar industry reveals a marked inconsistency. This happened due to declined assets turnover coupled with deteriorated profit margin. The factors that attributed to decrease the Asset turnover rate are falling sales, which was due to market uncertainties, production interruptions due to frequent power cuts, raw materials shortage, use of out-dated technology and improper monitoring and control operation cost which led to decline in profit margins ratio.

An Analysis of individual factories reveals that only Bannari have registered on an average ROI of 10 per cent. This factory had exceeded not only the industry but also reached the standard norm of 10 – 12 per cent. The ROI of Parrys, Prabhuligeshwara, Renuka, Ugar, Davangere and Chamundeshwari was 3.33 per cent, eight per cent, six per cent, five per cent, 6.1 per cent eight per cent and 6.3 per cent respectively, which is below minimum standard norm of ROI. There exist disparities in the ROI of sample sugar factories. Analysis of the ROI performance of individual factories is undertaken to find out the reasons for such disparities in profit performance.

Parrys

Inspite of variations in ROI, the Parry factory had occupied lowest position with 3.33 per cent on an average. The ROI of the factory varied between the minimum of negative four per cent in 2010-11 and maximum of 14 per cent in 2006, thereby reflecting poor profit performance. The reasons for inconsistency of ROI were continued demand recession supply and demand imbalances. The assets turnover and profit margin, on an average, were registered 0.44 times and 6.2 per cent respectively. These ratios have declined than the combined picture. However, the profitability performance was dissatisfied due to high operating expenses and lack of capacity utilization (Table 7.1).

Table-1
Return on Capital Invested (ROI) in Sample Sugar Factories

Particulars	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Averages
Consolidated											
ROI	12	13	6	9	8	6	8	7	-1	1	7
Assets Turnover	0.83	0.59	0.69	0.59	0.78	0.79	0.74	0.78	0.79	0.69	0.73
Profit Margin	14.33	21.54	8.12	14.49	10.44	7.67	10.36	9	-1	1	9.6
Parrys											
ROI	14	12	4	2	-3	-4	4	0.33	4	0	3.33
Assets Turnover	0.62	0.52	0.28	0.19	0.28	0.56	0.54	0.33	0.48	0.58	0.44
Profit Margin	22.78	22.23	15.73	10.09	-8.97	-6.36	6.77	1	8	0	6.2
Prabhulingeshwara											
ROI	11	5	14	9	7	8	6	7	4	4	8
Assets Turnover	0.6	0.78	0.57	0.7	0.6	1	0.74	0.69	0.84	0.69	0.72
Profit Margin	19.14	6.36	23.74	13.11	11.49	8.31	8.65	10	5	6	11.18
Renuka											
ROI	13	9	10	9	12	7	0	6	-5	-2	6
Assets Turnover	1.12	0.65	0.97	0.62	0.96	0.85	0	0.8	0.98	0.82	0.86
Profit Margin	11.64	13.1	9.99	13.7	12	8	0	7	-5	-2	7
Ugar											
ROI	6	2	7	9	-1	5	9	8	1	1	5
Assets Turnover	1.01	0.29	0.78	0.77	0.73	0.98	0.99	1.1	1.05	1	1
Profit Margin	5.72	6.65	9.09	11.8	-0.98	5.13	8.68	7	1	1	6
Athani											
ROI	7	5	6	10	7	6	8	7	8	3	6.1
Assets Turnover	0.45	0.34	0.44	0.71	0.35	0.48	0.89	0.5	0.62	0.31	0.51
Profit Margin	19.15	15.51	14.68	14.38	19.1	12.77	9.34	14	13	10	14.19
Table-1											
(Contd.)											
Particulars	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Averages

Davangere											
ROI	11	11	9	11	10	8	7	7	6	-1	8
Assets Turnover	0.77	0.59	0.7	0.86	0.78	1.17	0.61	0.67	0.84	0.55	0.7
Profit Margin	13.7	17.83	12.88	12.86	12.59	7	11.13	11	7	-2	10.4
Chamundeshwari											
ROI	8	8	4	6	8	13	6	5	3	2	6.3
Assets Turnover	0.36	0.37	0.31	0.41	0.39	0.76	0.73	0.67	0.61	0.69	0.53
Profit Margin	22.95	20.6	11.54	13.88	21.47	16.89	8.86	8	5	3	13.22
Bannari											
ROI	16	14	4	14	17	5	10	12	4	4	10
Assets Turnover	0.96	0.96	0.62	0.67	0.71	0.52	0.76	0.78	0.29	0.39	0.7
Profit Margin	16.87	14.14	7.04	20.36	23.38	9.5	13.78	16	14	10	13.12

Note: i) Return on Capital Invested and Profit Margin is Expressed as Percentage.

ii) Assets Turnover is Expressed as Number of Times.

Source: i) Appendix - I (A) to I(I); and

ii) Appendix - III (A) to III(I).

Prabhulingeshwara

The factory had recorded on an average ROI of eight per cent, which is nearer to the minimum standard level. The assets turnover and profit margin have oscillated from a minimum of 0.60 times in 2006 to the maximum of One times in 2011 and from five per cent in 2013 to 23.74 per cent in 2008 respectively. Consequently, ROI had also varied from four Per cent to 14 per cent over the years. The assets turnover had varied throughout the study period under reference. The profit margin had declined continuously accepting 2008 over the years under study. The factors responsible for this decline in profit margin are: adverse market conditions in the sugar board sector and an increase in interest rate and financial charges. Further, the factors attributed to the continuous decline in ROI over the study period are: increase in cost of goods sold, depreciation, administrative and selling expenses and other high financial costs. The factory's ROI performance was very poor at the end of last two years of the study. This was due to unfavourable market conditions, delayed stabilization of new facilities, excess capacity in the domestic and international markets, sluggish demand and growth because of fierce price competition, high interest and depreciation charges.

Renuka

The Renuka's overall profit performance (ROI) recorded, on an average, six per cent, which is far away from minimum standard norm. The ROI ranged from the minimum negatively five per cent in 2015 to the maximum of 13 per cent in 2006. The two components of ROI-assets turnover and profit margins-were marked with oscillations. The variation in the former ranged between 0.62 times in 2009 to 1.12 Times in 2006 and later from negatively five per cent in 2014 to 13.70 per cent in 2009. The factory had registered 13 per cent in 2006. The factory's ROI had suddenly started to decline from 13 per cent in 2006 and reached as low as negatively five Per cent in 2014. The reasons responsible for the lowest ROI are: decline in assets turnover due to weak economic conditions and recessionary trend prevailing in the most of the industries and steep competition prevailing in the market. However, the factory's management was trying hard to reach standard norm of ROI.

Ugar

Ugar recorded five per cent of ROI on an average, which is a faraway from the minimum standard level. The assets turnover and profit margin have oscillated from a minimum of negative 0.29 times in 2010 to the maximum of 1.1 times in 2013 and from negatively 0.98 per cent in 2010 to maximum of 11.80 per cent in 2009 respectively. Consequently ROI had also varied from negatively one per cent to nine per cent over the years. The assets turnover had declined continuously over the years under study. The profit margin had been decreased continuously over the year under study except in 2009. The factors responsible for this decline in profit margin are: adverse market conditions and an increase in interest rate and Finance charges. Further, the factors attributed to the continuous decline in ROI over the study period are: increase in cost of goods sold, depreciation, administrative and selling expenses and other financial costs. The factory's ROI performance was very poor at the end of the last two years of the study. This was due to unfavourable market conditions, delayed stabilization of new facilities, excess capacity in domestic and international markets, sluggish demand and growth because of fierce price competition, high interest and depreciation charges.

Athani

Athani's overall profit performance (ROI) recorded, on an average, six per cent, which is below the minimum standard norm. ROI ranged from the minimum of three Per cent in 2015 to the maximum of 10 per cent in 2009. The two components of ROI-assets turnover and profit margin- were marked with oscillations. The variations in the former ranged between 0.31 times in 2015 and 0.89 times in 2012 and later from 10 Per cent in 2015 to 19.15 per cent in 2006. The factory had registered 10 per cent ROI in 2009. The factors responsible for this are: high sales turnover with better product mix coupled with improved market demand and low operating costs. The factory's ROI had suddenly started to decline from 10 per cent in 2010 and reached as low as three Per cent by the end of the study period. The reasons responsible for the lowest ROI are: decline in assets turnover due to weak economic conditions and

recessionary trend prevailing in the most of the industries and steep competition prevailing in market. However, the factory's management was trying hard to reach standard norm of ROI.

Davangere

The factory had recorded on an average ROI of eight per cent which is nearer to minimum standard level. The assets turnover and profit margin have oscillated from a minimum of 0.55 times in 2015 to the maximum of 1.17 times in 2011 and from negatively two per cent in 2015 to the maximum of 17.83 per cent in 2007 respectively. Consequently, ROI had also varied from negatively one per cent to 11 per cent over the years. The assets turnover had been varied continuously over the years under the study. The profit margin had been constant in initial five years and then declined to negatively one per cent. The factors responsible for this decline in profit margin are: adverse market conditions, and increase in interest rates and financial charges. Further, the factors attributed to the continuous decline in ROI over the study period are: increase in cost of goods sold, depreciation, administrative and selling expenses and other high financial costs. The factory's ROI performance was very poor at the end of last one year of the study. This was due to unfavourable market conditions, delayed stabilization of new facilities, excess capacity in the domestic and international markets, sluggish demand and growth because of fierce price competition, high interest and depreciation charges.

Chamundeshwari

Chamundeshwari recorded 6.3 per cent of ROI on an average, which is far away from the minimum standard level. The assets turnover and profit margin have been oscillated from a minimum of 0.31 times in 2008 to the maximum 0.76 times in 2011 and from three per cent in 2015 to the maximum of 22.5 per cent in 2006 respectively. Consequently, ROI had also varied from two per cent to 13 per cent over the years in the study. The assets turnover had been declined continuously except in 2010 over the study under reference. The profit margin had been varied over the years under the study. The factors responsible to this decline in the profit margin are: adverse market conditions and increase interest rate and financial charges. Further, the factors attributed to the continuous decline in ROI over the study period are: increase cost of goods sold, depreciation, administrative and selling expenses and other high financial cost. ROI performance was very poor at the end of the last two years of the study. This was due to unfavourable market conditions, delayed stabilization of new facilities, sluggish demand and growth because of fierce price competition, high interest and depreciation charges.

Bannari

Bannari had occupied first position with regard to ROI with average ratio of 10 per cent on an average, which has reached the minimum standard level. ROI ranged between four per cent in 2015 and 17 per cent in 2010 thereby reflecting irregular behaviour. ROI in the initial year was higher than the standard norm because the factory enjoyed high assets turnover and high profit margin. From 2007 onwards, ROI started to decline and reached four per cent in 2008 due to decline in the assets turnover and profit margin. Again, it had shown it had shown a sudden rise in the year 2009 with 14 per cent and it continued till 2010. During this period, the factory's management was able to manage the operating cost at lowest level of the all the years of the study period. Thereafter, it had declined from 17 per cent in 2010 and reached to four per cent by the end of the study period. It is disconcerting to note that there was no relation between assets turnover and profit margin. Assets turnover and profit margin declined due to higher power cuts, slackness in the sugar market, continuous recession and severe competition. To sum up, the average ratio of ROI of Bannari was reached to minimum standard norm. It implies that the overall profit performance of this factory was comfortable. The reasons are: favourable demand for finished sugar, realization of better sale prices, effective utilisation of total assets and good profit margin. Further, all the sample factories registered the lowest ROI in the last two years of the study period, which was less than the minimum standard norm. The factors responsible for this situation are: sluggish market demand, price competition, recessionary trend prevailing in the most of the industries and high interest rate and financial charges. Sugar industry as whole and individual factories have reported wide

fluctuations year-wise in the profit performance. Only one factory is able to generate adequate profits since they acted positively to changing face. But majority of the sample factories selected for the study did fail, as the management of these factories were not vigilant.

Finding of the study

- The overall profitability position of sugar industry in Karnataka state had shown declining return on capital invested during the study period. It indicates that the overall profit performance of the sample sugar factories was uncomfortable and it is behind the hope and expectations of all stakeholders. The overall profitability position of sugar industry shows on an average was seven per cent of ROI which is lower than standard than norms of 10-12 per cent during the study the period under reference. The ROI of sample sugar industry was thin because of decline in capital turnover rate.
- Performance of sugar industry with reference to ROI exhibits intense disparities. The overall profitability of sample sugar factories was inconsistent. An analysis of individual sugar factory on an average that the ROI was satisfactory in Bannari and Davangere. The ROI of all other sample sugar factories was thin. Especially Parris had very thin ROI on an average of 3.33 per cent among all sample sugar factories under the study period.

Suggestions for the Study

- The practice of diversion of working funds for financing long-term assets shall altogether be stopped. This will help in improving the working capital condition of the factories. In fact, the generation of internal funds through fair profit performance and their diversion for current assets financing ensures strong liquidity of the sample factories.
- The sample factories are desperate need of financial support from commercial banks to augment their working capital funds. Commercial banks ought to provide working capital funds liberally at concessional rates of interest at least for a temporary period to tide over the present working capital crisis. Return on investment in the sugar industry has shown a declining trend. Shooting prices of inputs have put a severe strain on the sugar industry resulting in the inflated operating ratio. Therefore, the need of the hour is the effective control of operating costs. Adoption of profit planning and control techniques such as marginal costing, cost-volume-profit analysis, standard costing, activity based costing And flexible budgetary control system may enable the factories to push down the operating costs and boost up the profits.
- The quantum of sales should be improved progressively in order to maintain better capital turnover ratio and to enjoy higher returns on investment. To this end, qualitative sugar, which has high demand in the market, has to be produced.
- Cost of production of sugar per tonne of sugar manufactured has increased abnormally due to high operating costs and the phenomenal increase in the cost of inputs. Production of sugar at low-cost may be possible through the higher utilisation of capacity.
- Increase the price of sugar is one way to increase profits. Raising the prices of sugar is in the hands of Government. So, the Government should play a positive and constructive role while fixing sugar prices taking into account the realities. Otherwise, the sugar industry should be given freedom to fix selling prices of different varieties of sugar by prescribing a broader criterion for arriving at realistic selling prices.
- The main constituents in total cost of goods sold or administrative and selling expenses in sample factories. The amount spent on these, per tonne of sugar sold, has been very high. Excess expenditure in this area is also one of the reasons for low profit performance. So, factories have to reduce administrative and selling expenses.
- Shareholders of some of the sample factories are less satisfied about the performance of the factories, because of the absence of regular dividend. This trend is not conducive for further expansion of the industry. Therefore, the management of these

factories should put in sincere and committed efforts to improve the profitability of the factories to ensure fair return on shareholders.

Conclusion

Overall profitability performance of sugar industry in Karnataka state had shown declining trend in return on capital employed invested during the study period. However, Bannari have enjoyed better return up to 2013 and thereafter the profitability had tended to decline and other sample factories return on capital employed is below the minimum standard norms. It was due to weak economic condition and recessionary trend prevailing in the industries and steep competition prevailing in the sugar market which led to low sales price realisation. The uncomfortable ROI may lead to dissatisfaction of the stakeholders of the industry. As regards the individual factories, the ROI was comfortable in Bannari and uncomfortable in the other seven sample factories under observation. The industry's sales trends have depicted an overall rise with oscillation over the study period. But with regard to the individual factories, the sales trend registered a normal growth. There was no relation between sales and gross profit, since the increased sales did not lead to increase in gross profit in the industry and in all the selected factories.

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Pre pregnant weight a risk factor for Gestational Diabetes Mellitus

Bindu P*, John B Dominic **,Juby Ann **

* Department OBG,GMC Kollam

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Abstract

Introduction: Gestational Diabetes Mellitus is defined as glucose intolerance that is first recognized during pregnancy. This is associated with increased risk for adverse perinatal outcomes as well as long term complications of obesity and type 2 diabetes mellitus in mother and their children. The aim of this study was to identify the risk factors for Gestational diabetes mellitus.

Methodology:

Study design: Prospective nested case control study

Setting: Antenatal Out-Patient Clinic, Antenatal and postnatal Wards, labour room of a Tertiary care hospital

Sample size:With an estimated Odds ratio of 2 for risk factors, we need 100 GDM and 200 controls and with an estimate of 10% as GDM, we recruited a sample of 1000 Primigravidae patients attending the Out Patient Clinic at SAT Hospital, in the first trimester followed up and grouped into cases and controls depending on the GTT results.

Results: One thousand Primigravids were recruited and followed up. 960 patients were followed up till delivery and data collected; 240 developed gestational diabetes mellitus (cases) and the remaining 720 were taken as controls. The mean age of the study population 23.39yrs and that of the cases were 24.68yrs and that of the controls were 22.96yrs with significant difference.

The place of residence urban or rural, the educational status or the socioeconomic status did not show any significant difference for cases and controls in this study. The mean height of the cases was 155.68 cm and that of the controls were 155.40 cm and this did no show a significant difference between the cases and the controls.

There was significant difference with pre -pregnant weight of cases and controls. The mean Pre-pregnant weight of the cases was 56.69 kg and that of the controls were 49.2 kg with a mean difference of 7.48. The mean weight gain in pregnancy of the study population was 13.81 and ranged from 5kg to 29kg The mean Body Mass Index of the cases was 23.330and that of the controls were 20.355with a mean difference of 2.98 .

Conclusion: Prevalence of obesity and GDM is increasing worldwide. This Prospective nested case control study conducted at a tertiary care hospital to identify the risk factors for Gestational Diabetes Mellitus has identified pre- pregnant Body Mass index a strong risk factor which can be modified by reducing the pre-pregnant weight. This brings out the importance of health education of young women regarding healthy diet and exercise to prevent Gestational Diabetes mellitus and its adverse pregnancy outcomes, which is hazardous for the mother and the new born.

Index Terms- Body mass Index, Gestational Diabetes Mellitus (GDM), Glucose tolerance Test, (GTT), Pre pregnant weight.

INTRODUCTION

Gestational diabetes Mellitus complicates about 10 – 14% of pregnancies and the incidence is on the increase world wide. GDM is defined as glucose intolerance that is first recognized during pregnancy^(1,2).

This is associated with increased risk for adverse perinatal outcomes as well as long term complications of obesity and type 2 diabetes mellitus in mother and their children. The incidence of obesity has doubled according to global estimates in the last four decades, and over 30% of women are obese ⁽³⁾. Adipose tissue is an active metabolic organ and overweight and obesity before pregnancy increase the risk of main pregnancy complications such as hypertension and diabetes mellitus in pregnancy⁴.Maternal

obesity is reported as the strongest risk factor in most studies, but in several studies, overweight was more likely than obesity to increase the risk of these complications⁵.

Pregnancy is a diabetogenic state. Insulin resistance develops during pregnancy and there is considerable increase in the insulin secretion to compensate for this. In Gestational Diabetes the insulin resistance worsens and with reduced pancreatic cell reserve the impaired glucose tolerance is triggered. Excessive adiposity in obese women may promote a pro-inflammatory state and insulin resistance, which contribute to GDM development⁶.

Understanding the risk factors of gestational Diabetes Mellitus can help the clinicians identify those at risk and to make early diagnosis and intervention to reduce maternal and foetal complications.

Aim of this study was to identify the risk factors for Gestational diabetes mellitus among primigravids attending a tertiary care hospital for antenatal care.

METHODOLOGY

STUDY DESIGN

Prospective nested case control study

SETTING

Antenatal Out-Patient Clinic, Antenatal and postnatal Wards, labour room, Department of Obstetrics & Gynecology, Sri Avittom Thirunal Hospital, Medical College Thiruvananthapuram.

SAMPLE SIZE

With an estimated Odds ratio of 2 for risk factors, we need 100 GDM and 200 controls.

With an estimate of 10% as GDM, we need a sample of 1000 Primigravidae patients attending the Out Patient Clinic at SAT Hospital, in the first trimester.

Primigravida attending the antenatal OPD in first trimester is recruited into the study, 75-gram GTT is done before 12 weeks, at 24 – 26 weeks and at 32 – 34 weeks

DEFINITION OF CASES AND CONTROLS:

Cases: GDM as defined by WHO criteria; irrespective of gestational age a 75 gm Glucose challenge test in fasting state. Diagnosis of GDM will be made if the 2 hour plasma glucose is \geq 140 mg/dl in the study.

Controls: Pregnancies with euglycemia.

Inclusion criteria: Primigravida

Singleton gestation

Exclusion criteria: Past history of Diabetes Mellitus

Multifoetal gestation

Antenatal women attending the outpatient department of the hospital were recruited into the study after explaining the details of the study and taking an informed written consent. Detailed history taking and physical examination is done and data collected on a structured proforma. A 75 g Glucose tolerance Test (GTT) was done on the first visit and the subject is kept under follow up. Repeat GTT was done at 24-26 weeks of gestation and at 32- 34 weeks. Those who were found to have abnormal value of more than 140mg/dl were labelled as cases and others were taken as controls.

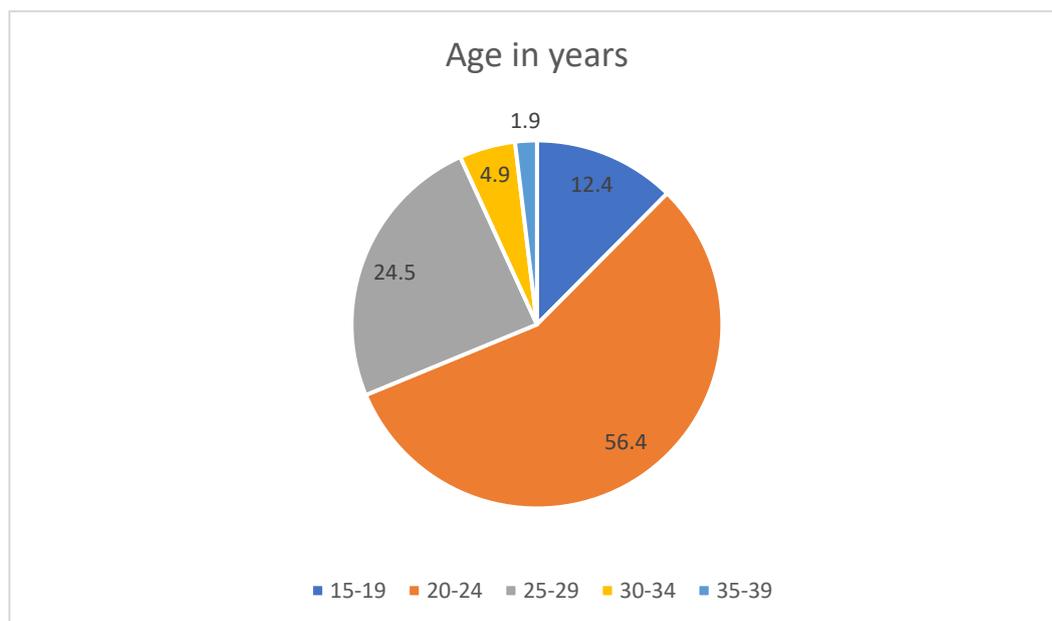
RESULTS

“Pre pregnant weight a risk factor for Gestational Diabetes Mellitus” was a nested case control study done at SAT hospital, Government Medical College, Trivandrum a tertiary care hospital.

One thousand Primigravids attending antenatal out patient department was recruited and followed up. 960 patients were followed up and data collected; 12 were excluded (multiple pregnancy, abortions, pregnancy of unknown location) and 28 (2.8%) were lost to follow up, Out of the 960 antenatal women who were followed up 240 developed gestational diabetes mellitus (cases) and the remaining 720 were taken as controls.

AGE

The mean age of the study population 23.39yrs and that of the cases were 24.68yrs and that of the controls were 22.96yrs



The majority of the study population 56.4% belonged to the age group of 20 – 24 yrs., 24.5% belonged to 25-29 years; 12.4% belonged to less than 20 years of age; 4.9% in age 30-34 yrs and 1.9% in the age group of 35-39 years.

PLACE OF RESIDENCE

Residence			
	Frequency	Percent	Cumulative Percent
Rural	889	92.6	92.6
Urban	71	7.4	100.0
Total	960	100.0	

The study was done in a tertiary care government hospital which takes care of mainly rural population. 92.6% of the study population were from rural areas and 7.4% resided in Urban areas.

EDUCATION STATUS

Education status	Frequency	Valid Percent
Middle school	9	.9
High school	166	17.3
Intermediate or Diploma	403	42.0
Graduate or Postgraduate	358	37.3
Professional	24	2.5
Total	960	100.0

Majority of the study population. 42% were Intermediate or Diploma holders, 37.3% of the study population were Graduate or Postgraduate; 17.3% High school, 2.5% Professional and 0.9% had middle school education.

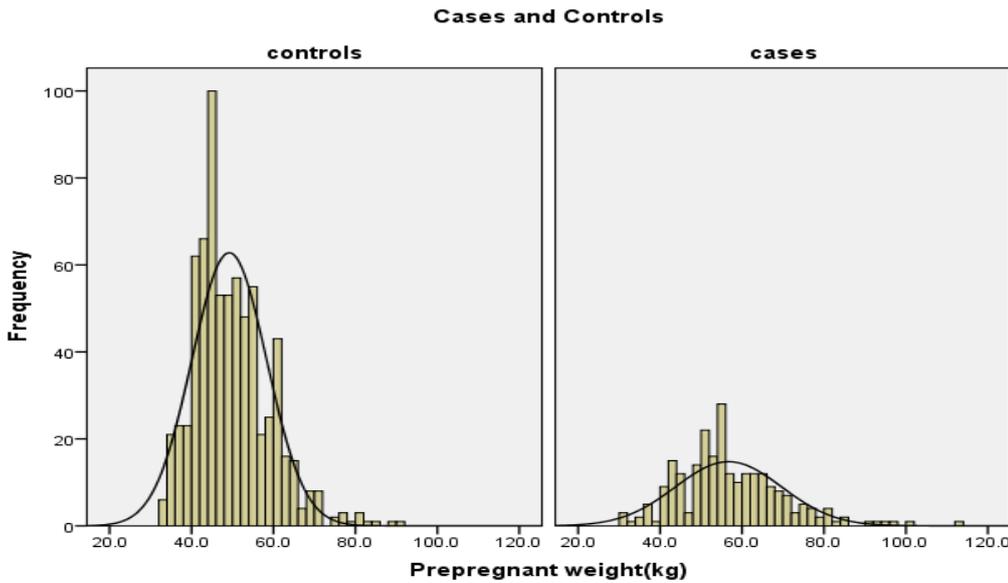
SOCIOECONOMIC STATUS

Modified Kuppuswamy’s scale was used to assess the socioeconomic status and majority of the study population 80.5% belonged to upper lower class.

HEIGHT

The mean height of the cases was 155.68 cm and that of the controls were 155.40 cm and this did not show a significant difference between the cases and the controls.

PRE-PREGNANT WEIGHT



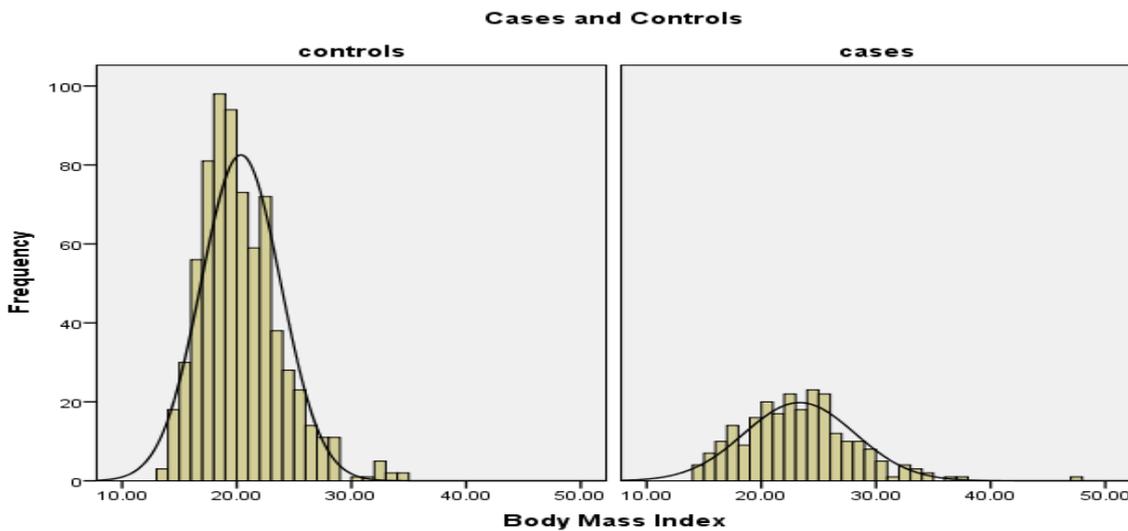
Pre-pregnant weight (kg)	N	Mean	Std. Deviation	Std. Error Mean	Mean difference	95% Confidence Interval of the Difference		t	Significance
						Lower	Upper		
cases	240	56.688	12.9679	0.8371	7.48	5.99	8.98	9.817	0.000
controls	720	49.200	9.1449	0.3408					

Statistical analysis showed significant difference with pre-pregnant weight of cases and controls. The mean Pre-pregnant weight of the cases was 56.69 kg and that of the controls were 49.2 kg with a mean difference of 7.48 (95% confidence interval 5.99 – 8.98) t 9.817; p< 0.001

BODY MASS INDEX(PRE-PREGNANT)

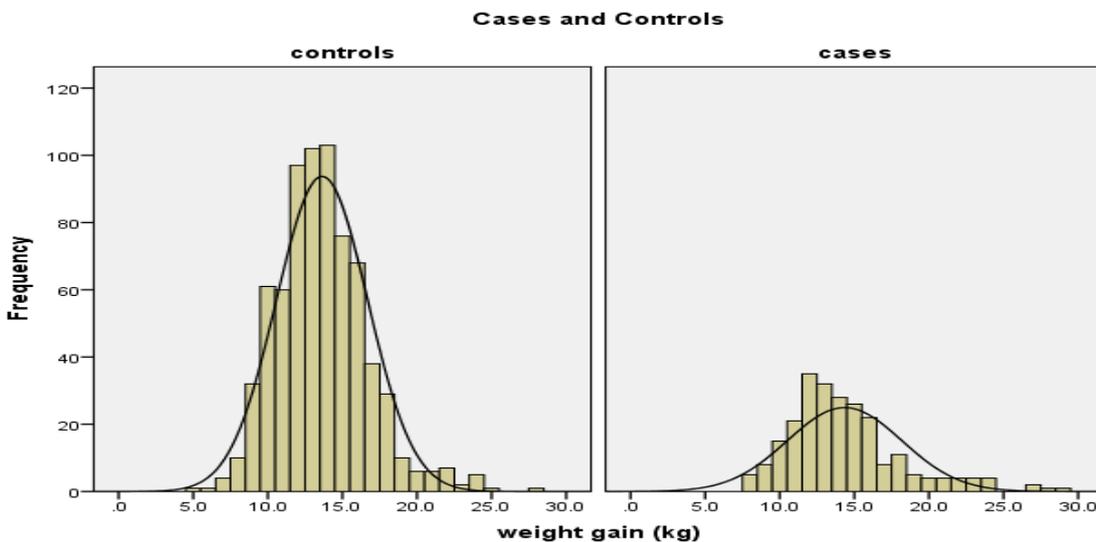
N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance
Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
960	33.84	13.38	47.23	21.0994	.13132	4.06893	16.556

The mean pre pregnant Body Mass Index of the study population was 21.099; of the cases was 23.330 and that of the controls were 20.355



The mean Body Mass Index of the cases was 23.330 and that of the controls were 20.355 with a mean difference of 2.98 (95% confidence interval 2.41 – 3.54) t 10.33; $p < 0.001$

WEIGHT GAIN IN PREGNANCY



The mean weight gain in pregnancy of the study population was 13.81 and ranged from 5kg to 29kg; the mean of the cases was 14.35 and that of the controls were 13.63 with a mean difference of 0.713 (95% confidence interval 0.23– 1.19) t 2.93; p 0.003

DISCUSSION

This study was conducted at a tertiary care hospital to identify the risk factors for Gestational Diabetes Mellitus. One thousand Primigravids attending antenatal out patient department was recruited and followed up. 28 (2.8%) women were lost to follow up 12 were excluded as they did not fit the inclusion criteria, Out of the 960 antenatal women who were followed up 240 developed gestational diabetes mellitus (cases) and the remaining 720 were taken as controls.

The majority of the study population 56.4% belonged to the age group of 20 – 24 yrs and the mean age of the study population 23.39yrs; that of the cases were 24.68yrs and that of the controls were 22.96yrs. The mean difference in age among cases and controls were significant with t test 6.279; p value $< .0001$. age more than 25yrs is identified as a risk factor in many studies published (7,8)

92.6% of the study population were from rural areas and 7.4% resided in Urban areas there was no significant difference among cases and controls as reported by other study by bhavadharani et al from Tamilnadu (9) Majority of the study population. 42% were Intermediate or Diploma holders, 37.3% of the study population were Graduate or Postgraduate and majority of the study population 80.5% belonged to upper lower class. Studies have reported that women with higher educational level was inversely associated with

risk of gestational diabetes mellitus however no significant association between household income and gestational diabetes was observed⁽¹⁰⁾

The mean height of the cases was 155.68 cm and that of the controls were 155.40 cm and this did not show a significant difference between the cases and the controls. Statistical analysis showed significant difference with pre-pregnant weight of cases and controls. The mean Pre-pregnant weight of the cases was 56.69 kg and that of the controls were 9.2 kg with a mean difference of 7.48 (95% confidence interval 5.99 – 8.98) t 9.817; $p < 0.001$. The mean Body Mass Index of the cases was 23.330 and that of the controls were 20.355 with a mean difference of 2.98 (95% confidence interval 2.41 – 3.54) t 10.33; $p < 0.001$. An increasing prevalence of GDM among groups with increasing pre-pregnancy BMIs⁽¹¹⁾ Many studies and meta-analyses have noted a relationship between BMI and GDM⁽¹²⁾ The risk factors identified for gestational diabetes mellitus are important especially the modifiable risk factors. BMI in which the pre-pregnant weight of the women and weight gain during pregnancy are modifiable risk factors which if taken care of can prevent gestational diabetes mellitus and its early and late complications to a large extent.

LIMITATION of the study was that it was done in a Tertiary care hospital where high risk population are dealt with hence there is limitation in generalizing the findings of this study.

CONCLUSION

The importance of GDM is that it causes adverse pregnancy outcomes, which is hazardous for the mother and the newborn. Prevalence of obesity is increasing worldwide. This Prospective nested case control study conducted at a tertiary care hospital to identify the risk factors for Gestational Diabetes Mellitus has identified Body Mass index at pre-pregnant state as a strong risk factor which can be modified by reducing the pre-pregnant weight.

This brings out the importance of health education of young women regarding healthy diet and exercise to prevent Gestational Diabetes mellitus and its maternal and foetal complications

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AUTHORS

First Author – Dr Bindu Policarp, MBBS,MD,DNB,MPhil, Government Medical College,Kollam ; bindupolicarp@yahoo.co.in.

Second Author – John B Dominic, MBBS, johnbdominic@gmail.com.

Level of knowledge of Science Instructors in Conducting Scientific Research and its Implications to Teaching

Hou Lu*, Dennis G. Caballes**

* Centro Escolar University – Mendiola, Manila
** De Lasalle – College of Saint Benilde – Manila

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Abstract- Scientific reflective thinking is what characterizes reflective teachers. Teachers who apply scientific principles in teaching are a product of scientific research. Thus, the knowledge of the instructors in scientific research has great implications for teaching. This study aims to assess the level of knowledge of the Science Instructors in conducting scientific research and determine its implications for their teaching methodology used. The respondents of the study will be the instructors of all science courses on the CEU Manila campus. The researchers will utilize an online survey questionnaire using scales to assess the instructor's level of knowledge in conducting scientific research in terms of information-seeking skills and research methodology. It will also identify the instructor's teaching and assessment methods. Further, it will determine the implications of instructors' knowledge in conducting scientific research and the teaching and assessment methods used. Descriptive statistics that include frequency and percentage, mean and standard deviations will be used. Science Instructors have satisfactory knowledge of information-seeking skills and the highest knowledge is the basic searching, gathering, and storage of information or data in disk or email. However, critiquing and validation of information gathered is the lowest rated. Instructors mostly used basic teaching methods such as lectures and classroom discussions. However, the instructors as utilized collaborative classwork which is considered a constructivist approach to teaching. Instructors need to attend continuous training in the conduct of the research process so they will have increased knowledge and information on other strategies for the teaching and assessment process. This study is limited only to the participants the study and does not generalize the conclusions to all science teachers.

Index Terms- Scientific research, Science Instructors, Teaching methodology, assessment methodology

I. INTRODUCTION

Science teachers are being prevented from being active and effective consumers of educational science due to a lack of orientation and training on how to understand the scientific process and how this process results in cumulative growth that leads to validated educational practice [1]. Educational practice is informed by formal scientific research through the use of research-based knowledge.

Instructors started their formal scientific research in their university profession preparation courses. As they become professional teachers continue their exposure to formal scientific research by subscribing to and reading professional journals and conducting scientific research. And this is becoming a requirement for them as part of their acquisition for graduate studies and becoming lifelong learners. Scientific reflective thinking is what characterizes reflective teachers. Teachers who apply scientific principles in teaching are a product of scientific research. Thus, the knowledge of the instructors in scientific research has great implications for teaching.

This study aims to assess the level of knowledge of the Science Instructors in conducting scientific research and determine its implications for their teaching methodology used. The assessment of Instructors' knowledge in conducting scientific research is important to determine their capability in conducting research. This will also be vital in determining the translation process of using research reports in teaching and assessment methodology. The results of the study will also be beneficial to educators teaching in science education because they can identify the implications of conducting scientific research in teaching. Further, administrators of science education can use the results of the study to plan for the improvement of instructors' knowledge in research and plans to utilize this in teaching and assessment methodology.

Research on science teaching and learning plays an important role in helping all students become proficient in science education[2]–[4]. This also helps instructors equipped with information on the latest strategies for science teaching[5], [6] and assessment

methods[7]–[9]. Research can help teachers what works and why, what the short and long-term implications are, provide a justification and rationale for decisions and actions, help to build a repertoire to help deal with the unexpected, identify problems, inform improvement, and so forth [10].

Research is embedded into initial teacher education because as research is embedded into the teacher's practice it can gain a range of benefits. It will help find solutions to problems arising in the classroom or school. Research underpins professional learning of knowledge, skills, and understanding. It connects the teachers to information and networks for professional support. It clarifies purposes, processes, and priorities when introducing change for example to curriculum, instruction, or assessment. It improves understanding of the teacher's professional and policy context, organizationally, locally, and nationally, enabling the teachers to teach and lead more strategically and effectively. Finally, it will help develop the teacher's institution or agency, influence, self-efficacy, and voice within their school and more widely within the profession (Austin, 2021).

General objectives

To determine the level of knowledge of Science Instructors in conducting scientific research and its implication for teaching

Specific objectives

1. To describe the profile of the Science Instructors according to:
 - 1.1 age,
 - 1.2 gender,
 - 1.3 science course handled
 - 1.4 years of teaching experience,
 - 1.4 years of experience conducting scientific research,
2. To assess the level of knowledge of Science Instructors in conducting research according to:
 - 2.1 Information-seeking skills
 - 2.2 Research methodology skills
3. To identify the teaching and assessment methods of Science Instructors
4. To determine the implications of conducting scientific research in teaching

II. METHODOLOGY

It's The present study utilized a descriptive research design. This design was utilized to assess the Science Instructors' Level of knowledge in conducting scientific research and teaching methodology. This is also to determine the implications of the instructors' level of knowledge in conducting scientific research and their teaching and assessment methodology.

The population included Science Instructors in the selected schools. Respondents were determined utilizing the set inclusion and exclusion criteria. The total sample included 20 Science Instructors from Centro Escolar University. The samples were chosen using the purposive sampling technique. The total respondents do not represent most of the faculty in CEU but are only representative of the population. Because of the limitation of time, the pandemic, and the online set up the researchers had difficulty obtaining the majority of the responses from the faculty online.

Inclusion criteria:

1. Instructors must be handling science courses for the last 1 year
2. The instructor must be conducting scientific research with at least 2 research papers
3. The instructor must be a full-time faculty of the selected school's

Exclusion criteria:

1. Instructors not handling science courses
2. The instructor not conducting scientific research, or with only 1 research paper
3. Instructor on a part-time basis only
4. The instructor who refused to participate in the study

Respondents who refused to participate in the study or withdraw their participation in the study were excluded from the total respondents of the study.

Ethical Considerations

The research proposal was submitted and approved in the chosen school for the conduct of research on human subjects. Participation in the study is voluntary and the respondents did not receive any financial benefit. The participants have the right to refuse participation or withdraw anytime during the conduct of the study without fear of retribution in terms of money or their employment. For the protection of participants' data privacy, all data was stored in the cloud (Gmail accounts) and accessed only by the researchers involved in the study. The principle of confidentiality and anonymity was safeguarded during the conduct of the study. Respondents'

information was coded to ensure the anonymity of the data. Further, the researcher ensured that none of the participants' names or personal details were included in the report of the study findings.

The research study was conducted at Centro Escolar University, Manila campus. The school was chosen as the setting of the study because it caters to learners enrolled in science education. The accessibility of the setting and the respondents were also considered. The school is also where the researcher is enrolled as a graduate student.

The study utilizes a self-report questionnaire. Using a self-report survey tell more than what the participants know or do, and this delimits the findings. The questionnaire is divided into three parts: (1) participant's demographic profile section, (2) rating scales for the instructor's level of knowledge in conducting scientific research, and (3) rating scales for the teaching methodology used. The demographic profile section asks about the instructors' profile (age, gender, courses handled, year of experience, year of experience in conducting scientific research). The instrument to assess the Instructor's level of knowledge in conducting scientific research is based on the study of Meeran and colleagues Developing an instrument to measure research skills [11]. It measures the sub-variables: Information seeking skills, and Research methodology skills. The Likert scale uses four scores (i.e., 5-strongly agree, 4-agree 3-neither agree nor disagree 2-disagree, 1-strongly disagree). The instrument to describe the instructor's teaching and assessment methods are adapted from the study of Akiri et al. (2021) in their study Teaching and Assessment Methods: STEM Teachers' Perceptions and Implementation. This includes assessment of instructors' teaching and assessment methods. The Likert scale uses four scores (i.e., 4-applies to me to a great extent 3-applies to me to a moderate extent 2-applies to me to some extent 1-does not apply to me

The instrument was reviewed by two experienced educators for clarity, accuracy, content, and face validity. The instruments have undergone reliability tests to determine internal consistency using Cronbach Alpha statistics. A Cronbach alpha statistic of 0.80 was obtained which means that the instruments are reliable for use. The data collection process was conducted online via a Google survey. The Google survey was utilized for the questionnaire. The participants were allowed to ask questions and additional explanations related to the questionnaire contents. Online surveys and interviews were used because of the pandemic and heightened restrictions.

To analyze the research variables, the study used descriptive analysis. Frequency and percentage distribution were used to describe respondents' profiles. Mean scores (M) and standard deviations (SD) to assess the Instructor's level of knowledge in conducting scientific research were used as quantitative analysis, The mean score for each descriptor was interpreted using the following scales: 3.18 to 4.00 (very satisfactory/to a great extent, 2.34 to 3.17 (satisfactory/ applies to me to a moderate extent), 1.51 to 2.33 (Poor)/applies to me to some extent, 0 to 1.50 (Very poor)/ does not apply to me. To determine the implications of the instructor's level of knowledge in conducting scientific research and their teaching and assessment methods,

III. RESULT AND DISCUSSION

Profile of the Science Instructors

The profile of the respondents is presented in Table 1. Respondents age ranges from 51-55 years old (N=7, 35%), 30-35 years old (N= 5=25%) and 41-45 year old (N=4, 20%). Almost a quarter of the respondents is in the 51-55 years age group. The majority of them are female (N=16=80%), with 16-20 years (N=6, 30%) and 1-5 years (N=6=30%) teaching experience. The majority of them also have only 1-5 years of experience conducting scientific research (N=16, 80%).

The data shows that the instructors are almost old and female. The instructors also have high years of teaching experience compared to fewer years of conducting scientific research.

Table 1 Profile of the Respondents

Profile	Frequency	Percentage
Age		
30-35 years old	5	25%
36-40 years old	2	10%
41-45 years old	4	20%
46-50 years old	1	5%
51-55 years old	7	35%
56-60 years old	1	
Sex		

Male	4	20%
Female	16	80%
Years of teaching experience		
1-5 years	6	30%
6-10 years	2	10%
11-15 years	3	15%
16-20 years	6	30%
20 years and above	3	15%
Years of experience conducting scientific research		
1-5 years	16	80%
6-10 years	2	10%
11-15 years	2	10%

Level of knowledge of Science Instructors in conducting research

The level of knowledge of science instructors in conducting research is determined by the two independent variables. This includes their knowledge of information-seeking skills and research skills. Tables 2 and 3 show the level of knowledge of science instructors in conducting scientific research.

Table 2: Level of knowledge of Science Instructors in conducting research according to Information seeking skills

Information seeking skills	Mean	SD	Rank	Verbal Interpretation
1. Premeditating the types of information that I need like books, articles, journals, and others.	3.50	0.50	5	Very Satisfactory
2. Awareness that information found in journals is more often checked, edited, and criticized compared to information found in magazines	3.55	0.50	4	Very Satisfactory
3. Awareness that information can be obtained through various means (e.g. electronic media, images, audio, and video).	3.55	0.59	4	Very Satisfactory
4. Awareness that the primary source is the first source (original source) that records work related to the literature	3.60	0.49	2	Very Satisfactory
5. Awareness that the secondary source is the source that discusses the work of others	3.25	0.70	9	Satisfactory
6. Use of other sources besides the library in my institution such as the inter-library loan service	3.30	0.56	8	Satisfactory
7. Identification and looking for synonyms, themes, or keywords that can be used to find information based on my topic.	3.65	0.57	3	Very Satisfactory
8. Finding information by reading general texts like dictionaries or encyclopedia articles to gain more understanding of the terminologies used in my topic	3.55	0.50	4	Very Satisfactory
9. Broadening my search using keywords given that the existing source of information indicates that my topic of research is too narrow	3.40	0.49	6	Satisfactory
10. Use of truncation (or shortcuts) in my search or use of root words to start my search	3.25	0.62	9	Satisfactory
11. Finding a book based on the title given	3.25	0.70	9	Satisfactory
12. Searching according to the field to identify the titles of the materials according to a particular field	3.55	0.59	4	Very Satisfactory
13. Looking at the strategy to find the information again to get exactly what I want if it is not successful the first time.	3.35	0.57	7	Satisfactory
14. Evaluating the writer's expertise to see if he/she is qualified in the written field	3.15	0.65	10	Satisfactory
15. Evaluating the accurateness of the content by reading other sources mentioned by the writer	3.15	0.57	10	Satisfactory
16. Understanding the contextual effect for instance how various	3.40	0.49	6	Satisfactory

cultures, history, and geography can influence the perspective of the information				
17. Realizing that time is a factor that influences the relevance of the information to my topic of research	3.65	0.48	3	Very Satisfactory
18. Confirmation of my understanding of a certain topic by getting an opinion or an expert's view (through individual interviews, email, telephone, and others)	3.55	0.59	4	Very Satisfactory
19. Searching for information by arranging each item systematically	3.35	0.57	7	Satisfactory
20. Adjustment with the various quotation styles used	3.35	0.57	7	Satisfactory
21. Searching for information using a database and storing it on my disk or to email it to my email	3.70	0.56	1	Very Satisfactory
22. Recording quotations in order to seek information	3.35	0.73	7	Satisfactory
23. Writing down the important concepts myself using my own words	3.40	0.49	6	Satisfactory
24. Using the main ideas obtained from the information researched to support my topic	3.50	0.59	5	Very Satisfactory
25. Combining the main ideas from one source or more to form a new idea.	3.30	0.64	8	Satisfactory
26. Constructing my conclusion based on the information gathered	3.55	0.59	4	Very Satisfactory
Average Mean	3.20	0.57		Satisfactory

The level of knowledge of science instructors in terms of information-seeking skills is rated to be satisfactory ($M=3.20$, $SD=0.57$) (Table 2). The highest-rated is criterion #21 "Searching for information using a database and storing it on my disk or to email it to my email" ($M=3.70$, $SD=0.56$) which is verbally interpreted as very satisfactory. While the lowest rated is criterion 14 "Evaluating the writer's expertise to see if he/she is qualified in the written field" ($M=3.15$, $D =0.65$) and 15 "Evaluating the accurateness of the content by reading other sources mentioned by the writer" ($M=3.15$, $SD= 0.57$).

The data shows that science instructors have satisfactory knowledge of information-seeking skills and the highest knowledge is the basic searching, gathering, and storage of information or data in disk or email. However, critiquing and validation of information gathered is the lowest rated. Information on the internet is vast and there is a need to determine the source of information if it is valuable or pertinent. Evaluation criteria must include accuracy, authority, objectivity, currency, and coverage. The instructor should determine who is the author and their qualifications and expertise. Gathering information consist of a literature review in which the instructor needs to review the information that is scholarly works. Most databases contain articles of different types.

The information-seeking skills pedagogy knowledge described in the study by Dahlqvist (2021) is defined as the base from which learning activities are enacted, and measurable normative outcomes of learning. Science instructors use information-seeking skills as a basis for their teaching and assessment methodologies[2], [5], [14]–[16].

Table 3: Level of knowledge of Science Instructors in conducting research according to Research methodology skills

Research Methodology skills	Mean	SD	Rank	Verbal Interpretation
1. Ability to plan a research	3.30	0.64	2	Satisfactory
2. Developing a research question	3.40	0.66	1	Satisfactory
3. Searching for a research problem	3.40	0.58	1	Satisfactory
4. Doing a literature review	3.30	0.64	2	Satisfactory
5. Design an experiment study	3.05	0.59	4	Satisfactory
6. Selecting an instrument	3.30	0.56	2	Satisfactory
7. Developing an instrument	2.95	0.59	6	Satisfactory
8. Collecting survey data	3.40	0.58	1	Satisfactory
9. Writing an abstract	3.05	0.59	4	Satisfactory
10. Preparing a manuscript for publication	2.85	0.73	7	Satisfactory
11. Selecting an appropriate research method	3.10	0.77	3	Satisfactory
12. Choosing an appropriate method of analysis of data	3.10	0.77	3	Satisfactory
13. Interpreting the result of a research study	3.00	0.71	5	Satisfactory

Average Mean	3.17	0.65		Satisfactory
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The level of knowledge of science instructors in conducting research according to research methodology skills is rated as satisfactory (M=3.17, SD=0.65). The highest-rated is criterion # 2 “ *Developing a research question*” (M=3.40, SD=0.66), 3 “*Searching for a research problem*” (M=3.40, SD=0.58), and 8 “*Collecting of survey data*” (M=3.40, SD =0.58). The lowest rated is criterion # 7 “ *Developing an instrument*”.

The data shows that the instructors have satisfactory knowledge of performing research methodology. They have satisfactory knowledge in developing a question, searching for a problem, and collecting survey data. However, the lowest-rated is their knowledge to develop an instrument.

A practical guide for instrument development and validation was introduced by [17]. He introduces the MEASURE approach to instrument development. This includes **Making** the purpose and rationale clear, **Establishing** an empirical framework, **Articulating** a theoretical blueprint, **Synthesizing** content and scale development, **Using** expert reviewers, **Recruiting** participants, and Evaluating validity and reliability.

The instrument development and validation is a tedious process that allows researchers to use their knowledge of the research problems and methodology. The use of peer reviews in instrument development, and validation is necessary to determine the reliability of instruments.

Teaching and Assessment methods of Science Instructors

The teaching methods used by science instructors are described in Table 4. The majority of them rated demonstrations as the most common method applied to them to a great extent (M=3.60, SD= 0.58). Lecture (M=3.55, SD=0.80), class discussion (M=3.5, SD=0.59) and collaborative classwork (M= 3.55, SD=0.59) comes next. The last rate is the use of experiments as a teaching methodology (M= 3.10, SD=0.77).

The results show that instructors mostly used basic teaching methods such as lectures and classroom discussions. However, the instructors as utilized collaborative classwork which is considered a constructivist approach to teaching. Constructivism is a learning theory that holds that knowledge is best gained through a process of reflection and active construction in mind. The learner must consider the information being taught and - based on past experiences, personal views, and cultural background - construct an interpretation [6], [18].

Table 4: Teaching methods of Science Instructors

Teaching methods	Mean	SD	Rank	Verbal Interpretation
1. Lecture	3.55	0.80	2	Applies to me to a great extent
1.2. presentations	3.40	0.80	4	Applies to me to a moderate extent
1.3 short videos	3.25	0.83	6	Applies to me to a moderate extent
1.4 demonstrations	3.60	0.58	1	Applies to me to a great extent
Collaborative classwork (M= 2. Interactive teaching methods-	3.55	0.59	2	Applies to me to a great extent
2.1Class discussion				
2.2Collaborative classwork	3.55	0.59	2	Applies to me to a great extent
2.3computerized learning	3.50	0.59	3	Applies to me to a great extent
3.3. Teaching methods combining formative assessment – also referred to as assessment for learning	3.10	0.77	8	Applies to me to a moderate extent
3.1 experiments				
3.2 worksheets	3.30	0.56	5	Applies to me to a moderate extent
3.3 Inquiry-based learning	3.30	0.64	5	Applies to me to a moderate extent
3.4 project-based learning	3.20	0.51	7	Applies to me to a moderate extent
Average Mean	3.39	0.66		Applies to me to a moderate extent

The assessment methods used by the science instructors are described in Table 5. The use of standardized tests that include open-ended and closed-ended questions applies to them to a great extent (M= 3.50, SD= 0.59) followed by standardized questions with open-ended questions (M= 3.40, SD=0.58) and standardized questions with closed-ended questions (M= 3.30, SD=0.64). The lowest rated is the use of experiment reports which applies to them to a moderate extent (M= 2.70, SD= 0.71).

The results show that the science instructors used the usual standardized questions with open-ended and closed-ended questions. Experiment report is not common to the instructors because all of them are teaching nursing subjects that do not require the conduct of experiments. Oral tests are seen to be also common in this course where students are used to oral revalida examinations. Oral exams provide many benefits, including assessing the deeper levels of student understanding, providing instant feedback to students, and developing students' oral communication skills (Hazen, 2020).

Table 5: Assessment methods of Science Instructors

Teaching methods	Mean	SD	Rank	Verbal Interpretation
1. Traditional Assessment			1	Applies to me to a great extent
1.1 Standardized tests with open-ended and closed-ended questions	3.50	0.59		
1.2 Standardized tests with open-ended questions	3.40	0.58	2	Applies to me to a moderate extent
1.3 Standardized tests with closed-ended questions	3.30	0.64	3	Applies to me to a moderate extent
2. Alternative Assessment	2.70	0.71	8	Applies to me to a moderate extent
2.1 Experiment report				
2.2 Project portfolio	2.90	0.54	7	Applies to me to a moderate extent
2.3 Inquiry portfolio	2.95	0.50	6	Applies to me to a moderate extent
2.4 Computerized assessment	3.05	0.59	5	Applies to me to a moderate extent
2.5 Oral tests	3.25	0.77	4	Applies to me to a moderate extent
Average Mean	3.13	0.62		Applies to me to a moderate extent

Implications to teaching

The limitations of this study include only 20 participants, thus inferential statistics is not advisable to determine the relationship of variables and determine the implications of the two variables: level of knowledge in conducting research and teaching and assessment methods of the instructors. Thus, descriptive research was only used in this study to describe the variables and determine possible implications for teaching[19].

The instructors have a satisfactory knowledge of the conduct of research but only on a basic process of formulating problems. However, higher knowledge of evaluating, synthesizing, and critiquing information gathered is necessary for them to develop. Further, the instructors are only using basic teaching and assessment methodologies and do not expand more on other strategies.

The information gathered is useful in the application and use of the teaching and assessment methodologies. Therefore, if instructors do not know how to synthesize, and evaluate the information they have gathered they cannot also apply it in the real setting of teaching. This will be true in this study where teachers only know the basics of the research process and teaching and assessment methodologies.

IV. CONCLUSION

Instructors have basic knowledge of conducting scientific research. They have difficulty evaluating and critiquing the validity of the information. The only teaching and assessment methodologies used are also the basic lecture and classroom discussions as well as the use of standardized examinations. Instructors need to attend continuous training in the conduct of the research process so they will have increased knowledge and information on other strategies for the teaching and assessment process. This study is limited only to the participants the study and does not generalize the conclusions to all science teachers.

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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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AUTHORS

First Author – Hou Lu, is currently a MAN RN graduate at Centro Escolar University. She earned her Bachelor of Nursing Degree at Centro Escolar University in the Philippines in 2013. She is currently taking her Doctor of Philosophy major in Science Education at Centro Escolar University, Manila. Hou Lu, PhD - CAR, Centro Escolar University - Manila, 61522636@qq.com

Second Author – Dr. Caballes is a Cum Laude graduate of Philippine Normal University with the degree of Bachelor of Secondary Education Major in General Science and an alumnus of De La Salle University Manila from Master's up to Doctorate level with the degree Master of Arts in Teaching Major in General Science and Doctor of Philosophy in Science Education Major in Biology respectively. He is the former Chairperson and Faculty of Chemistry and Life Sciences Department, Researcher, Statistician and Laboratory Chairman of the Manila Doctors College (now Manila Tytana Colleges). Dr. Caballes was a recipient of Sen. Angara and Sen. Roco Scholarships during his college years and a full scholar of DLSU-Manila in his graduate studies. He is likewise a Licensed Professional Teacher and a Civil Service Certified Eligible. He is currently teaching in the graduate programs of Centro Escolar University, The National Teachers College, De La Salle-College of Saint Benilde, Chiang Kai Shek College, and Ateneo de Manila University. College of Saint Benilde, dennis.caballes@benilde.edu.ph

Correspondence Author – Hou Lu, PhD - CAR, Centro Escolar University - Manila, 61522636@qq.com

Digital Innovation And Organizational Performance Of Kenya Commercial Bank Branches In Nairobi City County, Kenya

Stephen Kagwima Njau *, Dr. Linda Kimencu **

* Postgraduate student, MBA in Strategic Management, Kenyatta University, Kenya

** Lecturer, School of Business Administration, Kenyatta University, Kenya

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Abstract- The Kenyan banking sector is characterized by rapid changes and demanding markets and customers leading to fluctuations in performance like high non-performance of loans, reduced profits and more customer accounts going dormant or customers closing their bank accounts. These changes call on the leaders to readjust and reconfigure plans. The study focused on determining the effect of digital innovation on organizational performance of Kenya Commercial Bank Branches in Nairobi City County, Kenya. The study was grounded on technology acceptance model. The study adopted descriptive design and targeted 24 KCB branches within Nairobi City County and sample size list had 96 respondents who helped fill the semi-structured questionnaires. The response rate was 77.08% from the 74 out of 96 questionnaires were filled and returned. Results revealed that digital innovation ($r=.849$) positively and significantly improved performance of the KCB Bank Branches. The study established that digital innovation at ($\beta=8.101$, $p<0.05$) had significant effect to performance at KCB bank and 79.8% of performance in the KCB bank branches was as a result of elements of digital innovation. The study concluded that performance of the KCB bank branches in Nairobi City County depended on use of digital systems where there was alternative banking platform (internet, bank agents and mobile banking) that increased revenue streams and cut off expenses. The study thus recommends that during any changes in the market and business environment, the bank and other financial institutions should employ digital systems to improve performances.

Index Terms- Digital Innovation, Process innovation, Internet banking, Mobile banking, Performance

I. INTRODUCTION

The banking and financial sector is one of the important industry that builds the economy of a nation. Despite its importance, issues facing the sector have had negative effects to performance outcomes with cases of bankruptcy and scaling down operations. According to Chipwatanga and Benjamin (2019) the sector faces a lot of competition from other financial service

providers and the consumers have increased their demand for high quality service delivery. The turbulence experienced in the sector calls for modification of strategies and it take the of response strategies, which Lui, Bartosiak, Piccoli and Sadhya (2018) define as aligning the organizational strategies to respond to the turbulent environment and changes in the market these firms operate in. Response strategy is well planned and coordinated actions to counter the changes present in the environment, these changes may include technological advancement, globalization and crisis like covid-19.

Response strategies may also take the form of adoption and use of modern technological systems, training staff of the organization, shifting in operations, employing competitive strategies, expansion and cost management strategies. The point of re-align the organizational strategies is for responding to the changes in the environment, guaranteeing enhanced performance even in future and gaining competitive edge (Kipchumba, 2018). On digital innovation, Ekong, Chukwu and Chukwu (2020) shares that it is one of the strategies the organization used as a response to Covid-19 pandemic. Through use of digital tools, the national and local government could contact and trace patients that have contracted the corona virus. The accuracy and speed of digital contact tracing is useful to organizations that face a similar scenario, and the digital tools are used to share information that help in making informed decisions that can address the issues that a firm is going through.

Chege, Wang and Suntu (2020) noted that small and medium-sized enterprises have adopted the use of information communication technology (ICT) and adoption of technology innovation strategy led these enterprises to improve their performance. Use of ICT allowed the SMEs to easily interact and network with suppliers, clients and other SME owners which improved their productivity. Gathungu and Baariu (2018) shared that the SMEs in the manufacturing sector had adopted the digital processing system that helped improve performance outcomes and quality of the products they delivered to the markets.

Digital innovation is about organizations using digital systems and processes to handle the work tasks. Using the digital systems can make handling tasks faster, more efficient and

effectiveness with minimal costs (Markus & Nan, 2020). One system or digital application can accurately do the work that would have been handled by several people. In the banking sector, automating the processes can improve customer satisfaction with the services delivered. Again, the invention and use of mobile banking and internet banking has seen an increase of the number of people served by the banks, increase in revenue streams for the banks through deposits and interests charged on loans dispensed through the mobile applications. Nemoto and Koreen (2019) noted that many commercial banks have invested heavily in digital systems and applications to better serve the clients and keep in line with the developing techno-world.

Adoption of digital innovation in organizations helps to improve service quality and performance outcome. Performance measurement in the past was done through only two elements financial and non-financial elements. In the recent days, measuring performance was expanded to cover efficiency of service delivery that mostly applies for service-based organizations and rating the quality of direct goods production capacity for product-based manufacturing organizations (Chipwatanga & Benjamin, 2019). Furthermore, organizations measure their performance using sector-specific elements. In the banking sector, performance measurement consists of using financial and non-financial terms, with concepts like profit margins, returns on investment, return on asset, market share and customer satisfaction (Ontita & Kinyua, 2020). For the case of this study, organizational performance will be measured using customer deposits and the more there are deposits made by the different customer categories, like business customers and executive customers; will be an indication of high performance of the bank branch (Asiligwa & Rennox, 2017). It will also involve loan book, earnings made from interests charged on loan, teller transactions and total number of accounts opened and active.

Kenya commercial bank is one of the premier banks in the Kenyan financial sector, dating back to its inception in 1896. It has grown its asset base, branches, market presence, deposits and profitability, but the constant changes in the operating markets has had negative impact on its performance. According to Wandia and Ismail (2019), the bank has had strategic alliances and strategically aligned with technological firms like Kenswitch to increase ATMs and telecoms like Safaricom for KCB-Mpesa app but these alliances have not been very successful due to highly competitive markets. The bank report of 2019 showed that the bank has invested heavily in technology since 2007 and this led to invention of internet and mobile banking; however there have been gaps in aligning innovation and technological systems to the bank structure, its goals and strategy and how it can be used to improve the performance. Intense competition, knowledgeable and choosy clients, globalization effects and growth of the digital world and even the covid-19 pandemic have negatively impacted the performance of the bank. The bank showed decline in earnings from bank loan interest, such non-performing loans increased to Ksh.97 Billion on 2019 up from Ksh.42 Billion in the financial year 2018 and profitability index went down in 2020 from Ksh.19 Billion to Ksh.10 Billion (KCB annual report for FY 2019/20).

The focus is in addressing the challenges that KCB bank group has with its performance and concentrating on digital innovation.

II. STATEMENT OF THE PROBLEM

In the era of high competitiveness, globalization and knowledgeable customers, the banking sector has experienced a decline in its performance. The performance has further suffered because of the covid-19 pandemic and reduction in incomes and business operating hours (Kamau, Aosa & Pokhariyal, 2018). The Kenyan banking sector has seen increase in n-performance of loans, reduced profits and more customer accounts going dormant. Thus, the need to consider digital innovation to make changes and reverse the bad effects by improving customer deposits, increase teller transactions, raise loan book and increase number of customer accounts. KCB Group Plc. has seen an increase in NPLs from Shs.42.6 billion in 2018 to Shs.97 billion in 2019, increase in losses from loans and credits Shs.20 billion from Shs.5.8 billion in the 2017/18 FY. The overall profitability index also went down in the 3rd quarter of 2020 to Shs.10.9 billion from Shs.19.2 billion in quarter three of 2019. In the FY 2019/20 the adopted response strategy focusing on shifting operations to digital systems has seen an increment, such as mobile banking was 45% in 2018 and it went up to 78% in 2019, while teller transactions dropped from 12% in 2018 to 4% in 2019. Thus, at digital innovation as a response and tool to be deployed for improvement of performance at branch level.

Research Objective

To determine the effect of digital innovation on organizational performance of Kenya Commercial Bank Branches in Nairobi City County, Kenya

III. LITERATURE REVIEW

Theoretical Review

Technology Acceptance Model

The model was first suggested by Davis (1986) and used to explain how organizations behave when technology is introduced. TAM focuses on the ideology on what makes one technology to be either accepted or rejected and as such evaluates the usage and performance of technologies in organizations. The TAM model operates on two key factors; the intention by individuals to use the new technology and first, the perception of ease of using the technological applications and systems and secondly, perception of its usefulness and benefits that individuals and organizations gain (Rauniar, Rawski, Yang & Johnson, 2014).

According to Taherdoost (2018) technology adoption and usage is dependent on the attitudes of the consumers in the market and the expectations that its acquisition and ease in its usage. The framework dictates that the two aspects, ease of usage and expected usefulness of digitally innovated products in banking sector including mobile banking, internet banking and other alternative banking options as response to the changing operational and market environments. Bank customers can only adopt any of the digital banking innovations based on ease of use and expected usefulness and benefits of the technologies in terms of comfort and operational efficiency.

The theory is relevant in explaining how digital innovation that responds to the customer needs and demands for efficiency and fast banking operations. The customers perceived usefulness and ease of using the digital systems makes them embrace digital

innovation. This is done through process innovations, mobile and internet banking systems for improvement of performance outcomes in the bank in terms of increased volume of transactions, higher amounts of loans accessed on digital platforms, increased customer numbers and market base.

Empirical Literature

Mutie (2018) conducted a study on technological innovations and how they affect the organizational performance in the Kenyan government agencies. The focus of the study was adoption of technological innovations including elements like system development enhancements, information technology (IT)-based innovations, digital tools and systems and process integration and how they affect the performance in the government agencies. The researcher collected primary data from the employees working in the government agencies. The results show that elements of technological innovations - adoption of technological innovations including elements like system development enhancements, information technology (IT)-based innovations, digital tools and systems and process integration; accounted for 75.9% of the organizational performance in the government agencies. The study concluded that performance in the Kenyan government agencies was due to technological innovations including technological innovation enhancement, system development IT-based innovations, digital tools and systems and process integration. There was need to set more funds for advancing technology and digitalization efforts for improved service delivery.

Scott, Van Reenen and Zachariadis (2017) investigation of digital innovation and its long-term effects to the performance of banks and the focus was the SWIFT innovative financial services. The researchers looked at effect of SWIFT innovations which is a network – based technological infrastructure that allows inter-bank communication for banks across the globe. The researchers collected secondary data and constructed a longitudinal dataset from 6,848 banks in 29 European countries and the America. The banks were purposively selected because they have adopted the SWIFT innovation for the operations since its invention in 1977. The study concluded that digital innovation adoption in the banking industries has a large and positive long-term effect to performance of the banks. The study therefore suggests that all banks should embrace digital innovation to improve its performance and maintain the same for long periods.

Ouma and Ndede (2020) study was digital banking technology innovation adoption and its effect on financial performance of Kenyan commercial banks. The researchers noted

that the commercially based banks play a significant role in economic development and hence the need to employ digital banking technological innovations to improve financial performance of the sector players. Adoption of digital banking will help the commercial banks serve its retail customers that are widely spread geographically and address the issue of network. The commercial banks that have adopted the digital banking innovations have seen an improvement in the deposits, withdrawals and other bank activities and transactions across their networks, but some banks face some challenges. The results show that ease of accessing digital banking technology innovations and influence of turnaround time and lower cost implication of using digital banking technology positive and noteworthy influence the financial performance of the banks.

Izadi, Ziyadin, Palazzo and Sidhu (2020) evaluated the impact that innovation and managing its capacity had on organization performance. The focus of the study was to measure the extent to which intellectual and emotional assets influenced the marketing capacity and how these elements reflected in the organizational performance. The researchers collected data from 35 managers and academicians in multinational companies using in-depth interviews. The study findings showed that adoption of digital technology, knowledge and competence of the people and reputation of the firm had a big effect to performance of the companies. The study explains the increased role of digital innovation and its impact on sustainable outcomes. The more organizations and small and medium-sized enterprises employed innovation and digital technology, the higher their knowledge base, competencies and reputation that led to improved performance.

Chege, Wang and Suntu (2020) did a study on information technology innovation and the impact it has on performances of Kenyan firms. ICT has helped in creating modern employment options for people through networking sites such that people can easily interact through the innovation. ICT up-take and its implementation is different based on entrepreneurs innovativeness that affects the technological innovations which impacted on the performances of these firms. The study examined the link of technology innovation and firm performance by looking at 240 enterprises and findings showed that technology innovation significantly influenced firm performance. Entrepreneurs are thus encouraged into developing innovative strategies and products, the government to improve ICT infrastructure that will promote SMEs ease of adoption of technological innovations that will improve their performance.

Conceptual Framework

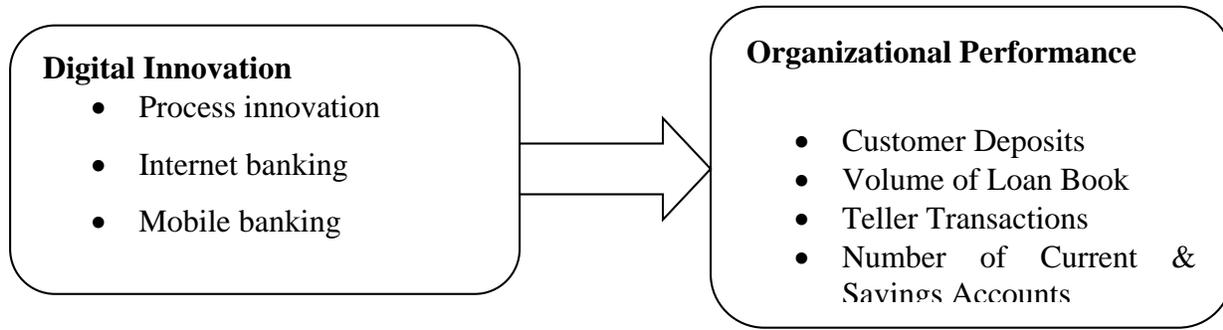


Figure 1: Conceptual Framework

IV. RESEARCH METHODOLOGY

The study adopted descriptive research design and according to Turner, Cardinal and Burton (2017), it focuses on seeking answers about the research phenomenon on questions like what, when, where and why of elements. The design was ideal to be used in describing how digital innovation influences performance at the Kenyan Commercial Bank (KCB) Nairobi County branches. All the 24 KCB bank branches located in Nairobi City County were included in the study and the respondents included the bank managers, operational managers, customer service executives and back office officials. Total respondents making the sample size of the study were 96 people. Census sampling of all bank branches and purposive sampling of the specific polled study participants were adopted in the study. Primary data was collected using semi-structured questionnaires such that data was qualitative and quantitative. The instrument was pilot tested using 8 respondents working KCB bank branches in Kiambu County. The assessment found that the research tool was both valid and reliable as all the Cronbach Alpha test results were above the 0.7 threshold. All the collected data was entered into SPSS version 25.0 and Ms. Excel for analysis of quantitative data that was done through description to get means, frequencies and standard deviation; correlation analysis to show the relation

between variables and regression analysis. Findings were presented in tables, figures and discussions. The qualitative data was analyzed through the use content analysis in such a manner that the data was arranged thematically and grouped as per the study variables and presented in prose form.

The regression analysis model format is:

$$Y = \beta_0 + \beta_1 X_1 + \epsilon$$

Where:

Y = Organizational Performance

β_1 = Coefficients of Response Strategies

X_1 = Digital Innovation

ϵ = Error term

V. RESEARCH FINDINGS AND DISCUSSION

The response rate was 77.08% realized from the 74 questionnaires that were filed and returned out of the 96 distributed ones. In abiding by the stipulation of Mugenda (2012) on response rate, where the researchers stated that any response rate for research that is 70% and above is fit and representative of the study.

Descriptive Analysis Results

Table 1: Digital Innovation

Digital Innovation	Mean	Std. Dev.
The bank use of digital systems eases the work tasks	4.047	.793
The digital systems allow banks to offer fast services to the clients	4.416	.497
Adoption of internet banking helps the bank minimize its operational costs	4.327	.759
Automating bank processes enables quality services delivered to the clients	4.291	.639
The clients can access bank services using mobile banking	4.333	.751
Mobile banking is another revenue stream for the bank	4.256	.807
The digital systems has enable the bank to serve more clients	4.325	.709
Overall Score	4.285	.707

The results on digital innovation as applied in the KCB bank branches in Nairobi County and the overall average scores at M= 4.285 and SD =0.707. This implies that many of the respondents agreed on the fact that their performance at branch level had been strongly influenced by digital innovation. The findings in the table are echoed by researchers such as Ouma and Ndede (2020) who

noted that adoption of digital banking technologies improved the turnaround time for services delivery. At the same time, Mutie (2018) such that technological innovation, system development, digital tools and systems enhance production and lead to improved outcomes. Chege, *et al.* (2020) also confirms that ICT allows networking across many sites and in that many clients can be

reached. This means that through ICT the revenue is increased for the organization. While, Markus and Nan (2020) argue that digital systems improve efficiency and effectiveness and minimize operational costs. Scott, *et al.* (2017) revealed that use of digital innovation enable the banks reach more customers, earn more

from transactions; it also resulted in increased knowledge base (Izadi, *et al.*, 2020). In addition, Nemoto and Koreen (2019) shared that use of mobile and internet banking can increase revenue lines and ease functions in commercial banks.

Table 2: Organizational Performance

Organizational Performance	Mean	Std. Dev.
The bank branch has increased its daily teller transactions	3.869	.824
The branch has strong loan book realizing higher interest earnings	4.204	.585
There is an increase in customer deposits at the bank branch	3.651	1.053
The bank's number of current and savings account is high	4.016	.706
Overall Score	3.935	.792

The results on organizational performance from the conducted descriptive analysis, showing the overall score at 3.935 and variation of the responses was at 0.792. In echoing these findings, Azmi, *et al.* (2021) noted that increased outputs enhance shareholders' and investor's value; it also about strong loan books such that increased advanced loans and credits mean more earnings for the bank through interest rate charges. Opening new accounts that remain functional increase performance outcomes of

the bank (Alawattegama, 2018), transactions done by each teller inform on their contribution to performance of the bank (Asiligwa & Rennox, 2017) and Ontita and Kinyua (2020) noted that performance in terms of financial elements included customer deposits and more deposits imply higher outcomes for the organization.

Correlation Analysis Results

Table 3: Correlation Analysis

		Organizational Performance	Digital Innovation
Organizational Performance	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	74	
Digital Innovation	Pearson Correlation	.849	1
	Sig. (2-tailed)	.000	
	N	74	74

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Digital innovation was strongly correlated to performance of the KCB branches in Nairobi City County, since the r values obtained were at a high (r= .849 and p-values=0.000).

Regression Analysis

Model Summary

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.518 ^a	.633	.798	3.42406

a. Predictors: (Constant), Cost Management, Digital Innovation, Strategic Partner Management, Human Resource Response

The coefficient of determination found from the adjusted R squared is at 0.798 which means that performance at the KCB bank branches in Nairobi City County can be traced to elements

of the digital innovation. Thus, 79.8% of performance in the KCB bank branches was linked to digital innovation.

Analysis of Variance

Table 5: Analysis of Variance

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	273.369	1	273.369	64.261	.001 ^b
	Residual	306.312	72	4.254		
Total		589.681	73			

a. Dependent Variable: Organizational Performance

b. Predictors: (Constant), Digital Innovation

The analysis of variance (ANOVA) was calculated at a significance level of 0.05. The findings show that the F calculated is greater than the F-critical such that $64.261 > 3.974$, implying that the model adopted in the study is a good fit and ideal for use.

Regression Coefficient

Table 6: Regression Coefficient

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	18.274	2.262		8.078	.000
Digital Innovation	8.101	1.296	.856	6.250	.000

$$Y = 18.274 + 8.101X_1$$

Where: Y = Organizational Performance; X₁ = Digital Innovation

The results show that when all aspects of response strategies are held constant, the organizational performance of KCB bank branches in Nairobi City County will be 18.274. When all factors are held constant but there is a single unit increment in digital innovation while other elements are held constant results in performance at these KCB bank branches to stand at 8.101. The study established that digital innovation ($\beta=8.101$, $p = 0.000 < 0.05$) had significant, positive effects to performance in the banks. The results are also shared by Ouma and Ndede (2020) noting that digital banking technology had significant effect to bank's financial performance. Mutie (2018) also discovered that elements of technological innovation positive and significantly affected organizational performance.

On the theme of digital innovation, the study found it was based on mobile and internet banking and digitalization of bank processes. Participants shared that there was frequently automated systems, use of online platforms for engaging the customers, answering online inquiries, adoption of point of sale (POS) machines by merchants, use of cloud computing, self-service portals at the banking hall like doing deposits at the ATM, chatbots and micro-services. Other digital innovations include Fin-tech innovations and block-chain technologies, use of ATMs for cash deposits and withdrawal, electronic funds transfers, real time gross settlement of funds, accessing statements on email, agency banking and processing cheques in a span of one day. The digital innovations improved performance of the KCB bank branches.

VI. CONCLUSIONS

The study concluded that digital innovation had improved performance of the KCB bank branches by expanding revenue streams, offering fast, quality and efficient services that had attracted many customers. The respondents agreed that through the alternative banking options (internet banking and mobile

banking) the bank has minimized operational costs, reduced staff workload and increased the number of customers served. The regression and correlation results indicate positive and significant influences of digital innovation to performance and hence the conclusion is there is an association between the two variables.

VII. RECOMMENDATIONS

The implication of the findings and drawn conclusions is such that digital innovation had improved performance of the KCB bank branches. Thus, the study recommends to practitioners that when introducing new systems and digital technologies, the banks should inform the general public, customers and staffs on the changes. These stakeholders must be informed on the use and advantages of digital systems such as alternative banking platforms. The digital systems must be user-friendly to accommodate different users and they need to be constantly updated to protect customer information from fraudsters. Anytime organizations and enterprises encounter changes in the economy, the social and technological environments; management team must assess the situation and re-configure the strategic plans. There is also need to adjust the recruitment policy and framework such as to attract candidates that are tech savvy so as to push forward the digital innovation agenda.

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AUTHORS

First Author – Stephen Kagwima Njau, Postgraduate student, MBA in Strategic Management, Kenyatta University, Kenya
Second Author – Dr. Linda Kimencu, Lecturer, School of Business Administration, Kenyatta University, Kenya

Smart Health Consultation and Record Management

Jatin kumar Chaurasia*, Utkarsh Shukla **, Urvi Verma **, Ashish Kumar Pandey**

* Computer Science & Engineering, IET Dr. RML Avadh University, Ayodhya, India

** Computer Science & Engineering, IET Dr. RML Avadh University, Ayodhya, India

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Abstract- There is currently a lot of study being done on the functioning of Electronic Health Records (EHR) software, and doctors are facing a lot of difficulties as they switch from a paper-based record management system to an electronic one. Our goal is to help healthcare providers embrace EHR software and improve the clinical and practise management aspects of their operations. The health reports of the individuals, which also include diagnostic data and medical prescriptions, are delivered in the form of papers, the subsequent hospital visit by the individual is blind to the individual's prior medical conditions and medications. However, this issue is lessened by storing a person's entire health record as a soft copy in the cloud. If they haven't already, healthcare providers are under increasing pressure to embrace an EHR. In order to avoid making a blind faith decision, providers should modulate their response to this pressure. In this study, examine 'what trust means and present a metric of dependability'. Cloud based EHR Rank is used in this work. The measure of trustworthiness quantifies how successfully someone. EHR addresses provider needs and essential operational requirements. The certainty is used as the trustworthiness metric. The standard of the evidence used to assess the EHR is a consideration. The reliability model offers a framework for contextualizing and ranking crucial choices issues, as well as using risk-reduction techniques decision-making while choosing an EHR should be improved.

Keywords- Electronic health records, Cloud computing trust, EHR policies, Risk mitigation.

I. INTRODUCTION

Today, everyone's life revolves around their health, and compared to the last several years, health issues have sharply increased. In spite of the fact that Indian doctors are doing a fantastic job at reducing health issues, many patients are losing their lives because the country's poor population cannot afford the proper care from the appropriate physician at the appropriate time. Now technology has advanced quickly, and our government is working to make sure that everyone in the nation has access to the internet. Using these facilities, we have created a central hub that houses all patient data, including diagnostic results and doctor-prescribed medications. It functions as a cloud, from which any doctor, with the patient's consent, can retrieve data from any location. The use of the internet has allowed us to create a central hub that stores all patient data, including diagnostic reports and prescriptions from doctors. This hub serves as a cloud from which data can be accessed from any location and by any doctor with the patient's consent. Today, technology has advanced quickly. Our government is working to bring internet access to every part of the nation. The doctors can learn about the patients' prior medical issues with the use of this, and they can treat the patients quickly by taking into account these requirements and the medications they used. We also provide you the chance to review the hospitals based on the experiences of the people who received care there. Numerous legislative, insurance, legal, and governmental measures aimed at encouraging the widespread implementation of health information technology are transforming the healthcare sector (HIT). Here are a few instances: The American Recovery and Reinvestment Act (ARRA) of 2009 set up nearly \$17 billion to pay qualifying hospitals and healthcare providers back for costs associated with implementing electronic health records systems (EHRs) through 2016, these reimbursement incentives are available [1,2,3]. After then, penalties in the form of lower Medicare reimbursement rates will take the place of the incentives. The Patient Protection and Affordable Care Act (PPACA) of 2010 revised the False Claims Act (FCA) by adding additional measures for penalties, criminal fines, and jail time to deter fraud and abuse among providers participating in Medicare, Medicaid, and the Children's Health Insurance Program (CHIP)[4]. EHRs gather the evidence required to back up claims made to government health care programmes and show that patient care complies with or exceeds industry standards. Receiving the greatest rates on malpractice insurance and reimbursements from patient care insurance is a perk for providers who utilise government-certified EHRs [5]. A growing number of healthcare professionals are being persuaded by these activities to reevaluate their reliance on paper-based clinical and practise management record keeping systems. By a ratio of nine to one, providers have avoided EHRs thus far. The causes are numerous and

include when used incorrectly, EHRs expose the practise to risks and liabilities. Health Insurance Portability and Accountability Act (HIPAA) [5] regulations that apply to EHRs are more stringent than those that apply to paper-based recordkeeping. Last but not least, EHRs are pricey, with acquisition expenses per qualifying provider ranging from \$10,000 to \$100,000. Finally, EHRs frequently require a lengthy learning curve. EHR selection, deployment, and maintenance are technically demanding; typically, physician productivity drops by 30% or more when EHRs are first deployed and does not increase until the system has been utilized for six to twelve months. Between 40% and 60% of EHR deployment initiatives are thought to fail. EHRs are available as on-site or cloud-based systems. Locally, in the practice office, an onsite EHR is kept up to date (s). This strategy necessitates a substantial investment in technical support personnel, computer hardware, and software. A third-party hosting service manages and backs up software and data files through a cloud-based solution releasing providers from their obligations. In order to access the cloud using a web-enabled browser, providers must maintain end-user PCs and network connectivity; nevertheless, this is far simpler and less expensive than installing an entire on-site EHR. In general, providers are wary about cloud-based EHRs because they believe they are more dangerous and unreliable than on-site EHRs. When depending on a third party to gather, retain, and secure clinical and practise management data, physicians have valid concerns about preserving patient privacy and confidentiality as well as the requirement to adhere to HIPAA and other governmental regulations [16]. However, many medical institutions, particularly small ambulatory clinics, lack the funds and knowledge necessary to keep an in-house EHR safe. They may actually be more vulnerable if the necessary systems, methods, and procedures aren't in place [3] than if these duties were delegated to a trustworthy, competent outsider. Providing healthcare workers with the resources they need to make knowledgeable decisions about health information technology is one of the objectives of the authors' research. As a result, the adoption of EHRs is neither outright rejected out of fear nor adopted without the necessary due diligence. The choice to use an EHR is ultimately based on the practitioner's confidence that the advantages will exceed the drawbacks. Choosing a solution that is well aligned to the providers' technical, functional, governance and compliance requirements is essential to building confidence.

Rest of this paper is organised as follows: II. Trust-blind or not ?, III. Strategies for mitigating risk, IV. Requirement and importance of cloud based smart health consulting, V. Data analysis, VI. Proposed methodology, VII. Conclusion

II. TRUST – BLIND OR NOT?

Numerous views and academic fields, such as psychology, sociology, economics, computer science, and decision theory, have investigated the concept of trust extensively in the literature. The idea of trust is nuanced, multifaceted, and situational. Trust may be founded on factual information, personal opinion, and previous experience [6,7,8,9]. There is no single, comprehensive definition of trust that can effectively capture all of its facets. According to [11]"assurance" and confidence that people, data, entities, information, or processes will work or behave in expected ways, trust revolves around these concepts. Trust can exist between humans, machines, humans and machines, and machines and humans. Trust may be seen, at a deeper level, as a result of achievement of security or privacy goals. Both known and unknown threats exist throughout the cosmos, as seen in Figure 1. Ideally, explicit knowledge of known knowns and known unknowns should serve as the foundation for confidence. Without it, faith is blind. Unknown unknowns result in unforeseen issues and prevent preventative remedial action. When providers are unaware of their own needs and the constraints of HIT, unknown unknowns develop. For instance, providers who buy EHR solutions based solely on referrals from peers or other outside parties without further investigation do so at their own risk. There are numerous anecdotal reports of providers signing long-term contracts only to discover that the chosen solution does not match their demands. While useful, industry certifications and evaluations of EHR offerings do not provide a comprehensive picture. For instance, in order for EHRs to be certified as meeting Meaningful Use requirements, the Office of the National Coordinator - Authorized Testing and Certification Body (ONC-ATCB) has created standards. Physicians that accept Medicare and Medicaid patients can qualify for government Meaningful Use (MU) incentives by using an EHR system that has been approved by the ONC-ATCB. The bigger question of whether the EHR is appropriate for the practice or incorporates industry best practices for online security and privacy, however, is not addressed by the EHR's support for MU standards.

For the past 20 years, ICSA Labs, a separate branch of Verizon Business, has offered trustworthy "independent, third-party product assurance for end users and organizations. Many of the best security product developers and service providers in the world have used ICSA Labs to provide vendor-neutral testing and certification for hundreds of security products and solutions [6]. Businesses all over the world depend on ICSA Labs to establish and implement impartial testing and certification standards for evaluating product compliance and performance. On its website, ICSA Labs offers free access to the certification outcomes for EHR software. Notably, the surveys don't include many popular EHRs with sizable market shares. There are numerous EHR products available. Many of the facts necessary to decide intelligently about their functioning, safety, privacy, and resilience are hard to get or not available in a way that allows for straightforward comparison. Cloud-based EHRs are deceptively challenging to secure and susceptible to a wide range of internal and external attacks. Providers who are thinking about using a cloud-based EHR must deal with a lot of unanswered questions. To aid in quantifying these uncertainties, a multi-criteria decision model is described in the next section.

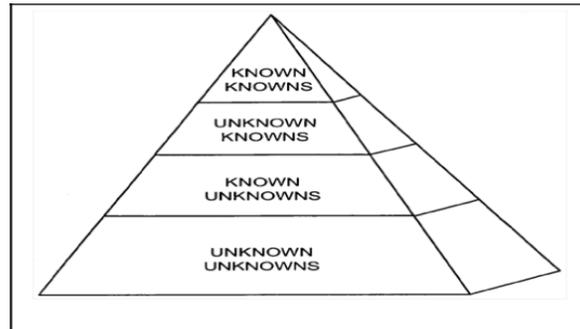


Figure 1: Universe of Unknowns and Knowns [21]

III. STRATEGIES FOR MITIGATING RISK

Risk mitigation techniques may be helpful in making up for EHR flaws discovered during the review process. Risk can be managed in three ways: by reducing it, controlling it, and transferring it. Using a disaster recovery and data continuity strategy, for instance, can help with risk reduction and risk control. Transferring risk includes transferring responsibility for exposure to a different entity, frequently through outsourcing or insurance. When an EHR solution that uses the cloud is used, system data is kept at the hosting service, most likely in an unidentified location. Physicians are nonetheless accountable under HIPAA rules if protected data is breached by unauthorized individuals, even though they are delegating the duty of data maintenance to a third party.

In order to prevent unauthorized individuals from reading protected, confidential, or sensitive health information and practice management data, providers must ensure secure end user computers and network connectivity. This article's description of a thorough due-diligence evaluation is an example of risk minimization. It lessens the possibility of choosing a subpar EHR. The methodology put forth here offers a framework for contextualising and ranking crucial factors. This tool should only be used after carefully reviewing the needs of the practise and with the guidance and support of knowledgeable information technology professionals and legal counsel. Following the computation of the Trustworthiness ratings outlined in the previous section, a straightforward graphical analysis is advised. Comparing and visualizing the relative advantages and disadvantages of each EHR is made simpler by a bar chart representation of the weighted Dj. components of the top ranked EHRs. According to Fig. 2 , EHR #1 outperforms EHR #2 in all categories besides functioning. EHR #2 would most likely win if a provider were to base their choice only on functionality, despite serious doubts about the vendor's reliability and the security of the system. Both options should be chosen if the capability offered by EHR #2 is essential to the success of the EHR implementation and is not supported by EHR #1.

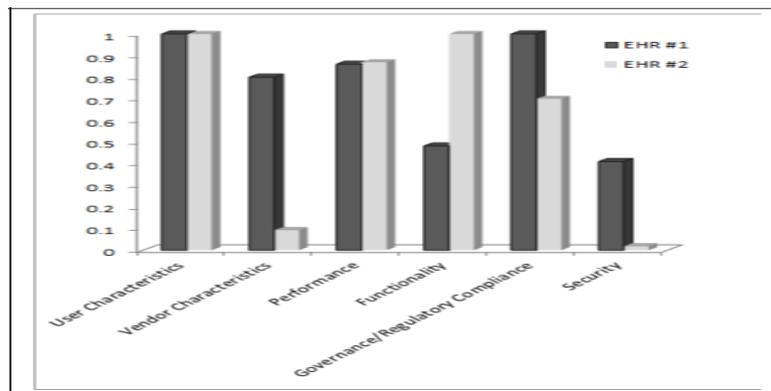


Figure 2: Comparison of Decision Factors in Top Ranked EHRs [21]

IV. REQUIREMENT AND IMPORTANCE OF CLOUD BASED SMART HEALTH CONSULTING

Every person in our country has an individual identifying number provided by their Aadhar card. Using this number, we may keep that person's data independently in the cloud. Every hospital, medical store, and diagnostic facility must have a distinctive identification number to be recognised. With this number, they can log into the cloud and enter reports using the person's Aadhar number. Each

hospital is required to keep their database up to date so that all patient information can be saved there. The hospital's database's information must be uploaded to the cloud. The patient's information will be saved on a cloud server in each city and village, which will be connected to the central hub [19].

• **Cloud data storage**

Data can be entered into the cloud using laptops, smartphones, and other devices. The data storage diagram [17,19] in the cloud is shown below:



Figure 3: Storing data into cloud [17,19]

- Check that the cloud we are utilising is current;
- Verify that the distant servers are operational and have access to the internet.
- Verify that the cloud is receiving data updates from the remote servers.

Hospitals, diagnostic facilities, and retail medical businesses must first authenticate with the cloud before submitting data. In other words, customers must provide their password and unique government-issued ID to connect in to the cloud. With the aid of their Aadhar number, patients' information must be entered into the cloud when they attend hospitals. Doctors need computers so they can write up prescriptions for patients and enter the information (the prescription) immediately into the patient's cloud. The medical stores must fulfil the patients' requests for medications, and data must be entered in the cloud belonging to the patient.

By adhering to the following authentication criteria, the data security can be provided as the Aadhar cards are successfully deployed in our nation, they can offer each and every person an individual authentication. Every person must sign up for an account in the cloud using their Aadhar and provide a security password so that only they may access their data. In order to write prescriptions for patients and promptly enter the information (the prescription) into the patient's cloud, doctors need computers. Patients' orders for pharmaceuticals must be fulfilled by medical supply stores, and patient-specific data must be entered in the cloud.

The following authentication standards can be followed to guarantee data security:

The Aadhar cards can provide each and every person with a unique authentication as they are successfully implemented in our country. Each person must create a cloud account using their Aadhar number and enter a security password to ensure that only they have access to their data. Only those who are permitted may enter data. The patient's data can be entered in the cloud by first verifying oneself and then using the patient's Aadhar card number.

Obtain data from the cloud:

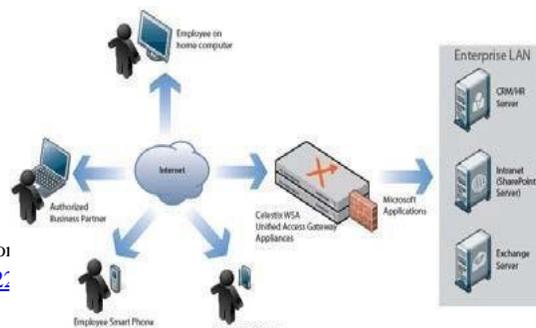


Figure 4: Retrieving data from cloud [19]

An individual can retrieve their own data by themselves. Smartphones, PCs, and laptops that are linked to the internet can access the data stored in the cloud. The individual must verify himself with the cloud by supplying his Aadhar id and the password in order to retrieve the data from it. He can access the cloud-based data when both the Aadhar ID and the password are accurate.

V. DATA ANALYSIS

The information that is gathered and stored in the cloud can be analysed to help the organization determine the patient's current state of health. With this knowledge, they can then advise their patients to follow certain lifestyle guidelines that are suitable for them based on their health conditions. Analytics can be utilized to suggest lifestyle changes for a particular patient. This places a high priority on the health of the patient, and I don't believe anyone will object to being reminded to take care of themselves. How to examine the cloud-based data: Unstructured data will make up the data saved in the cloud [15,19].

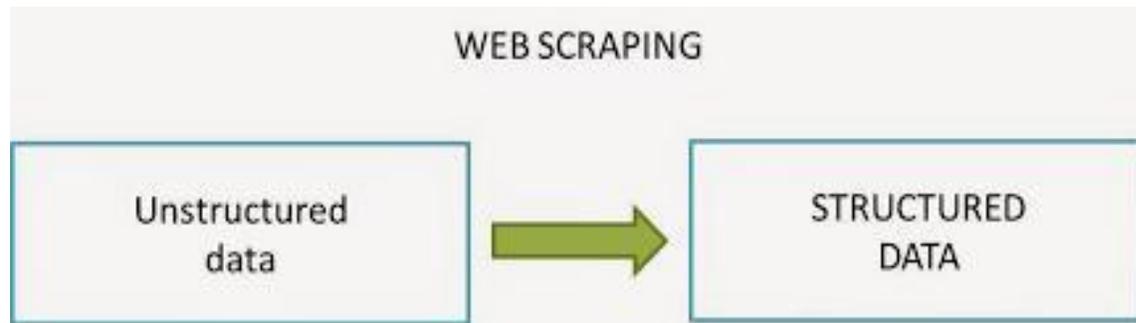


Figure 5: Converting unstructured data to structured data

By using data mining techniques like data cleansing, unstructured data should be transformed into structured data.

- Transformation of data.
- Pattern Recognition.
- Visualization of data.

After the unstructured data is converted into structured data, the data is compared to the standard values; if there is a difference between the standard value and the output, the patient is informed to take care and is given instructions on the precautions they should take.

The illustrations that illustrate how structured data can be seen are as follows:

- Table Format, Cluster Format, and Graph Format.

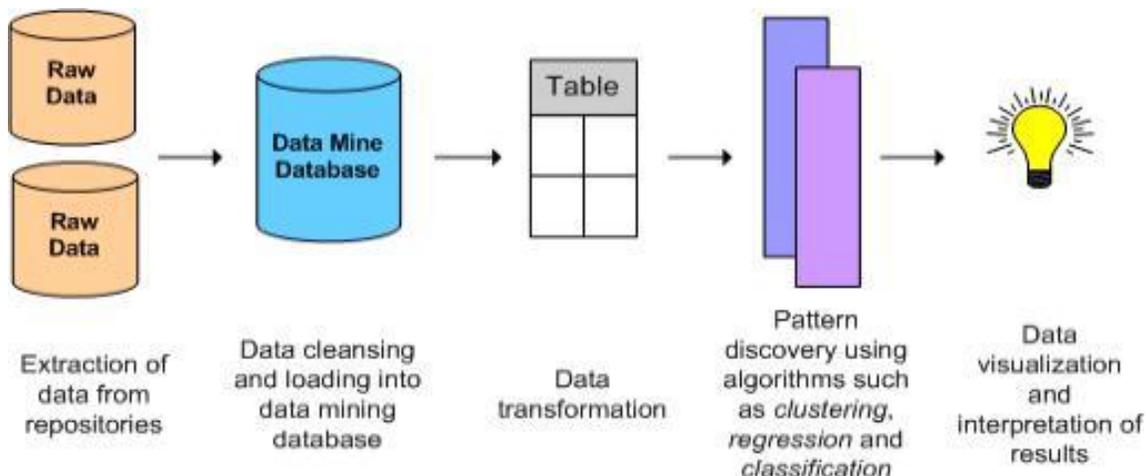


Figure 6: Data mining process [19]

VI. PROPOSED METHODOLOGY

In this section, explained the methodology of the proposed model represented in figure 7.

1. Home Context Manager

At this flow, the home context manager has a special function. Through various sensors or gadgets, it collects the information required based on the patient's conditions. The patient's smart device or an application connected to nurses or specialists will then receive these details and health records. Additionally, there is a database where all health information is maintained. From there, significant recommendations or alerts that may be deduced from patient health records and information history are given to patients, their loved ones, and occasionally clinicians.

2. Hospital Environment

Medical professionals must gather crucial and helpful clinical data before starting patient monitoring and treatment in a smart home environment. In a hospital setting, all patient-related health data will be gathered. In the project we've suggested, we've created a patient health record form that should be completed by nurse or physician. The patient health record (PHR) table will have an exhaustive collection of data . The PHR is centrally located within the cloud architecture to deliver the health data required for detection alerts and therapies based on expert medical analysis.

3. Cloud Structure

Our proposed structure has benefited greatly from the usage of the cloud in terms of accessibility, flexibility, globalisation, cost reduction, and other factors. The fundamental objective of utilising cloud computing in our framework is to create a patient management system that can be accessed from anywhere at any time. As a cloud infrastructure, we have suggested a public cloud similar to the Google App-Engine. The security and privacy of data is another crucial concern with cloud architecture. In order to safeguard all data and establish secure connections between all components of this model, we must also use a tool that offers a high level of safety and security.

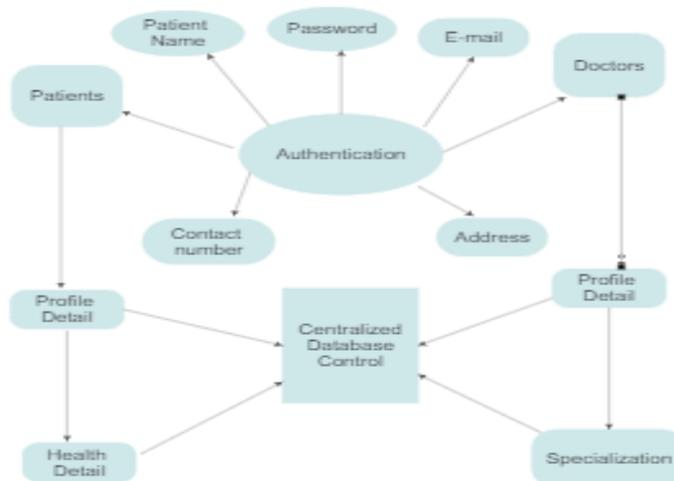


Figure 7: Proposed Model

VII. CONCLUSIONS

The proposed model makes the solution possible to decrease the disease in our country and also it would be easy to detect the form which are taking place in the medical field easily and the patient health conditions are monitored, some suggestions can be given to the

patients to increase their health. For the goal of assessing and ranking cloud-based EHR solutions, a multi-criteria model is proposed to define trustworthiness. Even the best cloud-based EHRs might have their integrity compromised if users don't take the proper security measures (e.g., by not protecting system passwords and log-in identities, using insufficient physical protection of system computers and networking infrastructure, etc.). Unfortunately, from the perspective of the end user, convenience and security are inversely related. User education, training, and policies and procedures to enforce best practises are crucial in ensuring a dependable EHR system, despite the potential inconvenience. For their part, vendors must offer users monitoring, auditing, and reporting capabilities that enable on-going confirmation of the EHR's adherence to contractual obligations and user expectations. This openness creates a foundation for informed confidence and trust in the cloud-based EHR. Convenience is adversely correlated with security. Contrarily, increases in openness and communication between parties open up new sources of system vulnerability that need to be carefully addressed. Security can never be completely assured, even when there is a very high level of confidence between the parties. Risks that have been calculated should be carefully compared to exposures and liabilities that may exist. From this study, a variety of risk reduction, risk control, and risk transfer techniques can be created that are suitable for the provider's needs and environment. Choosing an effective and reliable EHR solution necessitates careful evaluation of numerous decision-making variables.

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AUTHORS

First Author – Utkarsh Shukla, B.Tech Student, utkarsh3vns@gmail.com

Second Author – Jatin Kumar Chaurasia, B.Tech Student, jatinchaurasia97@gmail.com

Third Author- Urvi Verma , B.Tech Student, urviverma09071998@gmail.com

Correspondence Author – Ashish Kumar Pandey, ashishkumarpandey@rmlau.ac.in, 7317441066

Decision Support Tool for Uterine Fibroids Treatment with Machine Learning Algorithms – A Study

¹Dr.V.Sumathy, ²Dr. S.J.Rexline, ³Ms.T.D. Gowri

¹Assistant Professor, Department of Data Science, Loyola College, Chennai.

²Assistant Professor, Department of Computer Science, Loyola College, Chennai

³PG Research Scholar, Department of Data Science, Loyola College, Chennai.

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Abstract- Uterine fibroids are benign growth in the tissues of the uterus which gives discomforts in the form of symptoms like over bleeding, pain in lower abdomen, irregular periods, misconception, in conception etc., for which there are several possible treatment options. Patients and physicians generally approach the decision process based on a combination of the patient's degree of discomfort, patient preferences, and physician practice patterns. While there have been many successes in applying data mining technology to the improvement of diagnostic accuracy. In this paper the use of classification algorithms in combination with Machine learning algorithms as a decision support tool to facilitate more systematic fibroid treatment decisions is examined. Machine learning algorithms like Decision Tree Classifier, Gaussian Naive Bayes, Random Forest Classifier, K-Nearest Neighbours, Gradient Boosting Classifier and XG Boost Classifier algorithms results are used to decide the possible decision for treatment.

Index Terms- Machine learning algorithms, uterine fibroids, Decision Tree Classifier, Gaussian Naive Bayes, Random Forest Classifier, K-Nearest Neighbours

I. INTRODUCTION

Uterine fibroids are benign tumours of the uterus which are formed by the excessive growth of smooth-muscle cells in the wall of the uterus. They tend to be round-shaped with well-defined boundaries and their diameter can range from 1 cm to more than 10 cm[2]. They will grow as one neoplasm, or there are several of them within the womb. There are three types of fibroids based on their position in the uterus namely Intramural, Submucosal and Subserosal. The treatment options namely hysterectomy, Myomectomy, Gonadotropin Releasing Hormone (GnRH) depends on the symptoms, age, marital status etc., Fibroids are commonly diagnosed in all women, but certain factors such as age, ethnicity and heredity increase the risk.

Computer aided approach to fibroid treatment decision is described in many papers which includes identifying an appropriate distribution to estimate the waiting time of the patient to get a treatment [6]. Studies on non-parametric approach are also done to estimate the waiting time of the patient to receive an appropriate treatment[7]. Simplified case-based reasoning software has been developed to assist clinicians in helping their patients in taking the right fibroid treatment decision. While there have been many successes in applying data mining technology to the improvement of diagnostic accuracy of the Uterine fibroids [3]. Data Mining is that the technique of extracting vital data from an over sized information set. The applying of knowledge mining in extremely noticeable fields like medical, health management [1]. The health care data are wealthy however information is extremely poor attributable to lack of facility. So, there's an absence of effective analysis tools to get hidden relationships in information [4].

II. METHODS

The primary objective of this research paper is to analyze the Uterine fibroids data using various Machine learning algorithms like Decision Tree Classifier, Gaussian Naive Bayes, Random Forest Classifier, K-Nearest Neighbours, Gradient Boosting Classifier and XG Boost Classifier algorithms and that could be a useful to the patients and physician to make possible decision for treatment. The pipeline of the procedure is shown in Figure 1.

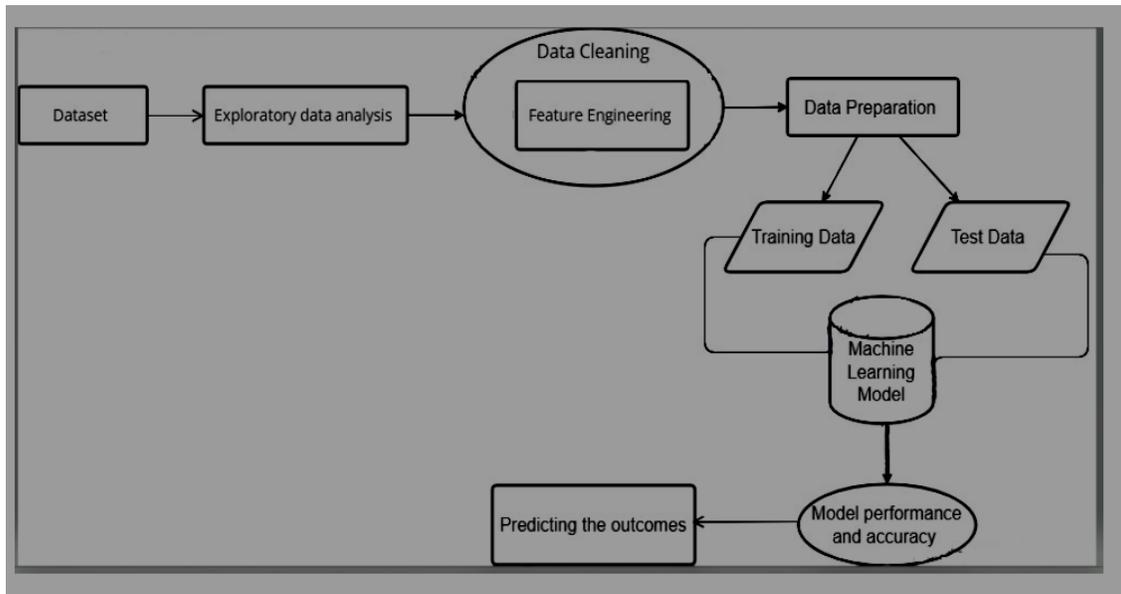


Figure 1. Pipeline of the Machine learning procedure

Data source is Kaggle.com and list of the features involved in the analyses are Age, Blood group, Age of menarche, Age of marriage, Age of menopause family income, place of residence, Location of fibroid, no., of fibroids, fibroid size, Symptom, no of children, month & year of diagnosis, month & year treatment, waiting time (in months), Type of Treatment taken.

The model is trained in such a way that it is capable of understanding the symptoms along with the issues related to fibroids to predict and choose the exact treatment accordingly. It is also an automated process where in the machine is trained only once and it gets easily capable to deal with the future data. Machine learning models used to analyze the information are Decision Tree Classifier, Gaussian Naive Bayes, Random Forest Classifier, K-Nearest Neighbours, Gradient Boosting Classifier and XG Boost Classifier algorithms. Type of Treatment is taken as the target variable and it has multiple classification levels.

3.1 Decision Tree Classifier

In Decision tree the given features are divided into Parent node (Root node) which forms the mountain top followed by the child node which takes the central part of the decision tree. At the end we could spot the Leaf node (End node) where in, it indicates the final decision. At the leaf node, the data could not be further split as it reaches the end point. Information gain measured from Entropy and Gini impurity are used to split the nodes.

Entropy:

It is a measure of impurity or randomness of each result after it is been split at every level. It is meant to be reduced as and when a new level is being introduced.

$$E(S) = \sum_{i=1}^c -p_i \log_2 p_i \quad \text{---(1)}$$

The value of Entropy always lies in between 0 and 1.

Gini Impurity:

Gini Impurity is same as entropy concept but the formula implemented is slightly different. In most of the cases, Gini Impurity is preferred over entropy as it is computationally more effective since it requires less time to execute due to not possessing a logarithmic function.

$$Gini = 1 - \sum_{i=1}^c (p_i)^2 \quad \text{---(2)}$$

The value of Gini impurity is lies between 0 to 0.5

Information Gain:

Information gain is the measure of amount of information that could be extracted at each level which helps in taking decision to further build the decision tree model. The main aim is to increase the information gain at each and every level. As the entropy decreases, the information gain increases.

$$Gain(S, A) = H(S) - \sum_{v \in Values(A)} \frac{|S_v|}{|S|} H(S_v) \quad \text{---(3)}$$

3.2 Naive Bayes

In Machine Learning, Naïve Bayes falls under the category of Supervised Classification Algorithm. It is the probability of one event occurring given that the other event has already occurred. The formula is indicated as

$$P(A|B) = \frac{P(B|A)p(A)}{P(B)} \quad \text{---(4)}$$

The naïve Bayes formula is used to calculate the probability of each class and the class with highest probability is given as the outcome.

3.3 Random Forest Classifier

Random forest which uses Bootstrap Aggregation is an ensemble technique which is combination of multiple machine learning models. It includes Bagging and Boosting Techniques

Bagging:

Random forest builds multiple decision trees where in each decision tree is instructed to work on its data separately. The dataset considered is split into many samples and is fed to the decision tree models which happens with replacement that is the rows could also be repeated. Each data sample is been processed by the respective models. For each and every decision tree model, it produces its own output which is then combined at last to produce a single output

3.1 K-Nearest Neighbor

The K value indicates the number of nearest datapoints that is being considered in terms of distance. The distance is calculated with the help of Euclidean or Manhattan. The K value considered should always be an odd number in order to neglect the same number of datapoints appearing in both the categories. A user defined loop is designed which starts from 1 till the preferred n. And the higher accuracy helps in choosing the right K value.

Gradient Boosting Algorithm

Gradient boosting is one of the categories of Boosting techniques and is a commonly used algorithm to solve real time big data. Here, Multiple models are combined together to form the final output. The main aim is to optimize the loss function which indicates that it tries to reduce the value of the error as much as it could.

3.3 XG Boost Classifier

Extreme Gradient boost is a boosting algorithm. It is an extension of Gradient Boosting machine learning algorithm. It is a regularized type of boosting which means that it automatically prevents over fitting. It is also designed in a way where in it deals with null values internally. It offers a good balance between bias and variance.

III. PERFORMANCE ANALYSIS

There are numerous ways to evaluate the performance of a classifier. Here Precision-Recall curves are used to evaluate the performance of the Decision Tree Classifier, Gaussian Naive Bayes, Random Forest Classifier, K-Nearest Neighbours , Gradient Boosting Classifier and XG Boost Classifier algorithms. Precision-Recall is a useful measure of success of prediction when the classes are very imbalanced. A PR curve is simply a graph with Precision values on the y-axis and Recall values on the x-axis. In other words, the PR curve contains TP/(TP+FN) on the y-axis and TP/(TP+FP) on the x-axis. It is important to note that Precision is also called the Positive Predictive Value (PPV). Recall is also called Sensitivity, Hit Rate or True Positive Rate (TPR).

To estimate performances in the models, we employed accuracy, sensitivity as a parameter.

The accuracy, sensitivity and specificity were calculated by TP, TN, FP and FN. Accuracy is the overall correctness of the model and Sensitivity is measure of the ability of a prediction model to select instances of a certain class from a data set. It is commonly called as recall and corresponds to the true positive rate.

Figure 2 shows the Average precision value of Decision Tree classifier. It gives the Average precision value as 0.58.

Figure 2. Average precision value of Decision Tree classifier

Figure 3 shows the Average precision value of Gaussian Naïve Bayes. It gives the Average precision value as 0.38.

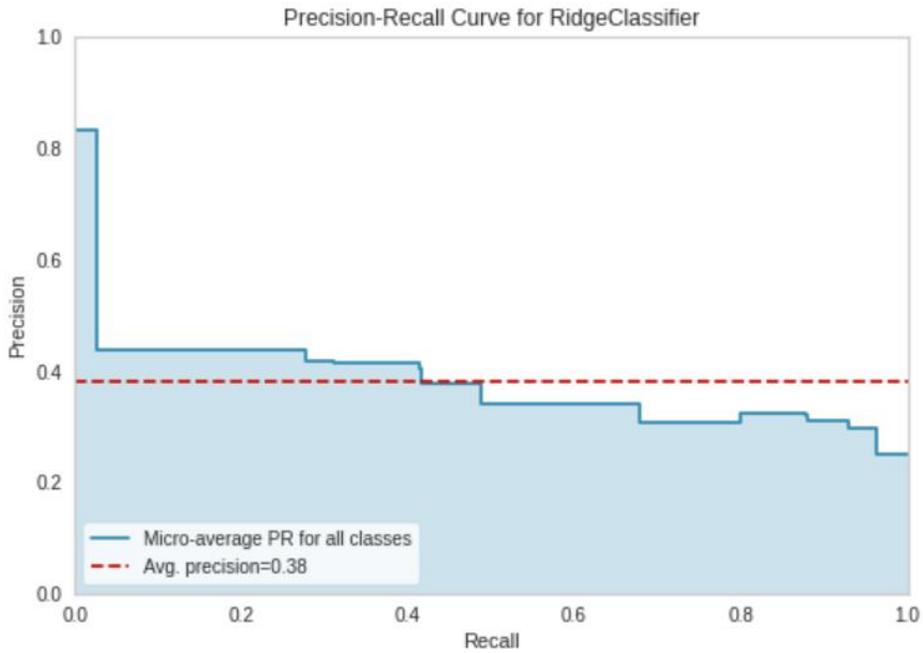


Figure 3. Average precision value of Gaussian Naïve Bayes

Figure 4 shows the Average precision value of Random Forest Classifier. It gives the Average precision value as 0.57.

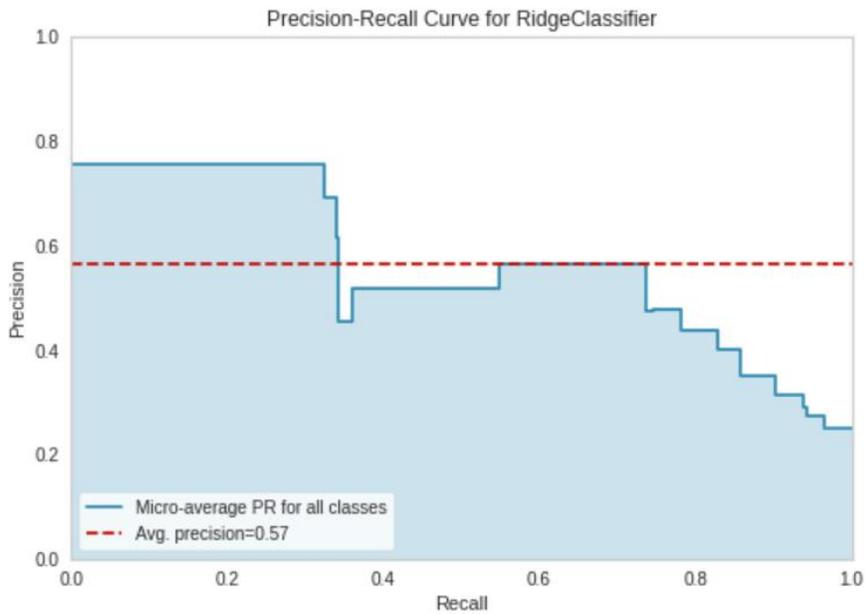


Figure 4. Average precision value of Random Forest Classifier

Figure 5 shows the Average precision value of K-Nearest Neighbours. It gives the Average precision value as 0.51.

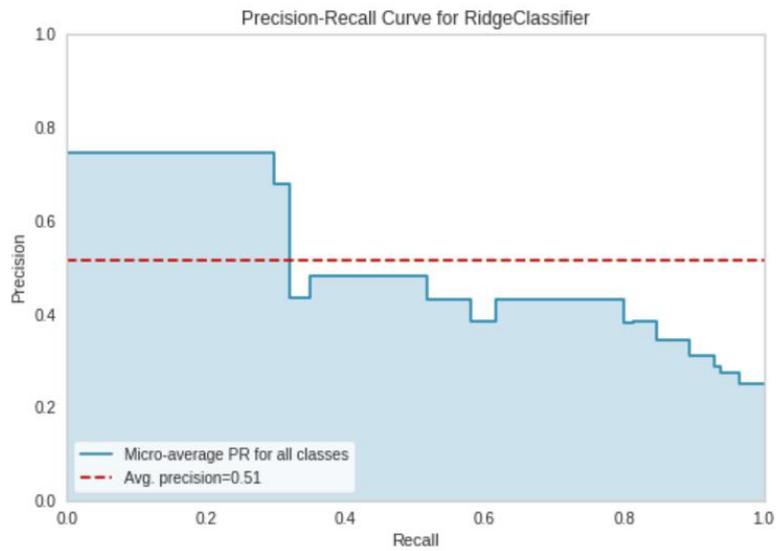


Figure 5.Average precision value of K-Nearest Neighbours

Figure 6 shows the Average precision value of Gradient Boosting Algorithm. It gives the Average precision value as 0.56.

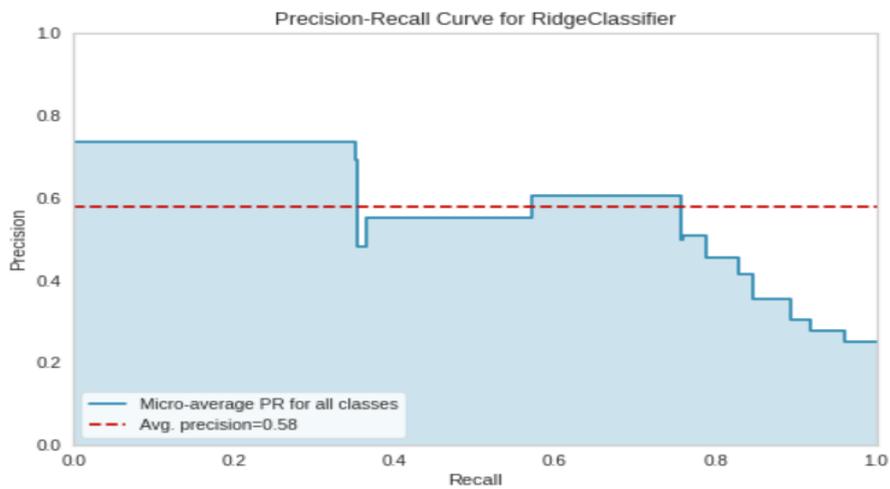


Figure 6.Average precision value of Gradient Boosting Algorithm

Figure 7 shows the Average precision value of XG Boost Algorithm. It gives the Average precision value as 0.51.

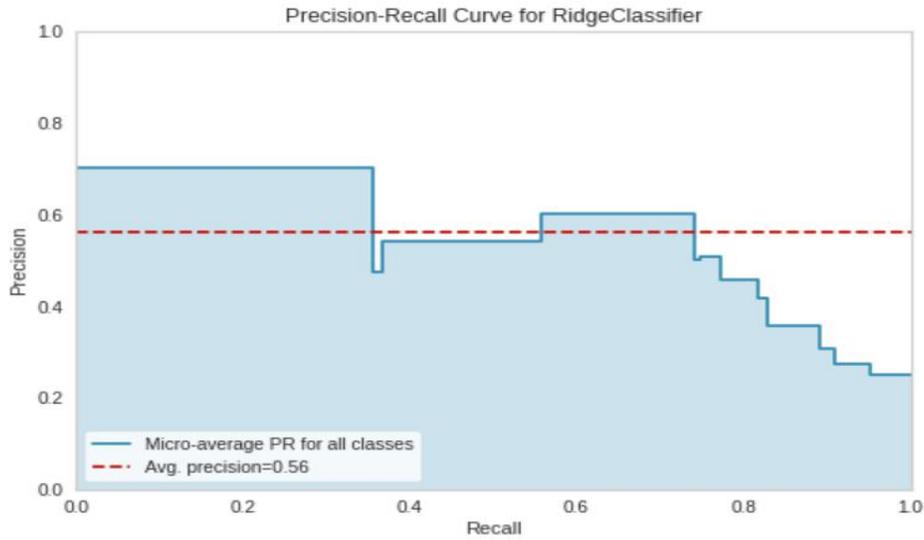


Figure 7. Average precision value of XG Boost Algorithm

Hereby the accuracy for the models is discussed in details. The Gradient Boosting Classifier is giving highest accuracy with 77%. The accuracy for the Decision Tree Classifier is 76% .And XG Boost Classifier gives the accuracy with 75%. Table 1 shows the accuracy value for all the Classification Algorithms. Figure 8 shows the model’s performance based on its accuracy value for all the Classification Algorithms.

Table1. Accuracy value for all the Classification Algorithms

Classification Algorithms	Accuracy Score
Decision Tree Classifier	76%
Gaussian Naive Bayes	34%
Random Forest Classifier	73%
K-Nearest Neighbours	68%
Gradient Boosting Classifier	77%
XG Boost Classifier	75%

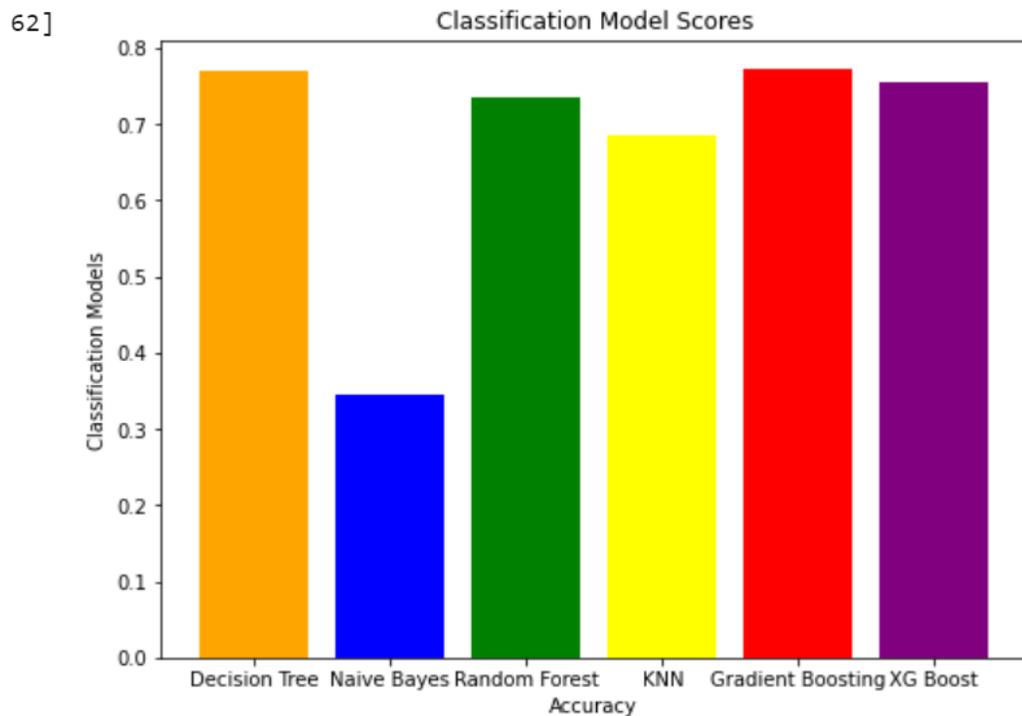


Figure 8. Accuracy value for all the Classification Algorithms

IV. CONCLUSION

In this paper, we have demonstrated machine learning approach to decision making for uterine fibroid treatments. We have used several data preprocessing strategies in order to optimize results from six well established classifying algorithms. The goal of classification is to accurately predict the target class for each case in the data. In order to believe any predictive model, the accuracy of the model must be estimated. We have noticed that decision tree model showed the highest accuracy, highest sensitivity and highest specificity for test options. By analyzing all these data, it is concluded that the excessive menstrual bleeding and pain in abdomen be the symptoms for fibroid.

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AUTHORS

First Author – Dr.V.Sumathy, Assistant Professor, Department of Data Science, Loyola College, Chennai.,
sumathy@loyolacollege.edu

Second Author – Dr. S.J.Rexline, Assistant Professor, Department of Computer Science, Loyola College, Chennai,
rexlinesj@loyolacollege.edu

Third Author – Ms.T.D. Gowri, PG Research Scholar, Department of Data Science, Loyola College, Chennai.,
21pds011@loyolacollege.edu

The Nature Of Justice In The Implementation Of A Dynamic Government System

Victor Pieter Pattinasarany^{1*}, M.J. Sapteno², E.R.M. Toule², J.J. Pietersz²

¹*Graduate Student PhD, Study Program : Science Of Law. Pattimura University, Ambon, Indonesia*

²*Faculty Of Law. Pattimura University, Ambon, Indonesia*

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Abstract : The consequence of implementing decentralization and regional autonomy is that each local government administrator makes or sets policies and implements government policies quickly, responsively, effectively and efficiently. In general, the people in the regions want or want the government service system to be carried out in a professional, reliable manner with an implementation method that is able to work effectively, efficiently, and at the same time satisfy the needs of the community. However, the local government bureaucracy becomes convoluted and lacks responsiveness and responsiveness to the needs and interests of the community. Based on this phenomenon, this research aims to (1) explain and analyze the nature of justice in dynamic government. (2) Explain and analyze what legal principles are the basis for dynamic governance, (3) Explain and analyze and find forms of dynamic governance. This research is normative legal research, namely research that examines and analyzes the rule of law, legal doctrine, legal theories as well as legal principles or principles, using a statutory approach, conceptual approach, case approach, and comparative approach. . The results of the study show that the essence of justice in a dynamic government is a government that always pays attention to or responds to conditions and needs in society according to real conditions in society, not the interests of the authorities. Various government policies and services that are made and implemented quickly respond to conditions and needs as well as developments that occur in the community, and even have to be responsive to changing situations/conditions in society. However, government policy making by government administrators in the regions has not reflected the dynamic principles of government, namely fast, responsive to the needs or interests of the local community, so that government policies are not effective and efficient in responding to the needs of local communities.

Keywords: Government Policy, Government Service System

1. INTRODUCTION

The fourth paragraph of the Preamble to the 1945 Constitution of the Republic of Indonesia (hereinafter abbreviated as the 1945 Constitution of the Republic of Indonesia) stipulates the objective of establishing a State Government of the Republic of Indonesia which protects the entire Indonesian nation and the entire homeland of Indonesia, promotes public welfare, educates the nation's life and participates in carrying out order. a world based on freedom, lasting peace and social justice.

In accordance with this determination, one of the objectives of establishing the Indonesian state government is to promote general welfare and social justice for all Indonesian people. In order to achieve this goal, it must be supported by various government policies carried out by state administrators.

One of the government policies in question is the implementation of decentralization and regional autonomy in the governance system. Through the said government policy, the central government delegates some of the authority or government affairs to the regions to regulate and manage their own government affairs and the interests of the people in the regions.

The government policy is intended as an effort to improve government services to the community, due to the Indonesian state which has an area, and consists of thousands of islands, tribes, cultures, and different regions. Because if all government affairs are centered on the central government with the state conditions as mentioned, it will certainly cause government services to become inefficient and effective in order to realize the welfare of the community.

Based on the constitutional provisions of Article 18, Article 18A, and Article 18B of the 1945 Constitution of the Republic of Indonesia, the state stipulates the transfer of government affairs to the regions as well as the granting of rights and authority to the regions to regulate and manage the government affairs themselves.

Article 18 stipulates that:

(1) The Unitary State of the Republic of Indonesia is divided into provincial regions and the province is divided into regencies and cities, each of which has a regional government, which is regulated by law.

(2) The provincial, district and city administrations shall regulate and manage their own government affairs according to the principle of autonomy and co-administration.

- (3) The provincial, district and city governments shall have a Regional People's Representative Council whose members are elected through general elections.
- (4) The governors, regents and mayors respectively as heads of provincial, district, and city governments are democratically elected.
- (5) Regional governments exercise the widest possible autonomy, except for government affairs which are determined by law to be the affairs of the Central Government.
- (6) Regional governments have the right to stipulate regional regulations and other regulations to carry out autonomy and assistance tasks.
- (7) The structure and procedures for administering regional government are regulated in law.

Article 18A stipulates that:

- (1) The relationship of authority between the central government and provincial, regency, and city regional governments, or between provinces and regencies and cities, is regulated by law with due observance of the specificity and diversity of regions.
- (2) Financial relations, public services, utilization of natural resources and other resources between the central government and regional governments are regulated and implemented fairly and in harmony based on the law.

Article 18B stipulates that:

- (1) The state recognizes and respects special or special regional government units which are regulated by law.
- (2) The state recognizes and respects customary law community units and their traditional rights as long as they are still alive and in accordance with the development of society and the principles of the Unitary State of the Republic of Indonesia, which are regulated by law.

These provisions serve as the constitutional basis for stipulating various laws and regulations that implement the transfer of government affairs by the central government to regions and the granting of autonomy to regions in the system of administering the government of the State of Indonesia to regulate and manage according to their own initiatives and initiatives.

Based on the constitutional provisions of Article 18, Article 18A, and Article 18B of the 1945 Constitution of the Republic of Indonesia, Law of the Republic of Indonesia Number 23 of 2014 concerning Regional Government is stipulated (State Gazette of the Republic of Indonesia of 2014 Number 244, Supplement to the State Gazette of the Republic of Indonesia Number 5587, last amended by Law Number 9 of 2015 concerning the Second Amendment to Law Number 23 of 2014 concerning Regional Government, State Gazette of the Republic of Indonesia of 2015 Number 58, Supplement to the State Gazette of the Republic of Indonesia Number 5679, hereinafter abbreviated as Law No. 23 of 2014) regulates the handover of government affairs from the central government to the regions or decentralization of government affairs to autonomous regions to regulate and manage their own government affairs and the interests of the people in the regions based on the aspirations and needs and conditions of the people in the regions. This makes government administrators in the regions able to determine government policies and implement government policies on their own initiative without direct central government intervention. Such conditions make government administrators able to make government policies that are tailored to the needs and interests as well as real conditions in the region.

Rondinelli said that decentralization was a way to reduce the density of the central government's workload (Hasbullah, 2010). Maddick also said that decentralization is a way to increase the ability of government officials to obtain better information about regional conditions, to develop programs more responsively and to anticipate quickly when problems arise in implementation (Hasbullah, 2010).

Van den Berg defines decentralization as the transfer of power or affairs from the central government to the regions (Agussalim Andi Gadjon, 2007). Meanwhile, Gie defines decentralization as the delegation of central government authority to government organizational units to carry out all local interests of groups that inhabit an area.

The understanding of the experts as mentioned shows that decentralization is the transfer of authority from higher government organs to lower government organs to carry out government actions independently. Normatively, Article 1 point 8 of Law no. 23 of 2014 defines decentralization as the transfer of government affairs by the central government to autonomous regions based on the principle of autonomy

Bagir Manan said that from the point of view of governance, decentralization aims to ease the workload of the center. Through decentralization, various tasks and work of the center are transferred to the regions. Center, thus can focus more attention on matters related to the national interest or the country as a whole (Manan, 2001). The implementation of decentralization gave birth to autonomy to the regions in regulating and managing government affairs in the regions. In other words, the handover of government affairs from the central government to the regions makes the regions entitled, authorized, and obliged to regulate and manage their own government affairs on their own initiative and initiative without being ordered by the central government.

Van der Pot, defines autonomy as *eigen huishouding* (running one's own household. Autonomy is the granting of rights to regions to regulate their own regions. Regions have freedom of initiative in managing household and local government (Agussalim Andi Gadjong, 2007). Meanwhile, Tresna, defines Autonomy as self-regulation within the scope of being free to act, not because it is ordered from above, but because of its own will and initiative for the interests of the region itself which must be regulated and managed (Agussalim Andi Gadjong, 2007).

The essence of the implementation of decentralization and regional autonomy is to bring the functions of government services closer to citizens residing in the regions. If all government affairs are centered only on the central government and its own implementation by the central government makes it difficult for the central government to provide government services quickly, responsively, effectively and efficiently.

As a consequence of the implementation of decentralization and regional autonomy in the government system in Indonesia, there is a division of government affairs between the central and regional governments as stipulated in Article 9 of Law no. 23 of 2014 which stipulates that:

- (1) Government Affairs consist of absolute government affairs, concurrent government affairs, and general government affairs.
- (2) Absolute government affairs as referred to in paragraph (1) are Government Affairs which are fully under the authority of the Central Government.
- (3) Concurrent government affairs as referred to in paragraph (1) are Government Affairs which are divided between the Central and Provincial Governments and Regency/Municipal Regions.
- (4) Concurrent government affairs that are handed over to the Regions become the basis for the implementation of Regional Autonomy.
- (5) General government affairs as referred to in paragraph (1) are Government Affairs under the authority of the President as head of government.

In the division of government affairs, there are classifications of government affairs, namely absolute affairs, concurrent government affairs, and general government affairs. Absolute government affairs are government affairs which are the authority of the central government which are not left to the regions. The government affairs in question are absolutely the authority of the central government. The government affairs as mentioned are carried out by the central government itself, which in its implementation in the regions the central government can delegate the said government affairs to vertical agencies in the regions or the governor as representatives of the Central Government in the regions.

Meanwhile, concurrent government affairs are government affairs that are divided between the central government, provincial regions, and district/city areas. Concurrent government affairs consist of mandatory government affairs and optional government affairs. Mandatory government affairs are government affairs that must be carried out by all regions. While elective government affairs are government affairs that must be carried out by the region in accordance with the potential of the region.

Government affairs must consist of government affairs related to basic services and government affairs that are not related to basic services. Mandatory government affairs related to basic services are mandatory government affairs, some of which are basic services, such as government affairs (a) education; (b) health; (c) public works and spatial planning; (d) public housing and residential areas; (e) peace, public order, and community protection; and (f) social (Article 12 of Law No. 23 of 2014).

The government affairs must be submitted to the regions as the basis for implementing regional autonomy, in addition to concurrent government affairs that are not related to basic services or government affairs of choice.

In principle, the transfer of government affairs from the central government to the regions is an effort to improve government services to the community in each region. On this basis, each regional government administrator makes or stipulates policies and implements government policies quickly and responsively to meet the needs and interests of the community so that government services become efficient and effective.

Each government administrator in the region makes and implements his own government policies in accordance with the needs and aspirations of the people in the region to provide government services to community members in the region and development in the region, so that there is no inequality of government services and development between regions if this is the case. carried out by the central government. However, this situation certainly requires great attention and fast handling but must be accurate. Each local government administrator is more responsive in responding to all the needs or interests of the local community without having to depend on the central government. The delegation of authority or government affairs to the regions to regulate and manage their own government affairs and the interests of the people in the regions according to the aspirations and objective conditions that occur in each region as a manifestation of the application of distributive justice proposed by Aristotle.

Aristotle, distinguishes justice into distributive justice and commutative justice (Aristotle, 1997). Distributive justice is justice that demands that everyone gets what is their due, so it is proportional. Here what is considered fair is if everyone gets what is their right proportionally. Meanwhile, commutative justice is the determination of fair rights among several human individuals who are equal, both between physical and non-physical individuals. Justice is also interpreted as equality, namely equality in the eyes of the law, where no one party is higher than the other party (Nasution, 2014).

Distributive justice as stated by Aristotle is manifested in the surrender and granting of rights, authorities and obligations to the regions to regulate and manage their own government affairs and community interests based on regional aspirations and conditions. This is to improve government services as an effort to create people's welfare. This is influenced by the concept of a welfare state or known as the Welfare State which requires the state to seek welfare for its people. The government is required to be able to behave dynamically to resolve all aspects/problems concerning the lives of its citizens (Ragawino, Bewa, 2006).

The government must be sensitive to every problem that occurs in the community, must prioritize the people first, advance the region, reduce problems that occur in society, not add problems to the people, starting from the service aspect, attitude in service from the government bureaucracy, even the length of time in service. not in accordance with the provisions, which people are tired of dealing with government bureaucracy. It doesn't make it easy for people to deal with it, but instead makes it complicated when dealing with government bureaucracy.

Whereas the government must be fast, responsive, effective and efficient. This is a form of dynamic government. In principle, in a dynamic government administration system, in the process of formulating and implementing government policies, it is carried out quickly, adaptive to conditions that exist in society. This makes the implementation of government policies more efficient and effective as well as fair to the whole community, because the purpose of handing over government affairs from the central government to the regions is as a form of improving government services.

In general, local people want or want government services that are fast, cheap and fair. The government service system is carried out in a professional, reliable manner with an implementation method that is able to work effectively, efficiently, and at

the same time satisfy the needs of the community. The existence of government administrators in the regions as part of state organs must be able to make it happen, by prioritizing the public interest, facilitating public affairs, shortening the time for the implementation of public affairs, and providing the best quality to citizens through public services. However, the local government bureaucracy becomes convoluted and lacks responsiveness and responsiveness to the needs and interests of the community as stakeholders in government services.

Various government service systems and government policies in the regions still cause problems. Whereas the purpose of handing over government affairs and granting autonomy to regions is to improve government services to the community in order to realize community welfare. The long-term development vision and direction for 2005-2025 is to improve the quality of state administration by: (a). Reorganizing the functions of government institutions so that they can function more adequately, lean, flexible and responsive; (b). Increasing the effectiveness and efficiency of management and procedures at all levels and between levels of government; (c). Structuring and increasing the capacity of apparatus resources to suit the needs in carrying out their duties and functions to provide the best service for the community; (d). Improving employee welfare and implementing a career system based on achievement (Vision, Mission and National Long-Term Development Direction, 2005-2025).

Local governments must be able to innovate in improving the quality of public services to eliminate the impression of a slow, convoluted and unfriendly government bureaucracy. This can be eliminated by reforming the bureaucratic governance system, improving human resources and institutions in order to realize good governance. good. The phenomenon of public services by local government bureaucracies is full of problems, for example long-winded service procedures, uncertainty of time and price that make services difficult to reach in a reasonable manner by the community. This causes distrust of local government. The condition of the performance of local government institutions still shows a lot of low governance performance even though they have financial resources that are considered sufficient to support the implementation of government programs and activities in the context of achieving state goals (Darusman and Wijaya, 2020).

According to Agus Pramusinto, there are three main phases of a dynamic government, namely internal government improvement, public service improvement, and a government that pays attention to the adaptive needs of its people (greater democracy). It is said, adaptive government is a government that wants to understand the needs of its people progressively. This government is able to see various problems from various perspectives so that they can find more effective and effective treatment for the people (Anonymous, 2022). Neo Boon Siong said that the needs of today's society are fast, responsive and efficient government. If these three needs can be met, then the relevant government can be said to have succeeded in implementing good governance properly. If it is not able to change, then it is not good governance.

We can take an example in the implementation of dynamic governance in the State of Singapore, a small, modern country, pocketing a series of world-class achievements, including: ranking (5) the most competitive country in the world in 2006. (5) the country with the least corruption, the most comfortable country (6) to do business in 2006 to 2010 as the top ranking country in Asia for the convenience of living, doing work, playing, and ranking 34th in the world, and others, one of the concepts that is well implemented is Dynamic Government which has led the State of Singapore to the state of progress as above. In its implementation, dynamic governance in Singapore has an impact on time and budget efficiency in terms of cheap, fast-paced through technological transformation, improving the quality of human resources, strengthening information systems, modernizing business management, institutional reform, reinventing government, banishing bureaucracy, deregulation. and debureaucratization, development of e-commerce and so on, which as a whole refers to increasing efficiency and quality of service, which is supported by professional abilities and skills as public servants (Neo and Chen, 2007).

Based on the above background, researchers are encouraged to conduct research with the title Principles of Justice in the Implementation of a Dynamic Government System. Based on the background of the problem above, the problems in this paper are: How is the nature of justice in dynamic government? The research objectives to be achieved from this research are to: examine, analyze and know the nature of justice in dynamic government. Research Benefits: The results of this study are expected to provide benefits both theoretically and practically, including: Theoretically, providing academic input for the development of Legal Science, especially in the field of Constitutional Law and State Administrative Law related to the principle of justice in the administration of a dynamic government system . Practically, the results of this study are expected to be useful for the Government and Regional Governments in carrying out government functions.

2. RESEARCH METHOD

Types of research

According to the substance studied, this research is a legal research with a normative juridical type. Legal research according to Peter Mahmud Marzuki is a process to find the rule of law, legal principles, and legal doctrines in order to answer the legal issues faced (Marzuki, 2006). Normative juridical research is a legal research method carried out by examining library materials or mere secondary materials (Marzuki, 2006).

Problem Approach

The approach to the problem in this research is the statutory approach, conceptual approach and comparative approach to obtain legal arguments in order to answer the legal principles in the implementation of a dynamic government system.

The statute approach is used to examine a number of laws and regulations related to the Implementation of a Dynamic Government System. A conceptual approach is used to explore the various terminology used in the Implementation of a Dynamic Government System. The comparative approach is carried out by comparing the implementation of government in other countries with regard to the Implementation of a Dynamic Government System.

Source of Legal Material

The source of the legal material in this research comes from library research, where library research uses primary legal materials, secondary legal materials and tertiary legal materials. Primary legal materials are legal materials whose contents are binding because they are issued by the government or institutions that have the authority. **Primary legal materials consist of:**

1. The 1945 Constitution of the Republic of Indonesia.
2. Law of the State of Indonesia Number 5 of 1986 concerning the State Administrative Court
3. Law of the Republic of Indonesia Number 39 of 1999 concerning Human Rights.
4. Indonesian State Law Number 9 of 2004 concerning Amendments to Law Number 5 of 1986 concerning State Administrative Courts
5. Law of the Republic of Indonesia Number 28 of 1999 concerning the Implementation of a State Free from Corruption, Collusion and Nepotism.
6. Law Number 11 of 2008 concerning Information and Electronic Transactions.
7. Law Number 25 of 2009 concerning Public Services.
8. Law of the State of Indonesia Number 30 of 2014 concerning Government Administration
9. Law of the State of Indonesia Number 23 of 2014 concerning Regional Government.
10. Government Regulation Number 105 of 2000 concerning Regional Financial Management and Accountability.
11. Government Regulation No. 58 of 2005 concerning Regional Financial Management.
12. Regulation of the Minister for Empowerment of State Apparatus and Bureaucratic Reform Number 06 of 2011 concerning Electronic Service Manuscripts.
13. As well as various other laws and regulations.

Secondary legal sources are materials in the form of books and other printed materials, as well as software, namely by accessing a number of data via the internet, various books, scientific journals, and research results, and tertiary legal materials are legal materials that support primary legal materials. and secondary legal materials (Sondakh, 2009).

Legal Material Collection Techniques

The technique of collecting legal materials used in this research is to conduct a literature study, namely by collecting rules that support the problem, selecting legal materials, so that several types of accurate legal materials are produced.

The legal materials that have been obtained are then analyzed, with qualitative analysis which is connected with relevant legal theories which are then used to draw conclusions as answers to the problems mentioned above. This is very important, because the study of documents for legal research includes the study of legal materials consisting of primary legal materials and secondary legal materials. Each of these legal materials must be re-examined for validity and reliability, because this will determine the results of the study (Amiruddin and Asikin, 2013).

Legal Material Analysis Techniques

The legal materials that have been obtained are then analyzed by qualitative analysis which is related to the relevant theories, concepts, principles, and principles of law which are then used to draw conclusions as answers to the problems mentioned above.

This is because a normative juridical analysis essentially emphasizes the deductive method as the main guide and the inductive method as a supporting work procedure. Normative analysis mainly uses library materials as research sources (Amiruddin and Asikin, 2013).

3.RESULTS AND DISCUSSION

The Nature of Justice in a Dynamic Government Administration System.

The design of the implementation of regional government in Indonesia through the delegation of government affairs or authority to the regions and the granting of autonomy to the regions to regulate and manage their own government affairs and the interests of the community is for equitable distribution of government services and development throughout the region. So that there is no more centralization of government and development services to the central government and to improve government services to the community in each region. This has the consequence that government administrators in each region are more responsive and responsive to the various needs or interests of the local community without being dependent on the central government. Government administrators in the regions must be able to create government services and development in the regions on their own initiative in order to improve the welfare of regional communities.

Delegation of government affairs or authority to the said regions, making government services equal to the community and development in all regions, so that people in each region will get good government services and the existence of equitable development throughout the territory of Indonesia, when compared to the centralized system makes it is difficult for people in regions to have access to good government services and even neglect them, for example government services in the fields of education, health and others, and development is only concentrated in certain areas.

Even though every citizen has the same right to get government services without any regional, ethnic, religious differences. Every citizen has the same right to enjoy government and development services. Therefore, the State is responsible for providing good or proper public service facilities for all citizens and carrying out development evenly throughout the territory of the country. There is justice in government services and development for all citizens.

However, people's lives are still isolated, especially in areas characterized by islands such as in Maluku from government services and development due to uneven development as a result of government policies carried out by the government and local governments. This resulted in areas far from the center of government unavailability of transportation facilities and infrastructure (land and sea) and communication that allows interaction between communities between islands. As a result, people living on certain islands do not have access to government and development services and information about social changes that are taking place. The low quality of human resources in various contexts of social relations, such as in the fields of education and health, for example, is due to the lack of adequate education and health facilities and infrastructure and are not evenly distributed throughout the region. There is a tendency for people in this region to maintain and practice traditional lifestyles in a system. In this context, the natural resources (especially marine and fisheries natural resources as well as mining) which are abundantly available in this region have not been utilized optimally, so that the degree of social welfare cannot be developed. The community has difficulty adjusting to the socio-cultural dynamics that occur. But on the other hand, this indication shows a strong tendency of the community to maintain and actualize cultural values that have not provided added value for the realization of living welfare. This requires the central government and regional governments to make government policies and provide facilities and means of connecting to make it easier for citizens to access adequate for the population so that they can interact from one place to another, for example by improving transportation facilities both land and sea for easy access to transportation. going from one place to another.

The choice of legal politics should be the submission of government affairs to the regions and the granting of autonomy to the regions as a means of applying the principle of justice in the fulfillment of the right to government and development services for all citizens to enjoy the same government and development services by all citizens, so that inequality and injustice do not occur. in providing inter-regional government and development services. However, this is not what happened, but injustice in government and development services.

Whereas the transfer of government authority from the central government to the regions to regulate and manage their own government affairs is a means of implementing justice in the government administration system. The principle is that there is justice in obtaining or obtaining government and development services for all citizens, as stated by John Rawls that there is a balanced distribution of rights and obligations in society so that everyone has the opportunity to benefit from them in real terms, and bear the same burden (Pan Mohamad). Faiz, 2009). There is equal fair treatment from the government to fulfill the rights of all citizens to get government services.

In principle, the transfer of government affairs from the central government to the regions is an effort to improve the quality of government services and regional development in order to fulfill the rights of every citizen. As a consequence, regional government administrators can determine for themselves the appropriate design and model of government bureaucracy to provide good governance and development services in the region on their own initiative and initiative according to the conditions and needs of the community and region, but in reality regional government administrators still show a negative impression in providing services. good governance and development to citizens. People are always placed as clients who need the help of bureaucratic officials, so they must submit to the wishes of officials in the bureaucracy. The culture that has developed in the bureaucracy so far is not a service culture, but rather leads to a culture of power.

Whereas the handover of government affairs and the granting of autonomy to regions is aimed at (a) realizing the effectiveness of regional government administration; (b) accelerate the improvement of community welfare; (c) accelerate the improvement of the quality of public services; (d) improve the quality of governance, and; (e) increase national competitiveness and regional competitiveness

The attention and concern of local governments so far has always been associated with a development approach that emphasizes security more than the approach and improvement of welfare (prosperity). Whereas the security approach must always be accompanied by a balanced welfare approach. On the other hand, several neighboring countries bordering Indonesia have developed their border areas as areas of advanced economic growth with various complete physical facilities and infrastructure as well as quality human resources, such as Singapore and others.

The essence of handing over government affairs and granting autonomy to regions is to bring the functions of government services closer to citizens so that government services are effective for citizens. Cheema and Rondinili suggested several reasons for implementing decentralization, namely: (1) Ways to overcome various serious limitations. (2) Overcome the strict structured procedures of a centralized plan. (3) Increased sensitivity to local problems and needs. (4) Penetration of State politics and administration. (5) Representation is better. (6) Better public administration capacity and capability. (7) Field services with higher effectiveness at local level. (8) Improve coordination with local leaders. (9) Develop local community participation. (10) Creating alternative ways of making decisions. (11) Public administration that is more flexible, innovative, and creative. (12) Better diversity of service facilities. (13) Better political stability. (14) Increasing the number and efficiency of distribution of public goods and services (Sumaryadi, 2005).

With the handover of government affairs and the granting of autonomy to the regions, efficiency of government services to the people in the regions should have been achieved, the sensitivity of regional government administrators to the problems and needs of the people in the regions, regional government administration to be more flexible, innovative, creative, and so on. .

According to S.H. Sarundajang has a number of bureaucratic weaknesses faced by local government, namely; 1). The organizational structure and work procedures made by each local government only accommodate personnel in a structural position; 2) community participation is still low, 3) transparency has not worked, 4) overlapping work mechanisms and division of tasks make it difficult for internal circles and the community to deal with local governments. 5) the politicization of civil servants is still symptomatic, 6) an unhealthy career system creates unhealthy competition, 7) the bureaucratic apparatus is not ready to face the demands of change. (Sarundajang, 2005]

The handover of government affairs to the regions as a form of proportional distribution of justice or distributive justice which is said by Aristotle in the context of equitable administration of government and development to accelerate the improvement of people's welfare. According to Aristotle, distributive justice is justice that gives everyone a portion according to their achievements (Pan Mohamad Faiz, 2009). This view of justice as a granting of equal rights is not equality. This means that there is proportionality in giving rights to everyone according to their abilities and achievements. Everyone gets what is due proportionally.

The concept of distributive justice has actually been adopted in government policy through the application of the widest possible autonomy to the regions and the division of selected government affairs in accordance with regional potential, so that the content of autonomy from each region to elective government affairs is different. The concept of justice is not only applied in the distribution of selected government affairs, but also in granting status to special regions and special regions that are owned as a manifestation of regional diversity. In addition, the nature of the contents of regional autonomy that is practiced in the system of governance in Indonesia does not have to be uniform, because regional conditions are different. Therefore, the distribution of government authority must be carried out proportionally based on the real conditions of the region. This means that the value of justice is obtained proportionally.

With the handover of government affairs from the central government to the regions as well as the granting of broad autonomy to the regions, there has been a change in the approach to governance in order to respond to the fulfillment of the interests or needs of citizens. There is a shift or transfer of authority from the central government to the regions to regulate and manage government affairs and the interests of the people in the regions. This means that there has been a change in the implementation of tasks and functions by local government administration. The central government provides opportunities for regions and even local communities to participate in regulating and managing regional households.

Government administrators in the regions themselves make and implement government policies independently without having to depend on the central government and must be oriented to the interests and needs that are really real in the community to overcome various problems faced by the community as an effort to create fast, responsive, and efficient government management. efficient and effective.

The regions must independently regulate and manage their own government affairs and the interests of the people in the regions, but still based on the norms, procedures, standards and criteria set by the central government in the provisions of laws and regulations, as a consequence of the stipulation of the Indonesian state as a unitary republic.

Koswara put forward four considerations of the need to give autonomy to the regions, among others: (1) From a political perspective, the granting of autonomy is seen as preventing the accumulation of power in one hand which eventually leads to a tyrannical or totalitarian government and anti-democracy; (2) In terms of democracy, autonomy is believed to be able to involve the people in the government process as well as to educate the people to use their rights and obligations in the daily administration of government; (3) From an organizational technical point of view, autonomy is seen as a way to achieve an effective and efficient government that is more responsive. What is considered more important to be managed by the government and local communities is left to the regions and what is more appropriate in the hands of the center is still managed by the center. (4) In terms of management as an administrative element, a delegation of authority and obligation to provide accountability for the performance of a task is a natural thing (Koswara, 2001).

I Nyoman said that the purpose of granting autonomy to the regions includes at least four aspects: (1) From a political perspective, it is to involve, channel the inspiration and aspirations of the people, both for the benefit of the region itself and to support politics and national policies in the context of development and the democratic process at the regional level. lower. (2) In terms of government management, it is to increase the efficiency and effectiveness of the administration of government, especially in providing services to the community by expanding the types of services in various fields of community needs. (3) From a societal perspective, it is to increase participation and foster community independence, by carrying out empowerment efforts, so that the community becomes more independent and does not depend too much on government grants and has strong competitiveness in the growth process. (4) From an economic point of view, development is to expedite the implementation of development programs in order to achieve increasing people's welfare (I. Nyoman, 2005)

The granting of autonomy to the regions or the rights, powers, and obligations to the regions to regulate and manage their own regional households can be seen from the political, democratic, government management, economic, and other aspects that have a positive impact on society, the region and the state. However, the rights, powers and obligations of the great regions in regulating and managing their own government affairs and the interests of the people in the regions do not give birth to sovereignty for the regions, the sovereignty of the state remains with the central government.

Rod Haqua and Martin Harrop explained that in a unitary state, the responsibility of the central government is (1) control over the making of regulations (legislation) including removing or changing the authority of local governments; (2) provide the majority of local government spending needs; (3) create administrative standards for service provision; and (4) handle national affairs. Meanwhile, the local government's responsibilities are (1) control over policy implementation; (2) the provision of public services, such as health, education and community welfare; (3) management of certain revenue sources; and (4) the authority to elect and appoint regional officials (Agussalim Andi Gadjong, 2007).

Regardless of the extent of regional autonomy, the final responsibility for administering regional government rests with the central government and policies made and implemented by regions are an integral part of national government policies. The difference lies only in how to utilize local wisdom, potential, innovation, competitiveness, and creativity to achieve overall national goals.

The transfer of government affairs and autonomy to the regions does not mean that the regions have power and are separate or independent from the central government. Local government is a subsystem of the central government administration

system. State power remains with the central government as said by Jimly Asshidiqie that the State of Indonesia is a unitary state, whose power comes from the central government (Asshiddiqie, 2001).

The unitary state does not absolutely apply the centralization of all government affairs to the central government, but transfers part of government affairs to the regions to carry out certain government affairs to become regional household affairs. This raises the responsibility of government administrators in the regions to carry out government affairs in the regions as well as the interests of the people in the regions, as stated by Joeniarto that in a unitary state all state government affairs are the full authority of the (central) government. If the country concerned uses the principle of decentralization, in which the regions are formed by local governments with the right to regulate and manage households, certain affairs can be delegated to them to be managed as their own households (Joeniarto, 1992).

However, government actions taken by the regions must not conflict with the national legal order and the national public interest. On the other hand, the central government in formulating policies must pay attention to local wisdom in the region so that there is a balance between national and regional interests. Between the central government and local governments have a mutually influencing relationship. The relationship referred to in the form of a relationship of authority, finance, public services, as well as the use of natural resources and other resources, which is conceptualized in Article 18A of the 1945 Constitution of the Republic of Indonesia stipulates that:

1) The relationship of authority between the central government and the provincial, district, and city regional governments, or between the Province and regencies and cities, is regulated by law with due observance of the specificity and diversity of the regions.

2) Financial relations, public services, utilization of natural resources and other resources between the central government and regional governments are regulated and implemented fairly and in harmony based on the law.

As a consequence of granting autonomy to regions, regions have the authority to regulate and manage their own government affairs in accordance with aspirations based on applicable laws and regulations to improve government services quickly, responsively, efficiently and effectively as a manifestation of a dynamic government administration system. At least the positive impact of giving government affairs or government authority to regions is that regional government administrators in making and implementing government policies become fast, responsive, so that there is an increase in the quality of government services, because regions are more flexible to manage and empower their resources, there are cuts procedural bureaucracy is long and convoluted so that the administration is fast, there is a reduction in costs and operational time, and so on. This is a demand from dynamic governance that requires the government to respond to the interests and needs of the community in the process of formulating and implementing government policies.

As stated by Boon Siong Neo, the current needs of society are fast, responsive, and efficient government (Neo and Chen, 2007). This is a manifestation of dynamic governance or dynamic governance. Neo and Chen stated that the desired result in dynamic governance is the achievement of adaptive policy making by public organizations. This dynamic governance does not occur by chance but also depends on leadership being able to change and interact with social structures to achieve organizational goals. In essence, dynamic governance is the result of capacity building and institutionalization of cultural values that support dynamic organizational capabilities and proactively build adaptive pathways and adaptive public policies. Through such dynamic governance, policies and institutional structures of public sector organizations will remain relevant and effective in achieving their long-term goals.

The government's dynamic condition is pursued through the development of adaptive paths and adaptive policies to produce effective policies. The adaptive path in question emphasizes the decision-making mechanism that is not complicated but still runs within the legal corridor. Meanwhile, adaptive policy is a source of ideas and actions that will give birth to a number of government innovations and is an important key in policy dynamics. The management of the government bureaucracy does not only emphasize the context of structural, institutional and management reforms. However, it involves a substantial aspect in the form of institutional culture which is the foundation for the movement of government activities.

The granting of autonomy to the regions is actually a form of creating a dynamic government, because it is given the authority to local government administrators to determine their own government policies that are in accordance with the aspirations of the people and regional conditions without having to depend on the central government, as well as local governments themselves who carry out government policies that made it. Therefore, it can be said that the granting of autonomy to the regions as a means of education towards regional independence to solve their own regional problems without having to always depend on the central government. Government administrators in the regions have the right, authority and obligation to regulate and manage their own government affairs that are handed over to the regions.

The essence of regional autonomy is one of the rights, powers and obligations of the regions to regulate and manage their own government affairs, and the interests of the community. Thus, the regions are authorized to make policies in order to provide services, increase participation, initiatives and community empowerment in order to improve people's welfare.

Regional government policies are made and implemented by the Regional Head and the Regional People's Representative Council (hereinafter abbreviated as DPRD) as regional government administrators. The existence of regional heads and DPRD work on the basis of partnership and not supervise each other. In formulating and formulating regional policies, the two institutions work together in a spirit of partnership. However, at the time of implementation the two institutions have different functions. The Regional Head implements regional policies and the DPRD supervises regional policies.

Thus the essence of justice in the administration of government is the distribution of government services to citizens and development throughout the territory of the country through various government policies and government services by state government organs. This means that there is no centralization of government authority to make government policies and government services only on the central government, but is distributed throughout the region so that local government administrators can act quickly, respond to the needs and interests of the community so that all citizens receive government

services effectively and efficiently. , which changes the government administration process, structure, government values, in government management that is centered only on the central government. Government administrators in the regions respond more quickly to problems and take policies adapted to community conditions and regional characteristics, while still relying on legal rules set by the central government.

4.CONCLUSION

The essence of justice in a dynamic government is a government that always pays attention to or responds to conditions and needs in society according to real conditions in society, not the interests of the authorities. Various government policies and services that are made and implemented quickly respond to conditions and needs as well as developments that occur in the community, and even have to be responsive to changing situations/conditions in society. However, government policy making by government administrators in the regions has not reflected the dynamic principles of government, namely fast, responsive to the needs or interests of the local community, so that government policies are not effective and efficient in responding to the needs of local communities.

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First author : **Victor Pieter Pattinasarany**, Graduate Student PhD, Study Program : Science Of Law. Pattimura University, Ambon, Indonesia : Email : pietervictor393@gmail.com

The Second author : **M.J Saptенno** : Faculty of Law. Pattimura University, Ambon, Indonesia

The Third author : **E.R.M. Toule**: Faculty of Law. Pattimura University, Ambon, Indonesia

The Fourth author : **J.J. Pietersz**, : Faculty of Law. Pattimura University, Ambon, Indonesia

Study Of Legal Regulation for The Utilization of Ownership Rights Above Land (Air Space)

Daniel W. Nirahua^{1*}, M. J. Saptanno², R.J Akyuwen², M. Tjoanda²

* ¹Graduate Student PhD , Study Program: Science Of Law. Pattimura University, Ambon, Indonesia

²Faculty of Law. Pattimura University, Ambon, Indonesia

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Abstract : Land tenure and utilization are always influenced by human needs, time and technology. Population growth is increasing, while the limited availability of land is a problem on the one hand where land is used not only on the earth's surface, but on the surface of the space above the ground and underground space. Meanwhile, on the other hand, there are no laws and regulations that accommodate human needs and interests that regulate the use and use of above-ground and underground spaces. The type of research used in this paper is normative juridical research. Normative juridical research is a legal research method that is carried out by examining library materials or mere secondary materials, namely legal research on the Principles of Utilization of Land Ownership Rights. Normatively, the Basic Agrarian Law as a unification of land law, has provided for the control and utilization of space above the land and the space below the ground as stated in Article 4 of the UUPA and Article 146 of the Job Creation Law. However, its implementation is constrained because there are no regulations that regulate the technicalities and how to use the above ground and basement spaces by providing legal certainty. The use of the same object can be owned by two legal subjects with different rights status, and the right of ownership of the space above the ground and the space below the ground by one legal subject is the same as the status of the existing rights attached to the legal subject.

Keywords : *Principles, Utilization, Ownership Rights*

1. INTRODUCTION

Indonesia is one of the countries that has a very wide area in the world, the total area of the country of Indonesia is 5,193,250 km² which includes land and sea. This places Indonesia as the 7th largest country in the world after 6 other countries, namely Russia, Canada, the United States, China, Brazil and Australia. When compared with the size of countries in Asia, Indonesia is ranked 2nd. Meanwhile, when compared to countries in Southeast Asia, Indonesia is the largest country in Southeast Asia. Apart from being one of the largest countries in the world, Indonesia is also the largest archipelagic country in the world. This is because Indonesia is an archipelagic country, so the territory of Indonesia consists of land and sea. One-third of Indonesia's area is land and two-thirds of Indonesia's area is ocean. Indonesia's land area is 1,919,440 km² which places Indonesia as the 15th largest country in the world (Anonymous, 2020). According to data from the Ministry of Home Affairs of the Republic of Indonesia, through the Directorate General of Dukcapil, Indonesia's population in the second semester of 2021 was 273,879,750 people (Anonymous, 2021).

As one of the largest countries in the world, national development is a serious problem for the country, especially for Indonesia with various backgrounds that hinder national development. One of the fields that plays an important role in the national development process is the land sector. To achieve national development goals, it is necessary to have the presence and power of the state to regulate and provide security and comfort guarantees to its people.

In the land sector, the right to control the state is regulated in the 1945 Constitution of the Republic of Indonesia Article 33 paragraph (3) which states that , "*Earth, water and natural resources contained therein are controlled by the state and used as much as possible for the prosperity of the people*". The realization of this article is stated in Article 2 paragraph (2) of Law no. 5 of 1960 concerning Basic Regulations on Agrarian Principles (UUPA), namely "*The State is authorized to regulate and administer the designation, use, supply and maintenance of earth, water and space*".

Furthermore, Article 14 of the LoGA explains that in order to achieve what the nation aspires to, the Government shall make a General Plan regarding the supply, designation and use of earth, water and space for the various interests of the people and the state.

Along with the pace of development development that has occurred recently, especially in big cities, which are so rapidly showing that land use is not only limited to the earth's surface, but has also developed by utilizing the space above the ground or also called the space above the air. so it also requires regulation and registration of rights regulated in the national land law system. The regulation of land use (air space) in addition to considering economic aspects related to land limitations and cost savings, also needs to pay attention to aspects of safety, security, aesthetics and the use of space for public and private interests.

The regulation of control, ownership, use and utilization of space on land, abbreviated as RAT, has not been regulated in detail in the land regulations.

In the UUPA Article 4 paragraph (3) states :

"The rights to water and space will be determined by the Government, furthermore, Article 16 paragraph (2) emphasizes that " the rights are the right to use water, the right to maintain and catch fish and the right to use space.

Article 48 (1) of the UUPA states that the right to use space gives the authority to use energy and elements in outer space for efforts to maintain and develop the fertility of the earth, water and natural resources contained therein and other matters. concerned with that, then Article 48 (2) confirms that the right to use space is regulated by a Government Regulation. However, until now the Government Regulation referred to has never existed, including in the general explanation of the LoGA it is not found, only in the explanation of Article 48 stating that the right to use space is held in view of current technical advances and the possibilities in the future.

In the Land Bill, there is an extension of the definition of "land" where in Article 1 Number 2 it is stated that land is the surface of the earth in the form of land or covered with water within certain limits as long as its use and utilization is directly related to the earth's surface including the space above and within the earth's body. This definition is only an extension of the explanation of the earth's surface itself without including other rights in the form of buildings, plants, or space, where according to Article 1 of the LoGA, land is the surface of the earth.

The terms air space and outer space refer to an unknown area with a starting point from the earth and is called "space". Space Law is included in the branch of international law that grows and develops in line with technological developments. In countries that adhere to common law, the term *strata title is known* , which according to the legal system, a person who owns a plot of land rights also has *airspace* rights. For example, in Singapore, if an apartment is built on a plot of land, the land owner can sell airspace lots called *airspace lots* . *Strata title* provides joint ownership rights over a building complex consisting of exclusive rights to space and joint rights to shared space.

Article 53 Paragraph (2) of the Land Bill states that the land in the upper area of the Land is controlled by different rights holders, the space above the Land may be granted a Land Use Right (HGART), and Paragraph (3) explains the authority of the HGART in effect. *mutatis-mutandis* with the authority contained in the HGB. Then Article 36 of the Land Bill states that the HGB is given to construct and own a building on land that is not owned by him, with the intention that buildings on land that do not belong to him are offices, residences or settlements, industry, and hotels.

The concept of space in the Right of Ownership to Flat Units (HMSRS) which consists of individual rights to Flats which can be owned separately, and joint rights to land, objects and shared parts. However, land, objects and these shared parts are an inseparable unit. Article 46 of Law no. 20 of 2011 concerning Flats states that HMSRS is a property right to an individual condominium unit whose ownership is separate from joint rights to joint shares, joint objects, and joint land, the arrangement of parts of land, objects and joint parts using calculations based on the Proportional Comparison Value (NPP).

On the basis of this article, a person holding one HMSRS has two types of rights, collective rights and individual rights. The issuance of a certificate of ownership of condominium units (SHM Sarusun) shows proof of ownership (*de jure*) of the space above the land in the form of a condominium unit. Ownership of HMSRS is also limited to the control and use of its space through shared land, which requires the suitability of the holders of land rights (collective in nature).

The definition of space according to Article 1 Point 1 of the Spatial Planning Law is a container that includes land space, sea space, and air space, including space within the earth as a single territorial unit. Furthermore, Article 1 Number 2 of the Law on Spatial Planning is a form of spatial structure and spatial pattern. The existence of spaces, one of which is above ground space that is structured and makes a pattern. It is the arrangement of structures and patterns that are regulated in the spatial arrangement. Based on Article 5 Paragraph (3) and Article 6 Paragraph (2) of the Spatial Planning Law, spatial planning based on administrative areas consists of spatial planning for national areas, spatial planning for provincial areas and spatial planning for districts/municipalities which are carried out in stages and complementary. Based on Article 6 Paragraph (3) of the Spatial Planning Law, the spatial planning of the national territory includes the jurisdictional territory and the national sovereignty area which includes land space, sea space and air space, including space within the earth as a single unit.

Article 4 Paragraph (2) jo. Article 2 of Law no. 5 of 1960 concerning Agrarian Principles (UUPA) explains that the authority to use the space above it is only necessary for interests that are directly related to the use of the land in question. The rights to land as referred to in paragraph 1 of this article authorize the use of the land in question, as well as the body of the earth and water and the space above it, which is only needed for interests directly related to the use of the land within the limits according to law. this law and other higher laws.

The control and use of land may contain rights, obligations, authorities, and prohibitions for the holder of land rights. There are rights to control and use of land which are private and some are public. Based on the BAL, there are known Indonesian Nation Rights, State Control Rights, Customary Law Community Rights, and individual land rights. Manifestations of State Controlling Rights are known as Use Rights and Management Rights, while individual rights are known as Ownership Rights, Building Use Rights, Business Use Rights, Use Rights, and Lease Rights. In its development, Flat Ownership Units were born, whose arrangements were different from individual rights regulated in the UUPA, where there were arrangements for shared land, shared objects and legal entity arrangements for the Association of condominium owners and residents who manage flats.

The trend of land use in urban areas, especially in areas where the availability of land is increasingly scarce, such as Jakarta, Surabaya, Bandung and Makassar, is increasingly inevitable with various types of use/utilization. In dealing with this problem, BPN-RI has made a quite historic breakthrough by stipulating the Regulation of the Head of BPN-RI No. 3/2006 concerning the Organization and Work Procedures of BPN-RI, which in article 220 establishes a work unit that will handle the above-ground and underground spaces. The main tasks of this work unit include processing and registering land use rights and basement land use rights, as well as providing proof of rights.

Although there has been a Regulation of the Head of the National Land Agency as a way to deal with this problem, until now there has been no concrete policy that has been set regarding the regulation of control, ownership, use and utilization of above-ground and underground space for development purposes. Problems that arise in the activity of using space on land are caused by the provisions of the legislation in the land sector which do not provide protection for holders of land rights. Until now, there has been no regulation regarding the control and use of space above and below the ground, although a Land Bill is currently being prepared which will regulate the two institutions.

The regulation on the existence of buildings in Indonesia from the perspective of the LoGA such as the Senen Multipurpose Bridge, Pondok Indah Bridge, BSD Bridge, Toll Road Building, Crossing Bridge Building, Sarinah Bridge, and other bridge buildings has not been accommodated by the LoGA or its implementing regulations.

It is necessary to regulate the rights to these buildings for legal certainty, because the building itself is considered to have a higher economic value than the land on which the building is based (Musa A. Siregar and Zulkamaein Koto, 2015). The existence of the Right to Use Space on Land (HGRAT) can be categorized as land control over the air space or the space above the land, for example, the Right of Ownership to Flat Units (HMSRS), where the HMSRS has become the legal umbrella under Law Number 20 of 2011 concerning Flats.

The control and use of space on land or space above the air should have a clear legal umbrella, and not only be limited to the formulation of Article 4 of the UUPA, because philosophically Article 33 of the 1945 Constitution obliges the state to regulate ownership or control of land and lead its use. so that the ideals of all national sovereignty are used as much as possible for the prosperity of the people. In connection with this, it is necessary to study the above-ground space or above-air space , and determine the legal arrangements that can be granted and their utilization.

2. RESEARCH METHODS

Type Study

The definition of legal research according to Peter Mahmud Marzuki is a process to find the rule of law, legal principles, and legal doctrines in order to answer the legal issues faced (Peter Mahmud Marzuki, 2006). Moving on from the definition, the type of this research is *normative juridical research*. Normative juridical research is a legal research method carried out by examining library materials or mere secondary materials (Soejono Soekanto and Sri Mamudji, 2007).

Problem Approach

This research is a normative or doctrinal legal research equipped with empirical data, which will examine and analyze the Principles of Utilization of Ownership Rights Above Space Above Air / Space above ground .

The second problem uses normative legal research by using a conceptual approach and Comparative Arrangements to find out the regulation on the utilization of ownership rights over the air space.

Source of Legal Material

The sources of legal materials in this study come from *library research*, where library research uses primary legal materials, secondary legal materials and tertiary legal materials. Primary legal materials are materials whose contents are binding because they are issued by the government or institutions that have the authority. And secondary legal sources are materials in the form of books and other printed materials, as well as *software*, namely by accessing a number of data via the internet (downloading) various books, scientific journals and research results, as well as tertiary legal materials. support primary legal materials and secondary legal materials (Devi K. G Sondakh, 2009).

Legal Material Collection Techniques

In this study, the techniques of collecting legal materials used are primary legal materials and secondary legal materials. The research materials in the form of primary legal materials and secondary legal materials referred to in this study are :

1. 1945 Constitution of the Republic of Indonesia
2. Law Number 5 of 1960 concerning Basic Agrarian Regulations;
3. Law Number 11 of 2020 concerning Job Creation;
4. Law Number 28 of 2002 concerning Buildings;
5. Law Number 26 of 2007 concerning Spatial Planning
6. Law No. 20 of 2011 concerning Flats
7. Government Regulation Number 16 of 2021 concerning Buildings
8. Government Regulation Number 18 of 2021
9. Regulation of the Head of Bali Province Number. 3/2006 concerning the Organization and Work Procedure of BPN-RI.
10. Minister of Public Works Regulation No. 20/PRT/M/2010 concerning Guidelines for Utilization and Use of Road Sections.
11. DKI Jakarta Regional Regulation No. 3 of 2008 in conjunction with DKI Jakarta Regional Regulation No. 7 of 2013.
12. DKI Jakarta Governor Regulation Number 167 of 2012 concerning Underground Spaces.
13. DKI Jakarta Regional Regulation Number 1 of 2014 concerning Detailed Spatial Planning and Zoning Regulations
14. DKI Governor Regulation No. 18 of 2008 concerning Mastery of Planning/Allocation of Land for the Implementation of Development in the Public Interest
15. Regional Regulation of Bali Province Number 16 of 2009 concerning Spatial Planning of Bali Region.

Secondary legal materials include materials that support primary legal materials such as textbooks, articles in various scientific magazines or research journals in the field of law, papers presented in various forms of meetings such as discussions, seminars, workshops and etc. To support or complete this research, the authors also use a comparison of the above-ground spatial use arrangements with the Netherlands and Singapore related to this research.

Legal Material Analysis Techniques

Analysis of the materials used in the study was carried out in a qualitative and comprehensive analysis (Devi K. G Sondakh, 2009). Qualitative analysis is to describe quality legal materials in the form of regular, coherent, logical, and non-overlapping and effective sentences so as to facilitate the interpretation of legal materials and understanding of the results of the analysis, while comprehensive means that the analysis is carried out in depth and from various aspects according to with the scope of research.

The analysis of legal materials in this study was carried out using descriptive techniques, describing materials by constructing laws and arguments, which were then assessed based on legal reasoning reasons related to the problem.

3. RESULTS AND DISCUSSION

A. Legal Arrangements for Utilization of Ownership Rights on Land (Air Space)

1. Settings in UUPA

There are at least 10 articles in the Basic Agrarian Law which regulates Airspace Rights, using space terminology. These articles are :

In article 1 UUPA:

Paragraph (2) reads: the entire earth, water and space including the natural resources contained therein within the territory of the Republic of Indonesia as a gift from God Almighty is the earth, water and space of the Indonesian nation and constitutes national wealth.

Paragraph (3) the relationship between the Indonesian people and the earth, water and space as referred to in paragraph (2) of this article is an eternal relationship.

Paragraph 6 reads: what is meant by space is the space above the earth and water as referred to in paragraphs (4) and (5) of this article.

In Article 2 of the LoGA:

Paragraph (1) : on the basis of the provisions in Article 33 paragraph (3) of the Constitution and the matters referred to in Article 1, the earth, water and space, including the natural resources contained therein, are at the highest level controlled by the State, as an organization of power for the whole people.

Paragraph (2) : the state's right to control as referred to in paragraph (1) of this article authorizes:

- a. Regulate and administer the designation, use, supply and maintenance of the earth, water and space;
- b. Determine and regulate legal relations between people and the earth, water and space;
- c. Determine and regulate legal relations between people and legal actions concerning earth, water and outer space

In article 4 UUPA:

Paragraph (2) The rights to land as referred to in paragraph (1) of this article authorize the use of the land in question, as well as the body of the earth and water and the space above it, only necessary for interests directly related to the use of the land in limits according to this Law and other higher legal regulations.

Paragraph (3) Apart from land rights as referred to in paragraph (1) of this article, rights to water and space are also determined.

In article 5 UUPA:

The agrarian law that applies to earth, water and space is customary law, as long as it does not conflict with national and state interests, which is based on national unity, with Indonesian socialism and with the regulations contained in this law and with other laws and regulations. everything by heeding the elements that rely on religious law.

In article 8 of the LoGA:

On the basis of the state's right to control as referred to in article 2, it is the taking of natural resources contained in the earth, water and outer space.

In article 9 UUPA:

Paragraph (1) only Indonesian citizens can have a full relationship with the earth, water and space, within the limits of the provisions of articles 1 and 2.

In article 11 UUPA:

The relationship between people, including legal entities with the earth, water and space, as well as the authorities that stem from the legal relationship will be regulated, in order to achieve the objectives referred to in article (3) and prevent control over the lives and work of others that exceeds limit.

In article 14 of the LoGA:

Paragraph (1) taking into account the provisions in article 2 paragraph (3), article 9 paragraph (2) and article 10 paragraphs (1) and (2) the Government in the context of Indonesian socialism, draw up a general plan regarding the supply, designation and use of earth, water and space and the natural resources contained therein:

- a. For the needs of the State
- b. For the purposes of worship and other sacred purposes, in accordance with the basis of God Almighty

c. For the purposes of community life centers, social culture and other welfare.

Paragraph (2) based on the general plan referred to in paragraph (1) of this article and taking into account the relevant regulations. Regional governments regulate the supply, designation and use of earth, water and space for their regions, in accordance with the conditions of each region.

In article 16 UUPA :

Paragraph (1) : the rights to land as referred to in Article 4 paragraph (1) are:

- a. Right of ownership
- b. Cultivation Rights
- c. Building rights
- d. Right to use
- e. Rental rights
- f. Right to clear land
- g. The right to collect forest products
- h. Other rights that are not included in these rights will be stipulated by law as well as temporary rights as stated in article 53.

Paragraph (2) : rights to water and space as referred to in Article 4 paragraph (3) are:

- a. Right to use water
- b. Right of maintenance and fishing
- c. Space use rights

In article 48 of the LoGA:

Paragraph (1) The right to use outer space gives the authority to use energy and elements in outer space in order to maintain and develop the fertility of the earth, water and natural resources contained therein and other matters related to it.

Paragraph (2) the right to use space is regulated by a Government Regulation.

In Article 4 Paragraph (2) jo . Article 2 of Law no. 5 of 1960 concerning Agrarian Principles (UUPA) explains that the authority to use the space above it is only necessary for interests that are directly related to the use of the land in question. The rights to land as referred to in paragraph 1 of this article authorize the use of the land in question, as well as the body of the earth and water and the space above it, which is only needed for interests directly related to the use of the land within the limits according to law. this law and other higher laws.

The rights as referred to in article 16 of the LoGA are as follows:

a) Right of ownership

As regulated in Article 20 of the LoGA, it states that property rights are hereditary, strongest and fullest rights that people can have on land. Ownership rights can be transferred or transferred to other parties. It can be said that the distinctive nature of property rights is hereditary, strongest, fullest. Rights that do not have all three characteristics at once are not property rights. Hereditary nature means that property rights do not only last for the life of the person who owns it, but can be continued by the heirs if the owner dies. (Devi K. G Sondakh, 2009)

Strongest shows :

- a. The term of the rights is not limited. So it is different from the right to cultivate or the right to use the building for a certain period of time.
- b. Registered rights and the existence of proof of full rights means :
 1. The right of ownership gives the authority to the owner the widest when compared to other rights.
 2. Ownership rights are the parent of other rights, meaning that a land owner can give land to other parties with rights that are less than property rights.
 3. Ownership rights are not parented to other land rights, because property rights are the most complete rights, while other rights are less complete.
 4. Judging from its designation, property rights are also not limited.

A land owner with property rights is basically free to use his land. Restrictions on land use are related to the social function of land. The use of land must be adapted to the circumstances and nature of its rights, so that it is beneficial for the welfare and happiness of those who have rights as well as for the community and the state.

What is undesirable and not justified is if the land is used solely for personal interests, moreover the right causes harm to the community (explanation of Article 6 of Law Number 5 of 1960). With regard to social functions, it is natural for the land to be properly maintained in order to increase its fertility and prevent its damage (provided in Article 15 of Law Number 5 of 1960). This obligation is not only borne by the holder of the right to the land concerned, but also to every person, legal entity or agency that has a legal relationship with the land.

Property Rights basically have the following characteristics;

- a. Property rights can be used as debt
- b. Can be pawned
- c. Property rights can be transferred to other people
- d. Property rights can be relinquished voluntarily

The provisions of Article 27 of the LoGA stipulates that property rights are nullified if:

- a. The land falls to the State;
 1. Revocation of rights based on the provisions of Article 18 of the LoGA.
 2. Because with voluntary submission by the owner.
 3. Because being abandoned

4. Due to the provisions of Article 21 paragraph (3) and Article 26 paragraph (2)

b. The land is destroyed.

Right of ownership is the strongest and most complete right that people can have on land. The granting of this character does not mean that the right is an absolute, unlimited and inviolable right as an eigendom right as formulated in Article 571 of the Civil Code. Such characteristics are contrary to the nature of customary law and the social function of each right. The words "strongest and most complete" have the purpose of distinguishing them from the right to cultivate, the right to build, the right to use and others, namely to show that among the rights to land that can be owned, property rights are the strongest and fullest.

Thus, the strongest definition as formulated in Article 571 of the Civil Code is different from that formulated in Article 20 of the LoGA, because in the LoGA it is stated that all land rights have a social function and this is different from the definition of eigendom rights formulated in Article 571 of the Civil Code.

b) Cultivation Rights

In the provisions of Article 29 of the UUPA, it is stated that the Right to Cultivate is the right to cultivate land which is directly controlled by the State for a certain period of time, for agricultural, fishery and livestock companies. Right to Cultivate is limited to agriculture, fishery, animal husbandry. However, even though the land is owned with a usufructuary right, it is permissible to construct a building on it. Buildings connected with agriculture, fishing, animal husbandry, without requiring other rights. Cultivation Rights has special characteristics, namely:

- a. Cultivation rights are classified as strong land rights, meaning they are not easily erased and easily defended against interference from other parties. Therefore, the right to cultivate is one of the rights that must be registered.
- b. Cultivation rights can be transferred, namely inherited by heirs who have rights.
- c. Right to Cultivate has a limited period of time, at some point it will expire.
- d. Cultivation rights can be used as collateral for debt with encumbrances with mortgage rights.
- e. Cultivation rights can be transferred to other parties, namely sold, exchanged for other objects, granted or given in a will.
- f. Cultivation rights can be released by the owner, until the land becomes State land.
- g. Cultivation rights can only be granted for the purposes of agriculture, fishery, and animal husbandry.

Cultivation Rights is granted for a period of 25 years. At the request of the right holder, this period can be extended for another 25 years. The subject matter of the Right to Cultivate is regulated in Article 30 of the LoGA:

1. The subjects of the Cultivation Rights are:
 - a. Indonesian citizens.
 - b. Legal Entity established under Indonesian law and domiciled in Indonesia.
2. Persons or legal entities that have Cultivation Rights and no longer meet the requirements as referred to in paragraph (1) of this Article are obligated to relinquish or transfer such rights within a period of one year to parties who meet the requirements.

Right to Cultivate occurs because of a government stipulation, while this right can be abolished because;

1. Term expires.
2. Terminated before the term expires because some conditions are not met.
3. Released by the right holder before the term expires.
4. Revoked in the public interest.
5. The land is abandoned.
6. The land is destroyed.
7. Due to the provisions of Article 30 paragraph 2 of the UUPA.

c) Building Rights

Article 35 paragraph (1) of the UUPA states that the Right to Build is the right to construct and own a building on land that is not one's own for a maximum period of 30 years. In contrast to the Cultivation Rights, the designation of the right to use a building is for buildings. Even though it is specifically intended to construct buildings, it does not mean that on the land, the right owner is not allowed to plant anything, raise livestock or have a pond to raise fish, as long as the main purpose of using the land is for building. Like the Cultivation Rights, Building rights is held to meet the needs of modern society. This right is not a right that comes from customary law.

With regard to the subject of Building Use Rights, it has been regulated in the provisions of Article 36 paragraph (1), namely;

- a. Indonesian citizens.
- b. Legal Entity established under Indonesian law and domiciled in Indonesia.

Building Use Rights basically have the following characteristics;

- a. Building rights is a strong right, meaning that it is not easily erased and easily defended against interference from other parties. Therefore, this right is one of the rights that must be registered.
- b. Building rights can be transferred, meaning that it can be inherited by heirs who have rights.
- c. Building rights has a limited period, meaning that it will end at some point.
- d. Building rights can be used as collateral for debt with encumbrances with mortgage rights.
- e. Building Use Rights can be transferred to other parties, namely sold, exchanged for other objects, granted or given in a will.
- f. Building rights can be released by the owner until the land becomes State land.

g. Building Use Rights can only be granted for the purposes of building construction.

Building rights can be granted for a maximum period of 30 years. At the request of the right holder and taking into account the needs and conditions of the building, this period can be extended for a maximum period of 20 years. Building rights occurs because:

- a) Regarding land controlled by the State due to government determination.
- b) Regarding the land owned, because the agreement is in the form of an authentic agreement between the owner of the land concerned and the party who will obtain the right to use the building which intends to give rise to the right.

Building Use Rights are abolished because :

- a. The term is over.
- b. Terminated before the term expires, because some conditions are not met.
- c. Released by the right holder before the term expires.
- d. Revoked in the public interest.
- e. Abandoned.
- f. The land is destroyed.
- g. provisions in Article 36 paragraph (2) of the LoGA.

d) Right of Use

Article 41 paragraph (1) of the UUPA basically states that the Right to Use is the right to use and or collect proceeds from land directly controlled by the State or land owned by another person, which gives the authority and obligations specified in the decision to grant it or in an agreement with the land owner. which is not a lease agreement.

The subjects of the usufructuary rights are:

- a) Indonesian citizens
- b) Foreigner domiciled in Indonesia.
- c) Legal entities established under Indonesian law.

Legal entities that have representatives in Indonesia. The UUPA basically does not contain special provisions regarding the abolition of the usufructuary rights if: (Effendi Warin, 1994)

- a. Term expires.
- b. Dismissed before the term expires because of something that must be fulfilled by the right holder related to his status.
- c. Released by the right holder before the term expires.
- d. Revoked in the public interest.
- e. The land is destroyed.

e) Rental Rights

Article 44 of the LoGA states that:

- a. A person or a legal entity has the right to lease land, if he has the right to use land belonging to another person for building purposes by paying the owner a sum of money as rent.
- b. Rent payments can be made;
 1. once or at any given time.
 2. before or after the land is used.
- c. The land lease agreement referred to in this article may not be accompanied by conditions containing elements of extortion.

Based on the contents of the provisions of the article, it can be said that the right to lease is a right that authorizes other people to use their land. The difference with usufructuary rights is that in rental rights the lessee has to pay rent.

Lease rights to buildings must be distinguished from rental rights to buildings. In the case of a lease for a building, the owner surrenders the land in an empty condition to the tenant with the intention that the tenant can construct a building on the land.

The control and utilization of land may contain rights, obligations, authorities, and prohibitions for the holder of land rights. There are rights to control and use of land which are private and some are public. Based on the BAL, there are known Indonesian Nation Rights, State Control Rights, Customary Law Community Rights, and individual land rights. Manifestations of State Controlling Rights are known as Use Rights and Management Rights, while individual rights are known as Ownership Rights, Building Use Rights, Business Use Rights, Use Rights, and Lease Rights.

In its development, Flat Ownership Units were born, whose arrangements were different from individual rights regulated in the UUPA, where there were arrangements for shared land, shared objects and legal entity arrangements for the Association of condominium owners and residents who manage flats. For example, the construction of the Integrated Highway Mode (MRT) is carried out on the basis of the DKI Jakarta Governor Regulation Number 167 of 2012 concerning Underground Spaces. In the construction of MRT facilities and infrastructure, PT Mass Rapid Transit Jakarta (PT MRT Jakarta was established on the basis of DKI Jakarta Regional Regulation No. 3 of 2008 concerning the Establishment of the Jakarta MRT which was later amended by DKI Jakarta Regional Regulation No. 7 of 2013) using space on the surface ground, basement, and space above ground level. Here you can find legal problems in building construction both below and above the ground. Problems that arise in the activities of using the basement and above ground are caused by the provisions of the legislation in the land sector which do not provide protection for holders of land rights. Until now, there has been no regulation regarding the control and use of space above and below the ground, although a Land Bill (RUU Pertanahan) is currently being prepared which will regulate the two institutions.

In this section the author explains with an explanation per article in the LoGA relating to the regulation of control and utilization of air space/space above the ground, among others:

a) Article 1

The space above the land in Paragraph (6) is referred to as space with the intention of space above the earth and water. The surface of the earth according to the UUPA is land, so that what is meant by space according to this paragraph is the space above the ground. Furthermore, Paragraph (2) describes the space above the land as a gift from God Almighty which belongs to the Indonesian nation and is referred to as national wealth. Paragraph (3) emphasizes that there is an eternal or lasting relationship between the Indonesian people and the land area, so that when it is related to the method of control and the method of ownership, the Indonesian nation is the owner of the space on the land with no expiration date.

b) Section 2

The state as a power organization authorized by the Indonesian nation to regulate and administer the designation, use, supply and maintenance of outer space; Determine and regulate legal relations between people and space; and determine and regulate legal relations between people and legal actions regarding space. The implementation of the designation, use, supply and maintenance of space is carried out in the form of spatial planning as well as permits to construct buildings as a regulator and control of legal relations between people and legal actions regarding outer space.

Here it can be seen that there is a regulation on legal actions between one legal subject and one legal subject with legal actions related to space, so there is the possibility of legal action in the form of transfer of rights, granting of utilization or use rights, building construction agreements. space, and so on.

c) Article 4

The authority to use and utilize air space/space above land by attribution is granted by the BAL through land rights as regulated in Article 4 Paragraph (1) provided that there is a need that is directly related to the use of the land. Utilization of air space/space above the land according to the form of land rights, it is known what the space above the land will be used for, for example, Hak Milik authorizes the use of space for residential, commercial, and other categories of functions because Hak Milik is a form of full land rights, HGB authorizes the use of its space to construct buildings with commercial functions, and other forms of land rights, both public and private. Paragraph (3) makes a separation between land rights and space rights as the implementation of horizontal separation.

It has been stated according to Boedi Harsono, (2012), which asserts that the space and the body of the earth used are not the rights of the holder of land rights, and therefore he is not entitled to hand over its use to other parties if it does not include the use of the earth's surface. This confirms the close relationship between land rights and space rights, and there is no land right without land rights.

d) Article 5

Applicability of customary law on air space/space above land in the corridor of national and state interests based on national unity, understanding of Indonesian socialism and national laws and regulations, and subject to religious law. It is clear that the application of customary law and religious law to the above-ground space, as well as its use is subject to the regulation of restrictions and controls regulated in national laws and regulations.

e) Article 8

The basis of the state's right to control is governed by the taking of natural resources in outer space. According to Article 4 Paragraph (2), land rights only give rights to the earth's surface, so the powers that come from it are not related to the natural resources contained in outer space.

f) Article 9

This full relationship with space relates to the rights to land that are under the space above the land. In General Elucidation II Number 5 it is explained that based on the principle of nationality in Article 1, according to Article 9 jo. Article 21 Paragraph (1) only Indonesian citizens can have ownership rights to land. Foreigners can own land with limited use rights. The consideration not to give full relations to legal entities is because legal entities do not need to have property rights but other rights are sufficient (HGB, Use Rights, Cultivation Rights).

g) Article 11

The mandate of regulating legal relations between people, including legal entities with airspace and the powers that stem from legal relations, is intended to prevent the occurrence of control over the lives and work of others that exceeds the limits in the fields of agrarian business, which is contrary to the principle of justice. humane social.

All control and use of space in the agrarian field must be based on common interests in the context of the national interest and the Government is obliged to prevent the existence of organizations and individual businesses in the agrarian field that are private monopolies (Article 13 paragraph 2). Not only private businesses, but also government efforts that are monopoly must be prevented from harming the people. On this basis, there are tiered and complementary arrangements for spatial planning and land use, as well as requirements for the existence of a national interest or public interest in the control and use of land space.

h) Article 14

Article 14 mandates the need for a plan (*planning*) regarding the allocation, utilization and supply of air space/space above the ground for the various interests of the people and the state. This *planning* is realized by a General Plan (National planning) which covers the entire territory of Indonesia which has now been realized in the form of a National Spatial Plan which has been regulated in Government Regulation no. 26 of 2008, which was later broken down into special plans (regional planning) for each region. The Regional Government on the basis of the general plan regulates the control and use of air space/space above the ground for its area, in accordance with the conditions of each region.

i) Article 16

Article 16 Paragraph (2) letter c mentions the existence of a right to use space, which is then explained in Article 48 the purpose of the authority contained. Space utilization rights authorize the holder to use energy and elements in outer space in the

context of efforts to maintain and develop the fertility of the earth, water and natural resources contained therein and other matters related to it. Space utilization rights are held with consideration of technical advances and the possibilities that occur in the future.

The provisions for the control and use of air/space can be found in the General Elucidation which states that the function of outer space must be in accordance with the interests of the people and the State and fulfill the needs according to the demands of the times in all agrarian matters. The control and use of space is based on the interests of the people, the public interest, and the interests of the state.

Affirmation of forms of right to control space that are attached directly to the ground below it or indirectly to the supporting pillars below it. Land rights basically cover the earth's surface as stated in the Elucidation Regulation Number II (1) of the LoGA. If the use of space which includes the body of the earth and air space is permitted, then the addition is a flexible and fair limitation criterion.

2. Regulation of the Use of Space on Land in Spatial Planning Law

Definition of Space According to Article 1 number (1) of Law no. 26 of 2007 concerning Spatial Planning, Jo. Article 1 number (1) Government Regulation Number 21 of 2021 concerning the Implementation of Spatial Planning states " space is a container that includes land space, sea space and air space including space inside the earth, as a territorial unit where humans and other creatures live and maintain their survival. " .

Furthermore, Article 1 Number 2 of the Spatial Planning Law, Jo. Article 1 number (2) PP Number 21 of 2021 " Spatial planning is a form of spatial structure and spatial pattern. The existence of spaces, one of which is above ground space that is structured and makes a pattern. It is the arrangement of structures and patterns that are regulated in the spatial arrangement.

Based on Article 5 Paragraph (3) and Article 6 Paragraph (2) of the Spatial Planning Law, spatial planning based on administrative areas consists of spatial planning for national areas, spatial planning for provincial areas and spatial planning for districts/municipalities which are carried out in stages and complementary. Based on Article 6 Paragraph (3) of the Spatial Planning Law, the spatial planning of the national territory includes the jurisdictional territory and the national sovereignty area which includes land space, sea space and air space, including space within the earth as a single unit. This explains the existence of the use of space which is indirectly related to the land beneath it, and this utilization has an element of public obligation (public *verification*) such as not disturbing the function of the infrastructure and facilities under it and/or in its surroundings, while still paying attention to the harmony of the building. the building to its environment, and meet the safety and health requirements according to the function of the building.

Zoning regulations according to Article 1 Number 27 PP No. 26 of 2008 concerning the National Spatial Planning is a provision that regulates the requirements for space utilization and the provisions for its control and is prepared for each designation block/zone whose zoning is stipulated in a detailed spatial plan. For example, in the DKI Jakarta Provincial Regulation No. 1 of 2014 concerning Detailed Spatial Planning and Zoning Regulations regulates the boundaries of space utilization such as height, land controlled and planned, the amount of open space for each building construction. The amount of space regulated in Article 1 Number 107 of the Regional Regulation on RDTR is the amount of space for certain functions which are determined based on the arrangement of KLB, KDB, Building Height, KDH, KTB, each part of the city according to its position and function in urban development.

Looking back at the consideration of spatial planning arrangements in the Spatial Planning Law, the regulation of restrictions on the use of space is made to maintain the existence of limited space and the growing public understanding of the importance of spatial planning; and the implementation of transparent, effective and participatory spatial planning in order to create a safe, comfortable, productive and sustainable space. Geographically, the Unitary State of the Republic of Indonesia is located in a disaster-prone area so that spatial planning based on disaster mitigation is needed as an effort to improve the safety and comfort of life and livelihood.

In line with the Spatial Planning Law, the UUPA states that in order to achieve the above-mentioned aspirations of the nation and state in the agrarian sector, it is necessary to have a plan regarding the allocation, use and supply of earth, water and space for the various interests of the people and the state. . With this plan, the use of land space can be carried out in a guided and orderly manner so that it can provide the greatest benefit to the State and the people.

3. Building Arrangements as a Form of Mastery of Upper Air Space

Buildings are a form of control and use of land or air space. Based on Article 1 Paragraph (1) of Law Number 28 of 2002 concerning Buildings, a building is a physical form of the result of construction work that is integrated with its domicile, partially or wholly located above and/or in land and/or water that functions as a place for humans to carry out their activities, both for housing or residence, religious activities, business activities, social activities, culture and special activities.

Based on Article 8 Paragraph (1) of the Building Law, it is stated that: paragraph (1) every building must meet administrative requirements which include:

- a. Status of land rights, and/or utilization permits from land rights holders;
- b. Building ownership status; and
- c. Building permits

In accordance with applicable laws and regulations.

Paragraph (2) : any person or legal entity may own a building or part of a building.

Based on article 8 letter c and paragraph (3) of the Building Law, an IMB is a letter of evidence from the government that the building owner can construct a building according to the functions that have been determined and based on the technical plan of the building that has been approved by the regional government, as well as the implementation of the principle horizontal separation. IMB is a permit to carry out the construction of buildings and as a means of controlling the operation of buildings.

Buildings built on land, water, or public infrastructure and facilities, the application for building permits is submitted after obtaining approval from the competent authority. The public infrastructure and facilities referred to are roads and/or green lines, high-voltage air delivery (transmission) areas, and/or telecommunications towers, and/or water towers.

Every building must be erected on land whose ownership status is clear, both own and owned by other parties. Based on Article 8 Paragraph (1) letter a of the Building Law, in the case of land belonging to another party, a building can only be erected with a land use permit from the holder of land rights or land owners in the form of a written agreement between the holder of land rights or the owner of the land and building owner. The written agreement shall contain at least the rights and obligations of the parties, the area, location, and boundaries of the land, as well as the function of the building and the period of use of the land.

Based on Article 7, 8 and Article 9 of the Building Law, every building must meet administrative requirements and technical requirements in accordance with the function of the building. The fulfillment of the function of the building and the classification of the building shall be proposed by each person who will construct the building in the application for IMB accompanied by proof of the status of ownership of land rights or proof of land use permit; building owner data; building technical plan; and the results of an analysis of environmental impacts for buildings that have a significant impact on the environment (Article 15 of the Building Law).

Proof of ownership status of land rights or proof of land use permit indicates the existence of an attachment to the building with the land beneath it. Based on the proposal received after checking, the regional government determines the function and classification of buildings (except for buildings with special functions by the central government) in the building IMB based on the regency/city RTRW, Detailed Spatial Planning for Urban Areas (RDTRKP), and or RTBL.

Based on Article 8 of the Building Law, the administrative requirements of the building include the requirements for the status of land rights, and/or utilization permits from the holders of land rights, building ownership status, and building permits. Building technical requirements include building layout requirements and building condition requirements. (Articles 13, 14 and 15 of Government Regulation Number 16 of 2021 concerning Implementing Regulations of Law Number 28 of 2002 concerning Buildings)

(Article 8 Paragraph (3) of the Building Law). The requirements for building layout include requirements for the designation and intensity of the building, the architecture of the building, and the requirements for controlling environmental impacts.

Article 24 Paragraph (1) PP Building states that RTBL is a regulation on building layout requirements as a follow-up to the regency/city RTRW and/or RDTRKP, used in controlling the spatial use of an area and as a guide for regional design to realize the unified character and quality of the building and the environment. sustainable.

Based on Article 27-29 PP Building, building reliability requirements include requirements for safety, health, comfort, and convenience. Safety requirements include the requirements for the building's ability to support loads, as well as the building's ability to prevent and cope with fire hazards and lightning hazards.

Based on Article 35-37 of PP Building, building health requirements include requirements for ventilation systems, lighting, sanitation, and the use of building materials. vibration level and noise level. In addition, the requirements for convenience include ease of connection to, from, and within the building, as well as the completeness of infrastructure and facilities in the use of the building.

Determination of the classification of Buildings, regulated in Government Regulation Number 16 of 2021, Article 9 paragraph (1) states "Buildings as referred to in Article 3 are classified based on:

- a. Complexity level
- b. Permanent rate
- c. Level of risk of fire hazard
- d. Location;
- e. Building height
- f. Ownership of buildings and
- g. Building class

Furthermore, in Article 9 paragraph (6) of PP Building, it is stated: "the classification based on the height of the building as referred to in paragraph 1 letter (e) includes super-tall buildings, skyscrapers, high-rise buildings, medium-rise buildings, buildings Low rise building.

In the explanation of Article 9 paragraph (6) of this PP it states: "classification based on height includes:

- a. Super Tall Building is a building with the number of floors above 100 (one hundred) floors;
- b. Skyscraper Building is a building with a total of 40 (forty) - 100 (one hundred) floors;
- c. High-rise Building is a building with more than 8 (eight) floors;
- d. Medium-Story Building is a building with a total floor of 5 (five) to 8 (eight) floors;
- e. Low-rise Building is a building with a number of floors up to 4 (four) floors;

Article 9 paragraph (7) states that the classification based on ownership as referred to in paragraph (1) letter (f) includes BGN and buildings other than state property.

The concept of space in the Right of Ownership to Flat Units (HMSRS) which consists of individual rights to Flats which can be owned separately, and joint rights to land, objects and shared parts. However, land, objects and these shared parts are an inseparable unit. Article 46 of Law no. 20 of 2011 states that HMSRS is a property right to an individual condominium unit whose ownership is separate from joint rights to joint shares, joint objects, and joint land, the arrangement of shares of land, objects and joint shares using calculations based on the Proportional Comparison Value (NPP). .

Based on the article, a person holding one HMSRS has two types of rights, collective rights and individual rights. The issuance of a certificate of ownership of condominium units (SHM Sarusun) shows proof of ownership (*de jure*) of the space

above the land in the form of a condominium unit. Ownership of HMSRS is also limited to the control and use of its space through shared land, which requires the suitability of the holder of the land rights.

In the Flats Law, the Building Ownership Certificate (SKBG) has the concept of renting state property in the form of land or waqf land and does not deviate from other sectoral laws that regulate BUMN and waqf land. Based on Article 48 of the Flats Law, the SKBG Sarusun is issued by a district/city technical agency that is in charge and responsible for building construction on State/Regional-owned land or waqf land by way of lease, which is an integral part with a copy of the building book, a copy of a letter of agreement on the lease of land, a drawing of a floor plan at the level of the apartment concerned, showing the condominium unit owned, and a description of the size of the share of the right to the joint portion and the joint object concerned. In the case of the transfer of SKBG Condominium, based on Article 44 of the Flats Law, the transfer is made with a Sale and Purchase Deed (AJB) by legal subjects before a notary. Thus, the SKBG Sarusun is not a land right but a right over the air space.

4. Regulation of the Above Ground and Underground Space in the Job Creation Act

a. Granting of Land Rights in the Upper Land and Underground Space

According to Article 146 of Law Number 11 of 2020 concerning Job Creation, paragraph (1) "land or space formed in above-ground and/or underground spaces and used for certain activities may be granted building use rights, use rights or management rights"

Paragraph (2) limit of land ownership in the space above the land by the holder of land rights is given in accordance with the basic coefficient of the building, the coefficient of the floor of the building and the spatial plan determined in accordance with the provisions of the legislation.

Paragraph (4) The use and utilization of land in the above-ground space and/or underground space by different rights holders may be granted building use rights, use rights or management rights.

Furthermore, Article 147 states that proof of land rights, ownership rights to flat units, management rights, and or mortgage rights, including deed of transfer of land rights and other documents related to land can be in electronic form.

With the concept as formulated in Article 146 of the Job Creation Law, it has also been formulated in Law Number 5 of 1960 (UUPA).

In article 4 paragraph (1) and paragraph (2) of the Basic Agrarian Law, in principle, it stipulates that individuals or legal entities who already have land rights, namely on the surface of the land, automatically have the right to use the space under the ground and above the ground. as long as it is necessary for interests that are directly related to the use of the land it owns.

b. Implementation of the Granting of Spatial Rights on Land according to the Employment Copyright Act.

The granting of space rights over land and basement which is the problem is how to implement the application of the concept, where the basic principle of this rule by the State regulates that the land or space formed above and/or below the ground can be used for certain activities, and can be used for certain activities. the right to use the building, the right to use and the right to manage.

The fundamental difference with what is regulated in the work copyright law is that in the work copyright law, the right to space is granted the same way a person or legal entity is granted land rights. However, in the basic agrarian law, the right to space is only limited to its use which is attached to land rights. Practically, before the Employment Copyright Act, a person or legal entity that owns a building on the ground level can automatically use the ground below to build a foundation or use the space above the land to build up to a height limit of several floors. However, when a person or legal entity does not own a building on the ground level, they also do not have the right to use or utilize the underground space and above ground space. In contrast, after the emergence of Article 146 of the Job Creation Law, a person or legal entity can have the right to space, namely by constructing buildings below ground or buildings above ground. Even when the legal subject does not own a building at ground level. That means, maybe in the next few years we will see that there are lots of buildings built underground or above ground with different legal subject ownership (individuals or legal entities). Example. A is the owner of the basement, B is the owner of the ground floor and C is the owner of the above ground. In simple terms, by referring to Article 4 paragraph (1) and paragraph (2) of the Basic Agrarian Law, a legal subject can build a building along with a basement and a connecting bridge (skywalk) which becomes an integral part of the building. With Article 146 of the Copyright Act, it is possible for a basement and a skywalk in a building to be owned by different legal subjects.

With the conflict of regulations that occurs between the Job Creation Act and the Basic Agrarian Law, it may be difficult for the State to implement it. The Job Creation Act does not revoke the provisions in the Basic Agrarian Law, meaning that the provisions in the Basic Agrarian Law are still valid. The basic concept in the basic agrarian law is that the right to use a building, the right to use, or the right to manage is given to the right to the surface of the land, not to the right to the basement or above the land. In terms of social life, the granting of rights to the space is prone to creating new problems in the land sector. Because there will be conflicts of interest with three different legal subjects (Article -146-verse-1-Uu-Creation-Work).

Although the Implementing Regulation as mandated by Article 146 of the Job Creation Law has not been made, but to implement the provisions of Article 142 and Article 185 letter b of Law Number 11 of 2020 concerning Job Creation, Government Regulation Number 18 of 2021 concerning Management Rights, Rights to Work has been issued. Land, Flats Unit, and Land Registration.

In Chapter VI Government Regulation Number 18 of 2021 regulates Land Rights or Management Rights in Upper Land and Underground Spaces (Government Regulation No. 18 2021).

Part One, Above Ground and Dungeon Objects

Article 74 paragraph (1) The use and utilization of land parcels owned by land rights holders are limited by:

- a. The height limit is in accordance with the basic building coefficient and the building floor coefficient as stipulated in the spatial plan; and
- b. The depth limit stipulated in the spatial plan or up to a depth of 30 (thirty) meters from the ground surface in the event that it has not been regulated in the spatial plan.

Paragraph (2) states: Land which is structurally and/or functionally separate from the holder of land rights as referred to in paragraph (1) is a land area or basement which is directly controlled by the State.

The second part; Occurrence of Management Rights, Building Use Rights, and Use Rights in the Upper Land or Underground Space.

Article 76

Regulates the utilization of space above ground or underground space obtained in accordance with the suitability of space utilization activities issued by the Minister.

Article 77

Utilization of Upper Land Space or Underground Space can be granted with Management Rights, Building Use Rights and Use Rights with a decision on granting rights by the Minister. Including HGB and HP in the above-ground space and the basement given above the HPL for the above-ground or basement space given with a decision on granting rights by the minister with the approval of the HPL holder.

Article 78

Regulating the granting of use and utilization of space on land that interferes with the public interest, then approval from the central government is required, and if it interferes with the interests of the holder of land rights on a parcel of land, approval from the holder of land rights is required, with an authentic deed accompanied by compensation in the form of money. or other forms.

Article 80

Regulating the granting of HPL, HGB or HP in the above ground or basement must be registered with the Land Office, and be given proof of ownership in the form of a certificate.

Part Three : Subject, Term, Imposition, Transfer and Release, and Cancellation of HPL, HGB, and HP in the Upper Ground Room or Underground Room.

Article 81

Provisions regarding the subject, time period, imposition, transfer and release, and cancellation of HPL, HGB, and HP on land apply mutatis mutandis to provisions regarding the subject, period, imposition, transfer and release and cancellation of HPL, HGB and HP on land space. or basement.

Article 82

Set the deletion of HPL, HGB and HP in the Above ground and dungeons. Furthermore, the rights to the space above the land or the space below are registered electronically (article 84 PP 18/2021).

5. Arrangements for Control and Utilization of Space Rights on Air Land in the Netherlands and Singapore

Dutch law applies the principle of *accession* or *accessie* where the owner of an object is the owner of all components of the object. Everything that is attached above and below the land belongs to the holder of the land rights [Henson Mulianto Salim, Suparjo Sujadi , 2019]. Unlike in Indonesia, with the enactment of the UUPA, the *accessie principle* is no longer valid, while what applies is the principle of horizontal separation, where the owner of an object is not directly the owner of the object component attached to it.

Based on Article 5 Paragraph 21 of the *Dutch Civil Code* , land ownership rights give the owner the right to use it, including using the air space above it. However, there is a possibility for other people to use the space above ground level, if that person uses it above a height or depth that will not be used by the owner of the land rights.

In Dutch law it is known as *opstalrecht* , the right to own, hold and manage buildings or plants, which are on the surface or on the surface of land belonging to other parties. This right gives the acquisition of ownership of a building or construction that is separate from ownership of land. On the basis of a notarial deed of *opstalrecht*, it can give birth to an obligation for the holder of the right to pay a certain amount of money (ground rent) to the holder of the land right. In addition, the deed can also be given restrictions on the use of using, constructing, destroying buildings. When this right is completed, the ownership of the building, construction, and plants attached to the land by law becomes the property of the holder of the land right.

Opstalrecht gives an exception to the principle of *superficies solo cedit* , the right to the surface includes the right to the inside of the land in question. This arrangement in Indonesia is similar to the concept of a permit for the use of space on land where there are two different legal subjects in land tenure with the control of space on the land in question. Airspace is not included in the definition of land but buildings and constructions attached to the ground. There is a right to use space on land if the person uses it above a height or depth that will not be used by the owner of the land right. In contrast to the UUPA which defines land as the surface of the earth only with rights to land, then from these land rights the attributive authority of the authority to use space on land is born, the legal subject of the holder has the authority to use the space above the land, limited on the authority to use it.

The Land Title (Strata) Act of 1967 introduced a strata title registration system that facilitates the subdivision of buildings or land into strata units. Strata title is a grant, grant with due payment or payment for goods of perpetual value, or lease of state land in any form issued or granted by *the Crown, the State or the East India Company*. The strata concept separates the building from the land into two parts, both of which are given rights on a grant or lease basis.

The separation of land and buildings has been recognized in Indonesian law, both in the UUPA and in customary law with the principle of horizontal separation. However, Singapore Law views buildings and spaces (*lots*) as ownership rights regardless of what land rights are under them, so Singaporean Law still recognizes the existence of space ownership regardless of the attachment of a space to the land below it, as well as registration. right to space. This is different from Indonesian law which recognizes the ownership of space if given the authority from the status of the land under it.

According to Article 3 of the *Land Titles Strata Act*, *stratum* is all parts of land that consist of all basement or air space or part of basement or ground air space, where the dimensions have been described. All buildings can be divided into several airspace plots, so that the building and its airspace plots are separated from the ground. Joint ownership of public facilities is assessed by proportional distribution of ownership of public facilities. Thus, the concept of land space in Singapore is completely separate and is not related to the land under it which is regulated in a *strata title legal system*. (Henson Muliando Salim, Suparjo Sujadi, 2019).

The control and use of space on land in Indonesian law is closely related to land rights, where space on land exists as a legal consequence of the granting of land rights in the form of authority that gives legal subjects to use the space on the land in question in accordance with Article 4 of the UUPA. This is also known in Customary Law where objects above the land have a legal relationship with the land below. Utilization of space on land is adjusted to the form of land rights given, so that the purpose of using space on land can be reflected in land rights such as HGB, then the use of space is to construct buildings.

Space on land in customary law in relation to land is also attached with active responsibilities as stated by Herman Soesangobeng, *beheersrecht*, as well as social responsibility as stipulated in Article 6 of the LoGA. The control and utilization of space on land to fulfill the responsibilities mandated by Customary Law and the LoGA is controlled by being limited to interests directly related to the use of the land in question, zoning regulations, licensing, providing incentives, and imposing sanctions as described in Article 35 of the Spatial Planning Law. The control is then further regulated at the level of regional regulations such as the DKI Jakarta Provincial Regulation No. 1 of 2014 which regulates the boundaries of space utilization such as height, land controlled and planned, as well as the amount of open space in the construction of buildings.

The implementation of land use and control in Indonesia can be seen in the practice of the Jakarta MRT Infrastructure and the connecting bridges between buildings. Elevated stations and elevated rail roads are based on IMBs issued individually per station, on the basis of land rights from government agencies. In addition, it is also based on a utilization permit from the DKI Jakarta Provincial Government for PT MRT Jakarta to operate the MRT infrastructure.

The control and utilization of the space on the land is controlled through the IMB which is issued on the basis of consideration of the spatial plan, building law, and technical and administrative regulations regulated by the regional government and sectoral government such as the Railway Master Plan, so that the function of the land space is can be in accordance with the public interest as regulated in Article 48 of the LoGA. The control and use of other land spaces such as the Senen Multipurpose Bridge and Pondok Indah Mall Bridge which cross public infrastructure and/or facilities in DKI Jakarta, in this case public roads are also based on permits managed by the Regional Asset Management Agency, which need to fulfill obligations such as payment levies to the state, technical guidelines Regulation of the Minister of Public Works no. 20/PRT/M/2010. This form of space utilization is manifested in the Permit for Utilization of Space Above Infrastructure and/or Public Facilities issued by the Governor through the Office of Highways, as well as being the basis for the issuance of IMB.

New land rights are needed to accommodate the tenure and use of land space. The necessary arrangements are implementing regulations that explain the forms of control and use of land space, the scope of land space, the boundaries of the authority of land rights holders, limits for granting land rights, the purpose of using space on land, the legal basis for ownership of the material used. is in the basement.

As the strata title which is regulated in its own regulations in Singapore and in accordance with the agrarian regulations in that country. The concept of space in the Ownership of Flats (HMSRS) and SKBG in Law no. 20 of 2011 which has shown the authority to control and use space on land, where the regulation of space on land is still very limited to residential functions. Therefore, the authors suggest to issue implementing regulations in the form of government regulations as guidelines for the implementation of space on land with the legal institution of the Authority for Control and Use of Space on Land. Government regulations as an implementation of the mandate of Article 4 and Article 48 of the LoGA that the authorities in the right to use space are regulated by a Government Regulation. Apart from that, it also serves as a guide and a liaison for spatial planning that has been implemented so far, so that it is clear that there are legal relationships, both *de facto* and/or *de jure*, which are governed by their control and use in such a way as to achieve the objectives of spatial planning itself. The reason it is not called a right is because the concept of space which is very dependent on the land rights that support it contains active rights and obligations. Active obligation to fulfill the obligations required to maintain the principles contained in spatial planning such as the principles of security and comfort. The regulation of control and utilization of space on land which regulates the principles of space, the nature of space on land, institutions of space on land, forms of rights and obligations, restrictions on legal subjects, tenure period, and procedures for transition.

4. CONCLUSION

The granting of rights to air space or space above ground, if the legal subject of the holder of the right on the ground surface is the same as the legal subject of the holder of the right to the space above the air or the space above the ground, then the rights

granted to the air space or space above the ground are the same, and if the subject rights in the space above the air are different from the subject of rights holders on the ground surface, then different rights can be granted to them, and arrangements regarding the subject, assignment, transfer and release, as well as cancellation of rights, apply mutatis mutandis to provisions regarding the subject, assignment, transfer and release. as stipulated in the UUPA.

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AUTHORS

- First author : **Daniel W Nirahua** , Graduate Student PhD, Study Program : Science Of Law.
Pattimura University, Ambon, Indonesia : Email : dnirahua679@gmail.com
- The second author : **M.J Saptetto** : Faculty of Law. Pattimura University, Ambon, Indonesia
- The third author : **R.J Akyuwen** : Faculty of Law. Pattimura University, Ambon, Indonesia
- The fourth author : **M. Tjoanda** , : Faculty of Law. Pattimura University, Ambon, Indonesia

Human Computer Interaction And User Experience In Computers: An Assessment Of Current Approaches And New Concepts)

Bilal Olalere Ashade¹, Tarek Najjar ²¹Department of Computer Engineering, Ankara Yıldırım Beyazıt University, Ankara, Turkey

²Department of Computer Engineering, Ankara Yıldırım Beyazıt University, Ankara, Turkey
205101102@ybu.edu.tr, tnajjar@ybu.edu.tr

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Abstract—Humans have grown to love their computers, and this is without a doubt seeing the way computers and technology generally have impacted our lives and permeated every fabric of daily living. From building smart homes to getting the job done at the office, humans interact with computers every period of the day. This level of inter-action also calls for some rules and principles because the popularity of a product will be highly dependent on how usable such a product is. Previous studies have shown how human-computer interaction (HCI) can optimize user experience (UX). It has led to some specific studies by scholars who have assessed the HCI needed for phones, laptops, and even mobile applications. Now that the foundation is in place, this paper explores an interaction plan. It will look at the contrast between a great plan and a plain plan, and you will notice how an object such as hardware and software products can differ radically in their usability. The paper will also assess what and who is involved in interaction design. Finally, the paper further outlines some of the primary vectors of usability and how the vectors are used to test interactive products.

Keywords—HCI | Intelligence | Algorithms | Interaction | Human

I. BACKGROUND

The affiliation of a computing enginery gives a definition [18]. "Human-computer interaction can be an education that bargains with the plan, assessment, and utilization of natural computer systems for human use and the extraordinary ponders that encompass them since the interaction between the client and the computer at the interface of a program or device such as a computer. As reported in many articles, it can be seen as a crossroads in computer science, behavioral science, planning, and several other research disciplines [20]. HCI evolved in the 1970s due to the increasing use of computers and computing devices in work environments. Initially, centralized computers that required a lot of

preparation and support emerged, and then a single computer was created. PCs have become more and more accessible at work, during which time they have been further developed for home use. The demand for "humanized computers" has not been long, as the possibilities of computer gadgets have evolved in all areas of life, and individuals are aware of the challenges they face when using them [11]. he HCI division then began to grow in the mid-to-late 1970s, attracting analysts in various disciplines such as ergonomics construction computing.

A connected and problem-focused field of investigate [24]. HCI needs a mix of perspectives and assumptions, perspectives and strategies. More than a society of analysts from different fields than education, the 1970s and 1980s saw a growing demand for the field as a center of inquiry and advancement. Therefore, courses that prepare individuals for strategies and increase sensitivity around the complexities of understanding human-device interactions are followed. In addition, the utilization of computers in consumer hardware is a significant growth area for computers. It is one of the factors why computer companies like Apple are pursuing the "personal advanced assistant industry."

Following up on additional inquiries, We have noticed that many HCI researchers view the plane as a surface structure or an ornament. We needed a unified view of what design analysts could bring to HCI research to grow. The lack of visibility into the engagement planning investigation represents a missed opportunity for the HCI research community to benefit from the composite perspective of planning review in the context of a collaborative investigation. An inclusive design viewpoint that takes an all-encompassing

approach to address under-constrained situations can greatly teach the research community.

Since human-machine interaction studies, the combination of man and machine relies upon records from each the on both the computer and the human side [42]. PC designs techniques, operating frameworks, programming dialects, and development situations are involved on the computer side. On the human side, correspondence hypothesis, practical expressions, contemporary-day plan, semantics, sociologist, highbrow mind research, and human motion are involved. Designing and plan techniques are moreover involved. The multidisciplinary concept of human pc interplay allows people from diverse foundations to feature to HCI. HMI is sometimes known as a human-gadget association (HMI) or human-PC collaboration (CHI). Even if the human interface designer tries to avoid device-oriented tasks due to software or hardware limitations, they cannot be removed. As long as you use bank cards, they will be inserted into certain slots and will need to be removed later.

A not unusual layout approach in this example is to mandate device-orientated tasks. H. Their role withinside the manner of action is pulled forward; as a result, users' goals cannot be achieved without performing device-oriented tasks. Therefore, HCI accuses it of being essential that the product is more fertile, safer, more useful, and more useful. In the long run, meeting users will be more comfortable. Therefore, it is essential to involve people with HCI skills at every stage of improving an element or framework. HCI is also essential to prevent a complete collapse of a product or business. HCI is fundamental to creating a clear and natural framework open to individuals with a wide range of gifts and information and individuals who have not yet been officially prepared. HCI makes computer programs and gadgets more comprehensibly and valuable for everybody by leveraging our ordinary environment information.

It is pertinent to justify why HCI study is important and what challenges society can face. These include (to name a few) quality of life, well-being, security and other forms of security, autonomous living, aging, working conditions, economics, natural issues, education, digital partition closures, data access. Issues such as are included. All of these concerns are personal and relevant. Several areas are exploring these zones and regularly incorporate data and communications innovations. The HCI sector plays an extraordinary role in addressing social issues by introducing a specific perspective of human centrality. This position is envisioned not by optimizing the quality of the interaction but by explicitly developing a progressive approach to the interaction to support social challenges. Based on this translation, our field covers many things to explore social challenges. However, the term "social interface" is rarely used. It can be characterized as a progressive approach to interactions explicitly planned to

advance or elucidate a particular social perspective, using HCI as an approach to creating diverse societies.

Some of the benefits of the technology are creating methods and processes for designing interfaces in relevant styles (that is, for specific tasks and user classes, as best as possible within specific constraints. (Learning ability or efficiency) to design the interface and optimize the desired properties, such as it also helps identify methods and techniques for implementing the interface (software tool kits and libraries, efficient algorithms, etc.). Engineers are encouraged to use the HCI solution to discover techniques for evaluating and comparing interfaces.

HCI likewise assumes a significant part in improving new points of interaction and interaction technologies and in developing descriptive and predictive models and theories of interaction. Plan a framework that limits the hindrance between individuals' intellectual model of what they need to accomplish and how PC might interpret the client's undertakings. The heart of social networking is to initiate an unused HCI arrangement (for example, how we as a science field can contribute to the special questions of nature) or to consider existing work within the zone. It is to introduce a specific perspective to get in. Raising HCI's work to a social level provides a new interdisciplinary understanding and perspective. We believe that the small solution in this issues article highlights some of the previous work and illustrations from HCI and will inspire even more work in the future.

Some of the key findings in the study will include an evaluation of HCI on algorithms, artificial intelligence, smartphones, gesture-driven devices known as leap motion devices, devices built for older people, Kinect devices, radioactive robot-powered devices, cognitive-driven devices, among many others. Overall, the study exposes some of the key concepts around human-computer interaction, and the general ways in which the study of HCI can be improved, for technologies such as virtual reality and augmented reality devices. Several perspectives are provided.

The adequacy of HCI depends on significant basic boundaries, for example, convenience and similarity, which would invigorate the end-user to ask the organizations safely and more dependable. Therefore, it will be essential to get the diverse convenience factors underneath unmistakable perspectives that are significantly central to the user framework architects and the capacity to the main of our findings, we give an illustration example to be considered by the health section, assessment, and formative technique in CHI work.

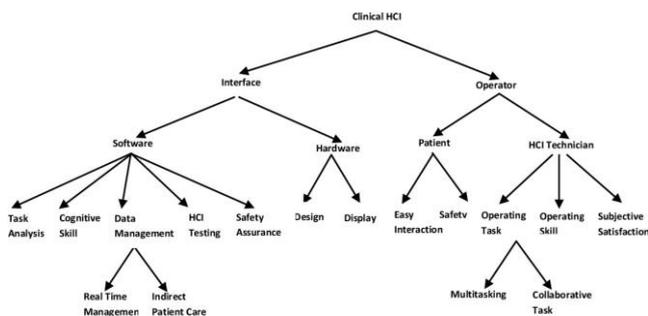


Figure 1: [16].Simplified the flow of usability and interaction with software and operators.

The clear scope for an increasingly useful approach to interacting with society is in the realm of well-being. We provide articles that analyze user experience issues and articles with virtual environments that support the individuals living. In expansion, attractive technology is important for inducing behavioral changes that positively impact social problem domains. These are some of the mosaics that shape the image of HCI as a social doctrine.

II. THE ROLE OF USER INTERFACES IN ARTIFICIAL INTELLIGENCE AND HUMAN COMPUTER INTERACTION

Several studies have evaluated the role of user interfaces and human participation in AI-assisted decision-making and their impact on human-computer interfaces. One study was conducted by [4]. The following section will assess what their findings are. Artificial intelligence (AI) is gradually becoming a central feature of humans augmenting decision-making. This study evaluated a case study of cognitive software in the telecommunication industry. Some of the key findings of this study include that people tend to withdraw from decisionmaking, and as people withdraw from decision-making, human and algorithmic intelligence become disproportionate three effects are likely to happen; namely, by deferring such decisions, having workaround to bypass such a decision, and manipulating data.

One of the conclusions asserts that creating a user interface that operates as a mediator between humans and algorithmic models is optimal for improving HCI. Research begins with theorizing the concept of an algorithm at work. As they move from unmistakable to the proactive method of information investigation, they explain the job of calculations in navigation, recommending the best decisions for operational and strategic action [43]. The article encourages clarifies that learning calculations, some of the time known as fake insights (AI) or "cognitive frameworks" [33], are increasingly being used in workplace decisions. Researchers sometimes refer to AI as data analysis automation in the workplace [3]. Machine

learning calculations upgrade making Decisionbureaucracy through the years without human mediation, coming approximately in people dropping human manipulate in their execution [26]. They note that algorithmic checking, estimation, and administration of commerce execution is the most common work of commerce insights computer programs. Research further explains that computational calculations to tackle an earlier issue are alluded to as algorithmic navigation [30]. At the point when calculations and AI are consolidated into the dynamic interaction, research suggests that individuals who are defied with routine decisions are isolated from choice creation since they forget about the information sources, assortment techniques, information investigation, and data handling that fill in as the prompt reason for information and direction [28].Social inquiries embraced touchy subjects and critical things expected to evaluate connection and separation. We utilized the large subjective methodologies of leading meetings, mentioning observable facts, and doing narrative examination to secure a feeling of the call place laborers' obligation to choices [9].

We led 28 semi-organized meetings with the organization's faculty. On a portion of its discoveries, the review uncovers an issue about interface intervention between the calculation and the specialist as the ' best' choice would almost certainly prompt whether or not the choice is as of now made before the specialist takes part. The concentrate additionally featured how UI could im- pact low human contribution in AI machines, topographical and fleeting division, objective separating, and intellectual relocation are, for the most part, instances of ways of eliminating the human chief from the independent directors. In any case, the choices introduced through the point of interaction may often bring about an undeniable degree of human cooperation. Thus, our discoveries highlight a concurrent connection to and separation from the choices that permit AI to work.

Their study likewise found the significance of relevant angles that no one but people can think about by distinguishing unintentional and infrastructural closeness to choices as an immateriality-driven sort of connection. Full of feeling grip, the third sort of human connection to choices is inspired by feeling. At long last, in light of conceded choices, workarounds, and controls, our information infer that an absence of adjusted human commitment in an independent direction has troublesome execution outcomes. In addition, the work addresses other calls by studies on exploring more subtle contrasts in the components of attachment and detachment than the simple opposition of attachment and detachment. We answer this call by characterizing the variables that make connections and separations conceivable.

The intricate programming highlights bring about low user involvement as far as spatial and fleeting detachment, normal distance, and intellectual dislodging. Future review on the algorithmic direction and the utilization of AI in computerized

information examination in organizations will profit from our worldview. These ends depend on the idea of client commitment, which has generally been related to brain science in media hypothesis [23]. The constitutive highlights of people's separation from and connections to dynamic that clients face in dominating their contribution in dynamic structure the underpinning of our idea on AI's capacity. Future investigation may disregard the persistent human consideration and go exorbitantly far in the conversation about computations as autonomous parts, assuming it doesn't consider the connection points that present algorithmic choices as middle people of explicit types of human separation and connection, and assuming it doesn't accentuate this double job of AI in work environment choices.

III. USABILITY AND THE CONCEPT OF HUMAN COMPUTER INTERFACE IN M-LEARNING APPLICATIONS

In another research, [1] assessed the concept of usability for mobile learning applications and how this affects smartphone devices. This research paper assesses the framework that describes the usability feature of the mobile learning application. The research also successfully created and implemented a design prototype for a smartphone that can test the usability features of mobile learning apps. The prototype developed used Java language and Android SDK. The prototype developed was also compared to another mobile application based on the Blackboard. The research also involved a survey of respondents in Western University, using questionnaires. The usability features tested include ease of usage, customer satisfaction, attractiveness, and learnability. In conclusion, the surveys found that the model developed was more easily usable than the Blackboard model. The research is mainly divided into the introduction, literature review, a developed theoretical framework, data analysis, a discourse, and the conclusion. The research is introduced by defining how mobile phones have become a permanent feature of societal and daily living [5]. The study sets the tone for the scope of the research by highlighting the key role mobile devices play in the conduct of education. The study also notes the relative challenges of mobile phones in terms of ease of viewing and the increasing adoption of phones by educational institutions to aid mobile education. The problem highlighted by this study is particularly important due to the emerging forms of education technology being developed in response to remote learning and other impacts of the Covid-19 pandemic. Therefore, it stands to reason that improving the usability of such devices should be a primary consideration.

The study highlights the importance of designing an attractive and user-friendly interface for mobile learning devices, including generating acceptance from the user base and creating acceptability with a wider audience. The study also highlights the current use of mobile phones in the mobile learning experience, citing many studies which have

established that students now utilize mobile technology in learning. They also highlight the importance of learning anywhere and at any time as one of the key factors driving the adoption of mobile learning. The study identified one of the key features of mobile learning technology as ease of use [44]. When a product is complex or has a confusing user interface, it would lose a degree of market share. Therefore, this consequence should encourage developers to target ease of use as a product thesis. The study further highlights the different guidelines for creating desktop and mobile applications. They emphasize that developers cannot utilize the guidelines for desktop applications in mobile learning applications. In their literature review, the work assesses the different articles and research which have assessed the concept of usability. In addition, they addressed the literature which has generally discussed the role of cell phones in mobile learning processes [2]. The research then takes a step-by-step approach to developing a framework that assesses the usability of mobile learning platforms. While their designed framework is similar to the one designed by Parsons and Ryu, they make a critical addition by considering usability, communication, and interactivity. They distinguish between the quality of use, internal quality, and external quality metrics and apply this to ISO/IEC metrics.

They assessed a case study called the Busuu Project, a mobile language learning platform, using the developed framework and found that the Busuu project is a successful and usable application as it meets all the requirements. In addition, they created a prototype for assessing the framework and created two models, the first based on the Blackboard website, while the other was created with the Android SDK recommendations and the created framework by the researchers. After this, the researchers surveyed respondents from Canada's Western University. The respondents were assessed based on the two models created [1]. The study evaluated ease of use, user satisfaction, attractiveness, and learnability from the survey findings and the data analyzed. A general validation test established that the two models do not perform in the same way and that Model B, which was built based on the authors' framework, performed more consistently than the model built based on the Blackboard website. The different tests used in the process include the T-test and the F-test to evaluate the models and the variance levels. Finally, the study establishes a reason behind building better user interface solutions for mobile learning applications, and this study has created a comprehensive framework for testing the usability of mobile learning apps. Its usefulness will be brought to bear, seeing the growing adoption of remote learning options across the globe.

IV. THE DEPLOYMENT OF USABILITY STUDY IN

LEAP MOTION DEVICES TO EVALUATE NATURAL USER INTERFACE

This work surveyed the idea of normal UI through ease of use study dependent on the jump movement gadget [14]. A leap motion device can be defined as a tool that enables users to interact with digital objects on a computer. In the heightened world of augmented reality and virtual reality, the leap motion device has become very important, and seeing how effective human interaction is with the device will enhance usability. The study introduces readers to the common device dubbed "Leap Motion" and its impact on the market, offering "touch-free" interaction based on a gestural interface. They clarified it as a state-of-the-art innovation that foregoes standard sources of info like the mouse and console for a clever graphical UI and client connection. Without using a pen or a realistic tablet, the gadget considers picture control and the formation of antiques, for example, drawing straightforwardly up high.

Their article incorporates a review to assess the intuitiveness



Figure 2: [32]. The Leap Motion Device

thought using the Leap Motion, just as the movement of a connection point architect utilizing Photoshop CS6 programming. The exploration was a convenience test with five architects who utilized the product in their everyday work yet were uncomfortable with the Leap Motion contraption. The respondents completed not set-in-stone assignments and finished a fulfillment overview. At last, the scientists found that the contraption should be adapted to a superior client experience with normal interaction points. Subsequently, the gadget's usefulness is still completely usable and could supplant the mouse and console in inventive exercises utilizing visual depiction programming.

The examine observes that regardless of technological advancements, it has grown to be a not unusual place to apply gestural interplay with gadgets that use frame actions because of the number one technique of interplay, along with pills or smartphones. The researchers referenced a study that asserted that interacting with a product through gestures and movements is insufficient [41]. The new technology must be integrated into the user experience so that engagement is as natural as feasible. The natural interface is the name given to this new mode of interaction. Their review saw that clients have searched for plans that can fulfill their needs and assist them with arriving at their objectives. In addition, graphic architects are searching for specialized arrangements to take

care of their plan endeavors in this setting. Because of the standards and idea of a normal point of interaction, the exploration announced in their paper expects to assess the connection point convenience of the Leap Motion gadget for planner movement while drawing in with the Photoshop CS6 program.

In this paper, the authors made errands for clients to finish utilizing the Ethereal application, which interfaces Photoshop CS6 programming to the Leap Motion gadget, permitting developments for the use of normal and significant devices for picture creation to be perceived. The specialists contended that it was feasible to investigate and handle the accompanying significant attributes of the Leap Motion interface dependent on the ease of use appraisal from the heuristic examinations in this exploration [39]. To sum up, the Leap Motion requires various changes to the gestural connection point and human variables actual hand development examination to diminish weariness and convey the ideal client experience. Thus, while the innovation is encouraging, it isn't yet prepared to supplant the conventional mouse and console crafted by realistic programming originators. When planning human helped gadgets, for example, Leap Motion Devices, it is basic to plan considering the clients, and this review had the option to build up that more should be possible in further developing LMDs considering AR/VR advances being utilized today.

V. IMPACT OF DESIGN ELEMENTS IN MOBILE APPLICATIONS ON CLIENT EXPERIENCE OF ELDERLY PEOPLE

Advancement in medical care has made it simpler to consistently keep up with one's well-being. With the maturing populace on the ascent, it's more vital than ever in recent memory to offer administrations made conceivable by innovative headways. Notwithstanding, it has been seen that the old are reluctant to accept present-day advancements, for example, versatile applications. With the examination of both older client encounters and UI plan of a mHealth application, just as an investigation of the connection between them, this exploration endeavored to eliminate this boundary.

The utilization of versatile innovations is turning into a pattern just as an important instrument in this day and age. Individuals in both created and non-industrial nations use them the most. A few applications are being presented in these PDAs under different classes like diversion, well-being, and way of life, among others, making them reasonable for an assortment of occupations. Versatile applications have developed progressively critical as of late, as medical care organizations have started to suggest their utilization. The contraptions that give the center stage to health administrations incorporate cell phones, tablets, PDAs, and iPads, among others. Portable well-being applications can be utilized to follow a patient's well-being, give data on different clinical themes, and advance well-

being and exercise for decent well-being. Any application's prosperity is controlled by how effectively the client utilizes it. The survey tool employs a Likert scale in a survey

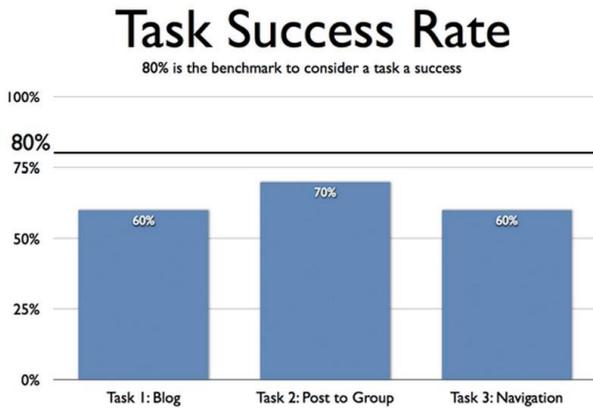


Figure 3: [25]. The success rate of Control Group participants over tasks

questionnaire that asks about many characteristics of the selected mobile application, such as content quality, availability, performance, and look. The QoE probe is a user experience tool proposed by Farnaz Fortrousi [21]. It's a portable application for Android and iOS gadgets that utilize an API to interface with other versatile applications. The objective of this apparatus is to catch the client's insight by social affair input. It helps us check prerequisites continuously and gathers use logs and QoE from clients through input. The example for the review is at first chosen from the populace involving a testing procedure in this examination. An irregular task is likewise used to partition the example into two gatherings: control and test. The current Glucosio application is utilized to test the UX of the benchmark group. The prototype is designed within the experimental surroundings relying on the modifications made. The prototype become created with the assistance of the software program Balsamiq. It's a device for developing smarter and less complicated person interfaces and cellular applications. The steps are similar to the management group. However, this time, the people are from the experimental group. The steps are similar to inside the manage group; however, the people are from the experimental group.

The essential objective of this review was to improve the senior populace's use of versatile health innovation. To set such a thought in motion, one should know the older's opinion on innovation as it is created. Therefore, a theory is proposed to research the effect of UI plan viewpoints on senior individuals' client encounters to displayed via a semi exam wherein a version for the initial is picked reliant upon the circumstance that people need to be fifty years vintage or extra

prepared. Individuals withinside the benchmark bunch had been given the Glucosio utility with the check to analyze purchaser experience, even as the ones withinside the check package had been given the Glucosio version to degree UX [21]. It has been visible that even as an extrude of any of the UI plan elements of a prosperity utility won't have a primary effect withinside the purchaser experience, while adjustments are made (UI plan) for the benefit of the extra seasoned, a huge development withinside the UX of the vintage should be significant once they use the utility.

VI. SURVEYING HUMAN POWERED GESTURE PROTOTYPES WITH USER INTERFACE

In a chunk of composing named GestureWiz [40]. A Human- Powered Motion Plan Environment for Client Through interface Models through Maximilian Speicher and Michael Nebeling, writers investigated the formation of a human-fueled plan to assist movement acknowledgment. They observed the momentum middle across the usage through fashioners and analysts relying on sincere movement recognizers for immediate UI models. Besides, they observed that maximum present recognizers are constrained to a particular information technique and pre-organized association of motions. As a result, they can not be effects joined with different recognizers. Finally, the review takes note of the prevalence of advancements and tangible gadgets, for example, AR-skilled telephones and HoloLens.

They acknowledge the need for designers to create a support system for newer forms of touch-based and gesture interactions. However, the study asserts that the current support framework for motion and gesture technology still needs more support. They referred to certain investigations that followed some of the limits for movement-based innovation [37]. For instance, recognizers are obliged by what is doable with current advancement and not constrained by customers' needs. Likewise, developments reliably change in devotion and strategy during design, and banner sets can rapidly fill in unconventionality and raise the potential for irregularity. By and large, these stances are altogether different specialized necessities. Generally, they note the utilization of in- citing end-clients to exhibit signals they might want to use in innovation. Afterward, they accumulate information on the most famous use cases controlled by the user. They also note

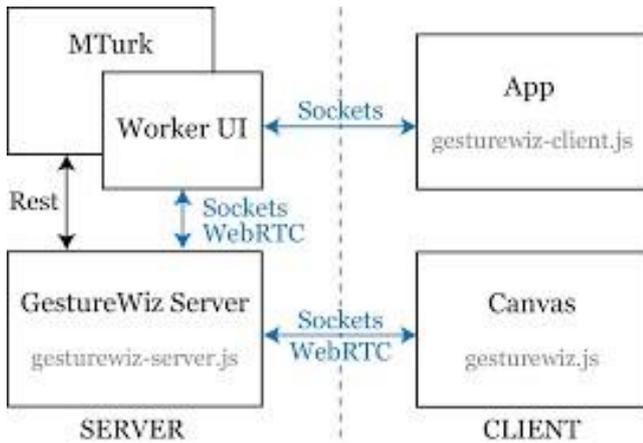


Figure 4: [40]. Shows the technical architecture of GestureWiz.

the support for a more participatory design approach and some challenges with this model. They assert that the project only elicits the information and data from users in some cases and does not implement it into designs [40]. Thus, the review suggests that work should decrease uncertainty and expand the clearness of client characterized signal sets. Furthermore, the review led to six tests to advise the plan regarding the point of interaction; they note that various information sensors might be needed for their proposed plan. They perceived the requirement for fingers and hand signal acknowledgment as virtual and actual following items.

In conclusion, they note the real-world cases in which the technology can be used. They note that it has various genuine applications, particularly in the circumstances with an absence of required equipment or blended modalities. One model is an architect who means to make a bunch of hand signals for Kinect and Leap motion; however, doesn't have the frameworks accessible that the review introduced the GestureWiz prototyping climate that gives fashioners a coordinated answer for motion definition, struggles to check, and constant acknowledgment by utilizing human recognizers in a Wizard of Oz way. It also led to tests with planners and groups to show that GestureWiz can perform with sensible exactness and inertness. At long final, they appeared the benefits of Gesture Wiz when replicating flag based association focuses from the composing and coordinating an audit with twelve affiliation originators and prototypes a multi-modal conversation with offer assistance for a colossal amount of novel activities in circular forty-five minutes

VII. LOOKING AT ADVANCED TELEOPERATION

IN RADIOACTIVE SCENARIOS FOR HUMAN-ROBOT IN USER GRAPHICS

Findings on human-robot teleoperations for the radioactive environment [25]. They tried a high-level graphical not to set in stone how robots can perform visual reviews and tel-control errands. The study recognized the need for robots that can be used in extreme and dangerous environments, thus reducing men-faced risks and hazards like oxygen deficiency, radioactivity, etc. They noticed the need for automated telework stages for CERN is expanding each year because of the improvement of the machines, which will bring, in addition to other things, an expansion of the radiation, which will make human intercessions more troublesome. The most significant drawbacks of such robots are their usability: robot operators typically require ongoing training, limiting the number of people who can use the robot. The corporation must then assemble a team of robot operators to carry out all required interventions. However, an industrial facility often contains many different components that may require robotic manipulation: the robot operator is well-trained in robot operation but lacks complete knowledge and experience of the area in which the intervention will take place, and the characteristics of the component manipulate. Therefore, it would be preferable to supply an easy-to-learn and simple-to-use robotic system to the component responsible, who understands the component and the surrounding environment to complete the operation safely. They then highlight the key requirements for Human-Robot Interface as described by [29].

- to connect the operator to the remote workspace and establish the necessary connections There are two types of connections: the operator's actuation on the distant workspace and, in the other way, information feedback to the operator.
- to make task execution easier by allowing the operator to submit high-level commands as well as direct actuation as needed;
- to provide all required workspace information to the operator with the purpose of achieving the highest level of transparency This will allow the operator to complete the operation with dexterity while also making semiautomatic task supervision easy

The study explains the importance of communication, highlighting the significance of clock synchronization and asserting that the timestamp of the messages in the communication protocol is usually already included in the GUI. The Graphical User Interface and the robot must synchronize their internal time at the start of the conversation to offer correct timestamps, as this synchronization model is based on the Network Time Protocol's standard four-timestamp technique (NTP). The study also highlights the point on Control Interface in the three key forms of control modes: joint by joint control, cartesian control, and gripper. They further discussed

input devices and the Robot 3D model. The study also assessed the System Implementation noting the GUI is expected to work on Microsoft Windows since it is the popular OS for CERN. The study required that learnability be viewed as a skill for each GUI. They tested several scenarios, and in conclusion, they asserted that some feedback has to be provided to the operator of the GUI in real-time. In conclusion, this article demonstrated that this basic Graphical User Interface already creates a userfriendly environment. The tester operators' feedback and their

post-completion errors as those which occur after one may have performed all tasks but needs to perform one more to complete the whole procedure. Applying this to innovation, they compare it to the hypothesis of Jef Raskin and the idea that "an exchange box that has no options." They note that Raskin's hypothesis fits well with a gadget direction task [7]. The paper then, at that point, proceeds to demonstrate the goal of the review as enlightening the effect of gadget direction and subtask need on client mistakes.

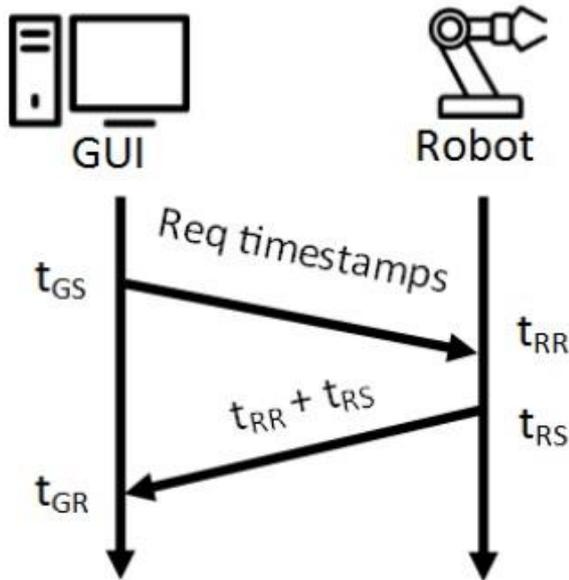


Figure 5: [25]. Synchronization model between the Graphical User Interface and the robot.

The first point concerning the concept is action control, and human error explained that skill, rules, and knowledge are three variables involved in human action control. They cited Rasmussen [15]. the meaning of these three factors. On Rasmussen's most reduced level, expertise-based conduct is created by profoundly robotized tangible engine activities that are not under conscious control. Information-based direct, then again, is characterized by intentional preparation and critical thinking in new circumstances. Finally, rule-based conduct exists between the ability and information levels. In closing, they state that after getting data, interfacing with PC frameworks, some guidance is generally centered around Rasmussen's standard level, with little commitment from the abilities level degree. As a result, the research focused our modeling efforts on rules-based behavior. On this level of active management, deviation from the programmed process is a sign of human mistake, either skipping a step or adding a new one that is not required.

quick learning time are indicated in the prior tables.

VIII. USING A COGNITIVE ARCHITECTURE TO PREDICT AND MODEL HUMAN ERROR IN USER INTERFACE DEVELOPMENT

This work assessed the differences between device orientation and task orientation and how this generally affects devices' effectiveness that adopts either orientation. [22]. They recommend cognitive modeling as a solution to predict error rates for either device or task-oriented subtasks. The work highlights the position and influence of humans' routine daily tasks. It emphasizes the repetitive way these tasks are performed and how errors occasionally still feature while performing them. The research then highlights the nature of errors we witness and points out post-completion errors as the most dominant. The authors further described the nature of

The work goes ahead to explore Model-Based User Interface Development (MBUID). They note that the Concurrent Task Tree (CTT) notation (Patern, 1999) is a commonly used approach for modeling tasks in MBUID that also supports running tasks in conjunction with UI models by defining mappings between these models [34]. In addition, CTT incorporates various administrators for sorting out undertakings into progressive designs, characterizing transient linkages, and depicting data streams between the client, the application, and the assignments [31]. The examination goes further to test the interconnection of various actual gadgets. Finally, the review analyzes procedural blunders while utilizing a kitchen help framework for encompassing helped living. With its accessible formula library, custom-fitted shopping list generator, and intelligent cooking or baking guidelines, the kitchen associate guides in the readiness of a dinner for a particular number of individuals. The review area was in Technische University, Berlin, with five men and 15 ladies in 15 and 59.

The work goes on to describe the Cognitive User Model. The CUM process was created using the ACT-R cognitive architecture provided in the study [19]. According to an earlier study, associative priming was deemed an appropriate explanation for the temporal disadvantages of device-oriented steps [36]. The research here establishes a clear correlation

between device orientation and user mistakes. In discussing the research results, they conclude that on the first note, it can be demonstrated that human error may be examined well without additional tasks or interruptions to the subjects' duties. Second, the gadget vs. task orientation idea has been demonstrated to be useful in theory.

Finally, the research discoveries show how little can be anticipated when scientists depend on hypothetical ideas to make forecasts. Just when the application's association rationale (here zeroed in on required versus nonobligatory undertaking stages) is considered do significant varieties become more significant exploring further. Although there is a growing corpus of theory and empirical study on human error, verified approaches for predicting user errors are only available in a few areas. The research provided a computational user model based on cognitive science research and predicts more generic errors. The intellectual client model can precisely replicate the aftereffects of past convenience research utilizing UI metadata during the model-based improvement of different UIs. The study concludes the need to adapt the model to new and various interfaces in the future and develop the link to MBUID to achieve greater automation. It highlights how to interface designers would be able to get error predictions early in the development cycle, making error prevention considerably easier.

IX. HUMAN-DRONE INTERACTION: ASSESSING A GESTURAL AND VISUAL INTERFACE APPROACH

This research by Cauchard et al. [8]. Evaluated the utilization instance of robots presenting the numerous manners by which robots are utilized and the strategy for use. They note that robots are helpful for photography, conveyance, observing, and search-and-salvage. They note that robots are for the most part involved outside and can work in one of two modes: independent (where the robot is altogether computerized and follows still up in the airway or uses sensors to adjust its bearing), or manual (where a pilot controls the robot progressively, typically through a controller or a telephone). They highlight a key challenge: drones do not let the mode of use be changed unless such usage is preprogrammed, and note that drone.io technology has been created to address this challenge. A new show of coordinating a projection-camera framework on a robot as a practical method for customers to speak with an assistance drone. It enjoys the benefit of being coordinated on the robot, permitting individuals to approach it or have it fly dependent upon them and interact impromptu [35]. For example, people might draw in with a robot while zeroing in on their action, without the pressure of control, by choosing a projected menu and getting fast criticism, using the drone.io foundation made under the review. The study assessed the different forms of previous literature on human drone interaction. Several methods for interacting with a drone have been proposed, including remote controls and phones, gestures and face postures, and even touch. In

addition, drones can modify their flight route or be equipped with screens, projectors, or LEDs to indicate their intentions. In comparison, most previous research has focused on either the drone's input or output, based on a similar drone. Another study created and tested an interface with both features as part of what the study aims to create in the drone.io technology.

The study also assessed mobile handheld interface devices. They noticed that portable projected connection points could be conveyed in hand, worn on the body, or embedded in robots and robots. They can be utilized to increase things or the client's climate, for example, exploring people on foot. They referred to the investigation of Sasai et al. [38]. introduced a local robot escort that extended a connection point over which the client might venture to enter their objective before being directed en route by projected data. Some goals conceptualized for the drone.io device included the ease of usage, learnability, static interaction, spontaneous short-term interaction, drone position, multiple users; on the gestural input, some of the interactions recognized for the device include the hands and feet, indirect hand interaction reference frame, and stability. The work also determined the projected output, noting the need for a projection space, menu projection, and a menu design. The research also did a user study and evaluation for the drone.io. In a first in-door test, the researchers recruited a sample audience of 15 volunteers, with ages between 18 and 26.

Three tests were designed for the indoor tests. An outdoor user study was likewise conducted on six right-handed volunteers, and in all 18 trials were conducted [12]. All in all, from the post-concentrate on interviews, the respondents' recognized that the menu had been obvious to see (6.3 out of a 7-point Likert scale) and that the framework was helpful to cooperate with (4.9/7) in post-concentrate on interviews. However, two users reported they could not see items on the periphery and would instead concentrate on the three portions in front of them. When the menu was rotating, two others found it difficult to see the icons. Some of the major challenges identified during the study were flickering and navigation. The work further discussed the interaction design, interface design, and the different limitations of the drone.io device.



Figure 6: [10]. (Cleared out) User connection with the drone.io menu amid a campus tour. (Right) The drone.io concept permits for different projection spaces including the ground, a divider, or the user's body.

In conclusion, the specialists concluded that the framework is easy to utilize, engaging, and profoundly solid when utilized outside in close to certifiable settings in three client studies with 27 people. Users may now approach a partner robot and see with their own eyes how the robot can help them, just as make demands for help, utilizing drone.io. Drone.io has a simple to-utilize UI that doesn't need any earlier information. We have the chance to foster another age of surrounding and semi-public showcases with drone.io that are not compelled by the foundation where they are constructed. The mix of the projector and the robot considers more prominent adaptability in the size, shape, and area of the presentation at any one time, just as real intuitiveness, taking into account a more regular Human-Drone Interaction.

X. BUILDING A CLOTHING-COORDINATED RFID-PRIMARILY BASED TOTALLY INTERFACE FOR HUMAN-TECHNOLOGY INTERACTION

In a study [45]. It was assessed the different forms of interaction with technology and its importance in society. They noted the limitations of handheld, screen-based, touchbased, and voice-based devices in attending to all needs, especially with people suffering disabilities and different use case environments. They noted the variations of touchless devices on being voice or body-movement-based. Demanding gadgets like this encompass linguistic coverage, conceptual failures, noisy disruptions, and the absence of usefulness in environments that call for silence. Thus, they have been capable of setting up a touchless, easy, and automatic entry required on the human-era interface, permitting the whole society to interact with the encircling Wi-Fi world seamlessly. Clothing-included and frame movement-primarily based interfaces are a handy method for revolutionizing our lifestyle.

Clothing integrated the human-innovation interface, permitting the whole society to align flawlessly with the encompassing remote world.

Clothing incorporated and body development-based connection points are an incredibly advantageous methodology for reforming our way of life. Clothing incorporated human innovation correspondence should be usable without- out view, detached, and upkeep free to be truly helpful in day-to-day existence. The paper innovates the uninvolved super high recurrence, radio recurrence ID innovation. This one-of-a-kind way is a body development-based answer for humans to innovate collaboration. They characterize clothingincorporated detached radio recurrence distinguishing proof as utilizing without battery and remote electronic labels comprised of a receiving wire and a coordinated circuit [6]. The review demonstrates that the utilization of signs and stages from on-body detached RFID labels has been shown to effectively give data on body positions and developments, showing an overall help use for attire coordinated innovation. They also demonstrated using the on-body passive RFID tags in other studies.

The study further defined what the clothing-integrated solution looked like, which featured the two imaginative elements, including solid and normal on/off actuation of contributions by straightforward hand developments and usefulness. Likewise, the research demonstrated that it comprises halfway adjusted split ring tag radio wires connected to shirtsleeves and groups encompassing the wrist. The examination portrays a bit-by-bit model for the RFID peruser to be introduced. They show that since the RFID peruser can be associated with different Wi-Fi applications, split ring labels can function as remote information associated with the body and other static things like furnishings. Using a particular ID, the creators contend that remote information can then be given to an associated gadget that permits individuals to connect with their computerized

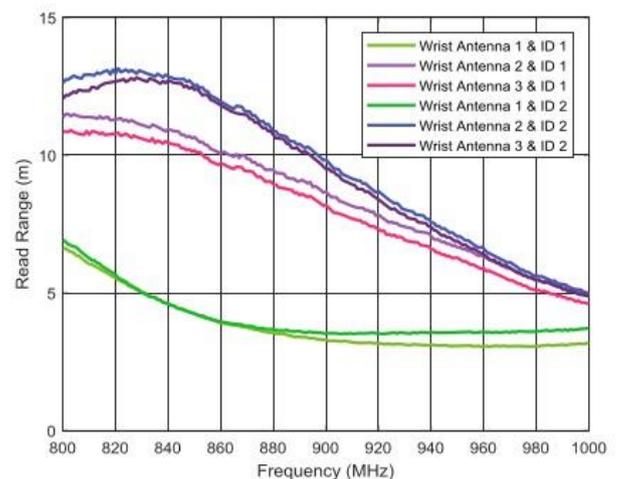


Figure 7: [27]. Simplified comparison of the three distinctive wrist receiving wires and two types of ID rings (ID 1 = ID ring manufactured from electro-textile; ID 2 = ID ring fabricated from copper tape).

environs through garments. At last, it is contended that this will add to more accommodation [27]. The work defines the different forms of antenna designs and fabrications that may be useful. They highlight the three main antenna designs. The first is an antenna that consists of a simple ring but observe that while it is a simple design, the wrist may cover the whole tag while in use, which likely affects the wireless receiver and its performance. The subsequent plan is two contrast wrist receiving wires that have groups circumventing the wrist, and it is promoted as having better remote execution, including a more extended read range.

The essay went further to explain the concepts of the tag fabrication and tested and measured using two samples of each wrist antenna type. A geared-up made blouse changed into extensively utilized to assess the advanced technology. The paintings info the one-of-a-kind case examination conducted. In conclusion, the study discussed the findings from the evaluation as encouraging. The review clarifies that considering the requests of ordinary utilization of an apparel incorporated human-innovation interface, the innovation created in the review is a stage forward [17]. The read ranges were described as long enough to provide a broad enough user interface area for the solution to be convenient and seamless to use. The study also indicated that the mobile reader gives the system complete mobility unlimited possibilities. The gadget can be flawlessly coordinated into different kinds of dress since it is savvy, inactive, and support-free. This UI can likewise be cleaned with the dress assuming it is covered with a defensive covering. At final, the author accepted that the contraction might be considered a promising inclination for fate human advancement alliance subordinate on those essential comes about. They saw that the following stage is to put the innovation through its speeds with certifiable applications like music and light control, just as creating a genuine game for recovery.

XI. VOICE USER INTERFACE INTERACTION:
 USER MENTAL MODELS IN AUTONOMOUS VEHICLES

Studying the different forms of user interaction in the different forms of technology we interface with is pertinent. In a study by [13]. The authors assessed the mental model and how it can influence interaction design and technology usage. First, they surveyed the idea of driving independent vehicles. Separating the various levels into Level zero to level five. With regards to human communication, they affirm what independent vehicles are by characterizing that the

independent driving framework, which incorporates dynamic driving assignments, stopping requests, expressway, and worker data, gets and assembles enormous information from transportation components and situations, and afterward dissects the movement course and controls vehicle versatility utilizing an AI calculation. The Human-Vehicle Interaction is comprised of the feed-forward and criticism of the human-vehicle, vehiclevehicle, and vehicle framework. The review proceeds to evaluate voice UI. They feature the arising significance of voice client connection point and how it contributes to human PC corporations. The concentrate then, at that point, proceeds to characterize what's more make various frameworks and use case for independent vehicle voice UI connection plan. They finish up on the handiness of mental models featuring how human insight and fake knowledge can communicate. The review finishes by expressing that the psychological model prompts the VUI communication plan strategy past the conventional collaboration plan technique, which opens up a universe of opportunities for association plans.

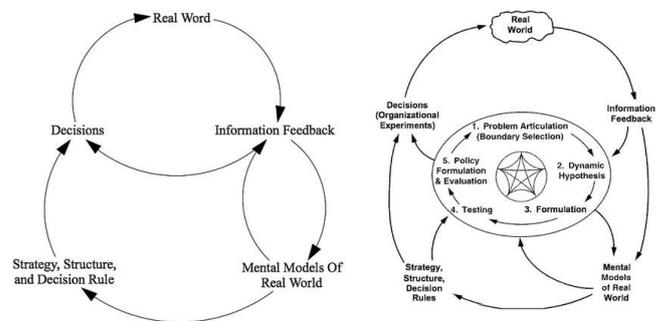


Figure 8: [13]. double-loop learning process and double intelligence mental models.

XII. CONCLUSION

This study has evaluated the different forms of technology that can be adopted in assessing human and computer interaction. Through the study, we discover different emerging ways in which our human experience of computers can be improved, from drones to the usage of voice, motion, and even clothing to better our experience of technology. In conclusion, it can be said that there are still several areas for improvement. However, this study has been able to assess diverse literature and conclude on some innovative ways in which human and computer interaction can be improved.

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Personal Resources, Emotion Regulation, Parenting Style, Social Support On Cyberbullying Victims: A Literature Review

Nia Agustiningsih^{1*}, Frastiqa Fahrany²

^{1,2}Sekolah Tinggi Ilmu Kesehatan Kepanjen, Malang, Indonesia
1 Sekolah Tinggi Ilmu Kesehatan Kepanjen, Malang, Indonesia
Jl. Trunojoyo 16 Kepanjen, Malang, Indonesia, 65163, +628223818830

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Abstract- Introduction: Cyberbullying is a teenage phenomenon that needs attention because it causes serious short-term and long-term impacts in all aspects of health. The right coping strategies are needed by teenagers to be able to face cyberbullying so that teenagers have good resilience. The purpose of this literature review is to find out what are the important things that need to be considered in cyberbullying victims. **Methods:** The method of writing this article is a literature review of 25 articles with the year 2019-2021 published from the Scopus, Science direct, SAGE and Proquest databases. The method of searching and selecting articles used *The Center for Review and Dissemination and the Joanna Briggs Institute Guideline* and *PRISMA Checklist* with selection criteria using the PICOS approach. **Results:** The results of the literature review show that Personal Resources, Emotional Regulation, Parenting Patterns and Support from Peers, Family/Parents, and Teachers is an important thing that needs to be considered for victims of cyberbullying. **Conclusions:** Furthermore, Adolescents need to get promotive and interventional programs to improve their abilities in coping strategies against cyberbullying and bullying so that with the right coping strategies they will feel good welfare and optimal academic achievement at school.

Index Terms- Coping Strategies, Teenagers, Cyberbullying

I. INTRODUCTION

Bullying is violent behavior or attacks in the form of verbal or non-verbal (physical) aimed at the victim by the perpetrator which causes psychological, emotional and physical impacts because the victim is unable to defend against attacks that are carried out continuously which can affect the victim in several aspects such as social, emotional, health and academic[1]. The term cyberbullying is related to bullying that is carried out via the internet / online using information and communication technology. Compared to traditional bullying, cyberbullying reaches an unlimited number of people with increased exposure and time[10]. Cyberbullying is bullying that is carried out using

an internet network system such as sending rude messages, mocking, hurting or embarrassing and harassing images through social media), intimidating via telephone calls and distributing videos that harass the victim, posting disparaging comments and/or embarrassing images on the social networks, or to intimidate or threaten someone electronically[9,15].

Cyberbullying is recognized as a serious growing psychosocial problem occurring in schools around the world [18,21]. Most of the studies on the prevalence of cyberbullying have been carried out based on different age groups of students from primary, secondary school. The results of the school population show that cyberbullying victims vary from 10% to 53% which describes the phenomenon in all age groups of students[27]. Cyberbullying has a significant negative impact on emotion well being in adolescents which is shown as negative feelings and emotions such as stress, sorrowful, angry, frustrated, shame, lonely, fright, heaviness, desire for revenge and suicidal idea[4,12,19,25]. Cyberbullying also has an impact on behavior problems such as juvenile delinquency, violence and bad value shift and functions at school until dropping out and withdrawing from the social environment[20]. This is a digital era, so every teenager will be at risk of cyberbullying, so teenagers need to know the right coping strategies to deal with this phenomenon[8]. In addition to the coping strategies used against cyberbullying, other strategies are needed that are different from traditional bullying[3].

Coping strategies are efforts made by individuals to adapt to stress as a result of cyberbullying so that they have resistance to psychological disorders. Emotion focused coping is problem solving performed to manage negative feelings resulting from a stressful event. Problem focused coping centers on solving problems that occur as a result of events. Various types of problem focused coping strategies used to deal with cyberbullying such as blocking the cyberbully's contact and direct confrontation are the most relevant strategies [3]. The results showed that victims who had direct confrontation stated that they were effective in stopping bullying. By doing confrontation, adolescents learn to recognize stressful situations as an effort to grow and develop in having

resilience[3]. In dealing with cyberbullying, adolescents need to be prepared with education and training related to the selection of coping strategies through education about emotional intelligence, emotional regulation, emotional social competence as described in the paragraph above so that adolescents have resilience in the face of cyberbullying. Based on this description, the systematic writing of this literature review aims to determine the perspective of the factors that play a role in the selection of adolescent coping strategies to face cyberbullying .

II. METHODS

The approach used in this activity is a literature review. The method of implementing the activities carried out is the process of collecting data:

- 1 Prepare a literature review scientific paper design according to a summary of the topic to be carried out.
- 2 Determine and prepare the registration protocol using the *Boolean* operator (AND, OR NOT or AND NOT). Keywords in this literature review are adjusted to Medical Subject Heading (MeSH).
 - a. Determining which *database* to use and which to use in this activity is to use *Scopus, ProQuest, Science Direct, SAGE* , with the article year 2019 – 2021.

- b. Determine the eligibility criteria with an article search strategy using the PICOS framework which is also adjusted to the inclusion and exclusion criteria (table 1)
- c. Explain the source of information in searching articles in a predetermined database until the last article is found for a comprehensive summary
- d. The study selection process by reading the entire article and selecting the articles that did not fit was discarded and recorded in the selection strategy using the PRISMA flow chart (figure 1). The article analysis method used in this literature review is a comprehensive process consisting of four interrelated stages: Reading the contents of the article in depth from all research results, Marking line by line the study findings, compiling sentences or findings marked based on similarity of meaning into themes presented in descriptive writing, and interpreting the analytical themes then written in the results of the *review*. In addition, descriptive analysis in the form of narrative is also added.

Table 1. Inclusion and exclusion Criteria with PICOS

Criteria	Inclusion	Exclusion
Population	Adolescence	Non adolescence age
Intervention	There are no intervention	There are no criteria exclusion
Comparisons	There are no comparison	There are no criteria exclusion
Outcome	Strategies coping to cyberbullying	No relevant Strategies coping to <i>cyberbullying</i>
Study Type	Cross sectional, longitudinal study	mixed method, a quasi experimental design, clinical trial or randomized controlled trial, Systematic or literature reviews, qualitative research
Publication Type	Peer reviewed original studies	Non peer-reviewed studies
Publication Years	2019 – 2021	Pre 2019
Language	English	Language ather than English

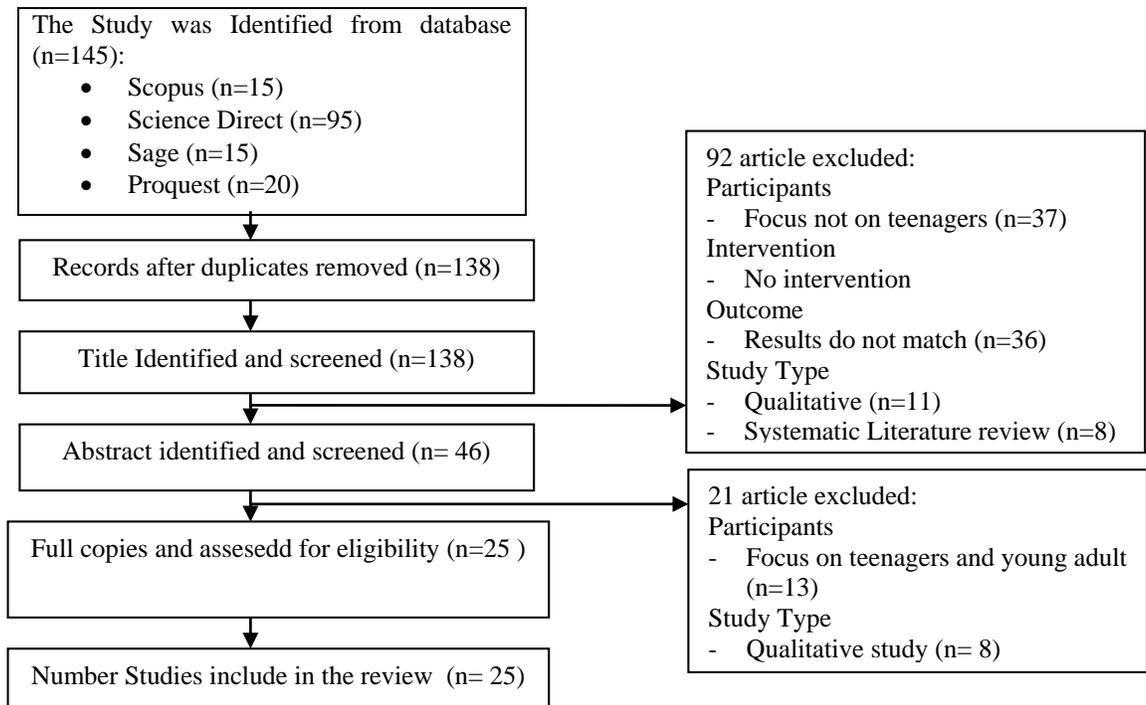


Figure 1 PRISMA Flow Chart

III. RESULTS

The results of the study of 25 articles obtained the following things:

1. Personal Trait

Adolescents who feel lonely have a history of anxiety, suicidal ideation and attempts. Age, loneliness, anxiety, suicidal ideation and attempts, and marijuana use are risk factors for bullying victims. Education about behavior and emotional expression is needed to strengthen students' coping with bullying. Cyberbullying victimization is positively associated with social anxiety and depression [1,23]. It is very important to improve children's social skills and modify negative cognitions in intervention programs to help children receive feedback on other people's reactions. Differences in anxiety, emotional dependence, social support, and social skills between direct actors, control actors, and direct/control actors [22]. Intervention programs are needed for the development of social interpersonal and individual cognitive factors. Cyberbullying victimization is associated with nonsuicidal self-injury (NSSI) through increased depression and early maladaptive schemas (EMS) with mindfulness as a protective factor. Cyberbullying, mindfulness and depression are interrelated [24]. It is necessary to improve intervention programs for adolescents through intervention programs that involve mindfulness as an effort to increase resilience or as a protective factor for adolescents in the face of cyberbullying [7]. There is a need for promotive efforts related to regulating positive emotions such as mindfulness attention and strategies for reducing emotion regulation for negative emotions such as acceptance, seeking support. Cyberbullying victims who showed symptoms of depression reported lower levels of personal resources (emotional intelligence, gratitude, optimism, and forgiveness) than those who

did not [17]. The importance of understanding through promotional and preventive programs relates to personal resources in mental health and in helping individuals to have resilience in the face of stressors such as cyberbullying.

2. Moral Guidance

Students with positive/loving emotions about bullying increase their active behavior in dealing with bullying by re-offending bullying [4]. Students with negative emotions/do not like bullying increase proactive behavior in dealing with bullying such as seeking support from adults and telling them to stop bullying. Students with high moral disengagement are associated with passive behavior when facing bullying while students with low moral disengagement are associated with proactive behavior in dealing with bullying such as seeking support from adults and telling them to stop bullying. Teenagers need to get moral guidance so that they have the awareness to stop bullying which is a harmful act. In a study conducted on 274 adolescents, it was found that confrontation with cyberbullying is negatively related to emotional symptoms [3]. Coping strategies in dealing with bullying and cyberbullying develop according to age. Parenting style is related to adolescent involvement in bullying/cyberbullying behavior [14]. The importance of knowing the values that must be socialized by parents to children because this is related to the involvement of adolescents in bullying and cyberbullying. Moral emotions mediate the relationship between parenting and cyberbullying. The importance of nurturing and providing moral values so that it can grow moral norms in children [25].

3. Emotional understanding and regulation

Adolescents who have a high level of emotional understanding and regulation of emotions have a lower likelihood of becoming victims, victims and perpetrators of cyberbullying [6]. The need for intervention programs and prevention education

for adolescents in dealing with cyberbullying actions in adolescents by increasing the ability of Emotional intelligence. Adolescents with higher levels of Difficulties in Emotion Regulation had high levels of loneliness, which also led to higher levels of depression, and ultimately were at risk for cyberbullying aggression [10]. It is necessary to increase the ability of emotion regulation in adolescents as a strategy for adolescents in dealing with cyberbullying so that they are able to manage emotions and not take revenge or cyberbullying aggression. Gratitude is an intermediary in the relationship between emotional intelligence and bullying attacks through cyberspace [5]. Adolescents need to acquire emotional and educational skills to increase gratitude as a strategy for dealing with cyberbullying. Education about improving psychological well-being is important for adolescents which aims to strengthen affective bonds and emotional self-regulation strategies as the main source, without ignoring the role of social cognition and perceptions of social support. Emotional Intelligence is positively related to satisfaction with life and negatively related to bullying and cyberbullying in adolescents. Control variables such as gender, age, class, self-emotion appraisal, use of emotions and emotion regulation are good predictors of life satisfaction for victims of bullying and cyberbullying [15]. Emotional intelligence needs to be promoted as an effort to improve the welfare of adolescents who are involved in bullying and cyberbullying. Furthermore, Intervention is needed for adolescent victims of cyberbullying to develop affective abilities so that they can carry out adaptive emotional regulation to obtain a good degree of health through intervention programs. Teenagers who are victims of bullying who have low levels of emotional intelligence and flourishing are associated with high suicide risk, on the other hand, suicide risk is lower in adolescents who have higher emotional intelligence [18]. The importance of understanding the role of Emotional intelligence and needs to be developed in preventing the risk of suicide among adolescents who are victims of cyberbullying.

4. Social support

Teenagers face cyberbullying by telling their parents, teachers, or friends [4,8,22]. Only a few teens directly address the problem by asking the cyberbully to stop texting or calling the abuser and, in some cases, the problem is solved by turning off their cell phones. Strategies for preventing and managing cyberbullying must be considered as part of the overall educational approach so that psychoeducation is needed for adolescents to find out strategies for dealing with cyberbullying, besides that a policy is needed to introduce cyberbullying to the curriculum and conduct training for teachers and education for parents. Family support is important for cyberbullying victims [13]. Education about cyberbullying in families is very important.

5. Communication and decision making skills

Most of the individual factors are significantly related to Traditional Victims, Cyber Victims [9]. It is very important to develop and improve problem-solving communication skills, and decision-making skills to increase assertiveness in dealing with traditional bullying and cyberbullying. Most students in dealing with cyberbullying prefer to remain silent because they feel they are not accepted in the group or even some are removed or removed from the group [11]. Improving personal skills through communication skills and emotional regulation is important for

adolescents. Socioemotional and relationship skill related to being victims of bullying and cyberbullying [12]. Good relationship skills which are part of socio-emotional competencies need to be developed for all genders in school-age children and adolescents as an effort for teenagers to be able to face bullying and cyberbullying. Age is positively related to the use of problem-solving coping skills to regulate behavior against cyberbullying [19]. Problem-solving coping skills need to be developed in adolescents to face cyberbullying. Cyberbullying victimization is positively associated with social anxiety and depression [23]. It is very important to improve children's social skills and modify negative cognitions in intervention programs to help children receive feedback on other people's reactions.

IV. DISCUSSION

Coping strategies that can be done by adolescents in dealing with cyberbullying are reacting directly (such as retaliating), neglecting (avoiding), getting support (parents, friends, or teachers), and blocking message [14]. Another coping strategy is technical coping, which is the most frequently used coping strategy followed by assertiveness, support from close people, helplessness/self-blame, retaliation, and advice [8]. Teenagers need to receive regular training to acquire proficiency to deal with cyberbullying, help other teenagers avoid from revenge motivation. Active strategies for dealing with cyberbullying are effective for dealing with problems related to cyberbullying [14]. Although problem-solving techniques can reduce the psychological impact of cyberbullying, an estimated 25% of cyberbullying victims do not seek support, and only one in three teens tell their parents about cyberbullying [20]. The role selection of adolescent coping strategies to on Cyberbullying:

1. Personal Resources

Efforts in dealing with cyberbullying are determined by each individual's personal resources such as emotional intelligence, gratitude and cognitive assessment and mindfulness [5,24,26]. Emotional intelligence is a mental ability that functions to understand, identify and manage/regulate one's own emotions and act with others [7]. Gratitude is a protective factor that can improve adolescent mental health in dealing with cyberbullying [5,7]. In general, better emotional management skills are associated with life satisfaction and better psychological adjustment. In general, better emotional management skills are associated with life satisfaction and better psychological adjustment. The results showed that adolescents with high emotional understanding were able to cope with stress better, while adolescents with low levels of emotional regulation showed social anxiety and more symptoms of stress, low self-esteem, depression, low life satisfaction, risk of suicide [5,16,19,23]. Emotional intelligence component consists of the capability to assess one's own, others, use and regulate emotions [16].

2. Emotion regulation

Emotion regulation is the competency to manage emotions socially [11]. Emotion regulation consists of the ability to perceive, understand [17], receive emotional responses, and avoid impulsive behavior when angry, and engage in effective emotion regulation strategies. According to the emotion regulation process model, effective emotion regulation can reduce ongoing negative emotion

expressive[2,22]. In this case emotion regulation is also related to socio-emotional competence which includes emotional skills, understanding and attitudes as well as social competence. These include responsibility in making decisions, skills in building relationships with others, self and social awareness[13]. Proactive behavior and knowledge about steps to deal with cyberbullying/intimidation are important for teenagers[4]. These skills are useful for socio- emotional development, friendship formation, and behavioral socialization in children and adolescents in establishing relationships with peers[25].

3. Parenting Style

Parenting patterns are related to the involvement of children in bullying and or cyberbullying both as perpetrators, victims, victims - perpetrators. In parenting, parents need to know the values that must be instilled by parents in children because this is related to the involvement of teenagers in bullying and cyberbullying such as socialization or the introduction and inculcation of values and morals[15]. Socialization on moral development is beneficial throughout childhood, adolescence and adulthood which consists of empathy, courage and moral identity[6]. A person's moral identity is stored in memory as a complex knowledge structure consisting of moral values, goals, traits, and behavior. A person's morality and sense of identity are intertwined.

4. Peer-support, Family or Parents, and Teachers

Adolescents who have support are less likely to be victims of intimidation than those who do not. Involvement of peers as educators (helping to awaken) can reduce the victimization of bullying in adolescents[9]. Therefore, increasing peer awareness, empathy and self-efficacy to support fellow victims can be part of an anti-bullying program in schools[14]. Individuals who receive strong parental support and get parental control that is oriented towards affection in internalizing moral norms will help adolescents in dealing with cyberbullying/bullying[14]. Parental support makes adolescents have the ability to develop resilience in the face of cyberbullying/bullying such as by trying to do confrontation, increasing personal agency and individual trust[4]. Teacher support is very necessary for teenagers in dealing with cyberbullying/bullying because teachers are an important component in the school environment that is able to provide comfort to their students. Several studies explain that adolescents who feel an uncomfortable environment at school will tend to avoid cyberbullying and bullying by not attending school because they feel there is no source of support, including teachers[14]. Therefore, training or socialization for teachers is needed as an important component in schools related to training programs to deal with cyberbullying and bullying for both perpetrators, victims, perpetrators - victims.

V. CONCLUSIONS

Adolescents need to get promotive and interventional programs to improve their abilities in coping strategies against cyberbullying and bullying so that with the right coping strategies they will feel good welfare and optimal academic achievement at school.

CONFLICT OF INTEREST

There is no conflict of interest in writing this literature review.

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AUTHORS

First Author – Nia Agustiningih, Sekolah Tinggi Ilmu Kesehatan Kepanjen, Malang, Indonesia, Email: anisa.hanifa1115@gmail.com

Second Author – Frastiqah Fahrany, Sekolah Tinggi Ilmu Kesehatan Kepanjen, Malang, Indonesia

Sekolah Tinggi Ilmu Kesehatan Kepanjen, Malang, Indonesia
Jl. Trunojoyo 16 Kepanjen, Malang, Indonesia, 65163,
+628223818830

Pong Game Using AI

Akash Rawat*, Ruchika Panday**, Ashish Kumar Pandey**

* Computer Science & Engineering, IET Dr. RML Avadh University, Ayodhya, India

** Computer Science & Engineering, IET Dr. RML Avadh University, Ayodhya, India

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Abstract- Pong is a simple game. It can provide AI to a computer. Model reaction time, which waits some period of time before making decisions, Two-part strategy: model accuracy, in which the computer knows exactly where the ball will land, and adding a random error factor to pretend that the computer is fallible. In this paper, try to balance the game by making the computer's skills better if it starts losing, or by making it worse if the computer is dominating. It's easy to play Pong. It can give a computer AI. Model precision, where the computer knows precisely where the ball will land, and adds a random error factor to simulate that the computer is imperfect. Model response time, which waits a certain amount of time before making choices. In this work, balance the game by improving the computer's abilities if it starts to lose or making them worse if it is winning.

Key words: Artificial Intelligence, Visual force, Native state space, Optimized state spaces.

I. INTRODUCTION

Modern learning techniques have been significantly affected by the rise of learning games in recent years [1]. Numerous studies have shown that playing games gives students "mental exercise" and that game-related activities increase students' motivation and foster a variety of crucial abilities [2]. Using learning techniques, it is hoped that an AI player would be able to train on a collection of states with various definitions and come to understand the PONG GAME's environment. After finishing the practise set, the player can keep playing as long as they go without getting struck. The number of training runs, learning rate, discount factor, and other characteristics may be used to evaluate the effectiveness of the learning process. According to the industry, AI allows for more interaction between the player(s) and the game. According to academics, games are great test settings for developing AI methods. There is a yearning for better, more lifelike video games that provide higher levels of enjoyment and realism.

A- AI AS THE PLAYER

- Current thread in research.
- Creating AI that interacts with the game in the manner of a human player.
- "Seeing" the game world.
- "Pressing" keys.
- External to the game environment.
- No cheating.
- A robot without the physical robot.

B- AI AS THE CREATOR

- New trend in both industry and academia.
- AI techniques used to control the game.
- Content creation.
- Adapt levels to suit players ability (Infinite Mario).
- Create weapons based on player tastes (Galactic Arms Race).
- Scene Management.
- Control flow of game to enhance replay ability and maintain a predetermined pacing (Left4Dead).

II. RELATED WORK

There has been a great deal of research done on the use of digital games for learning, with some studies concentrating on the game mechanics and others on instructional strategies that might improve teaching and learning. It is well known that playing digital games encourages students to learn how to collaborate, solve problems, communicate, and experiment—skills that are essential for success in a culture where information is constantly changing [2]. In contrast to practising on a single type of problem, skills acquired through gaming are more likely to transfer, which results in the knowledge and skills becoming automatic and consolidating in memory, allowing the learner to start paying conscious attention to understanding and using new information [3]. Digital games for learning put the player in charge of making decisions by putting him through increasingly difficult tasks and achieving learning through trial and error methods [4]. Digital games, which were first created for fun, have been shown to be helpful for the development of cognitive, behaviour, and social abilities [5]. There is a growing amount of research on the potential advantages of digital games for cognitive development (such as faster information processing [6]), but there is little evidence on how the stage of game play and level of competence influence mental effort. The use of digital games in formal and informal learning environments is now supported by a number of principles [2]. Furthermore, in game design and games' capacity to alter viewpoints and conduct [4], In previous studies on mental effort, electroencephalography (EEG) has been used to monitor participants during game play by measuring changes in their brain activity [7], [8] in order to increase neural efficiency when doing certain tasks [9], [10]. It may see changes resulting from changes in external perception in the topographical categorization of the electrical activity in the brain [8]. These variations in the activity of various brain bands and zones allow us to deduce cognitive functions like attention and focus, which are essential while playing digital learning games [8], [11].

III. DIVERSE APPROACHES TO STATE DEFINITIONS

Pong Bird is a continuous and dynamic game with an unpredefined environment, this gaming approach pits learning against search methods in an effort to construct an agent that can successfully complete the game's first learning phase. Because it constructs a policy before managing the states it will oppose throughout the game, the Q-learning method is the one that best fits our situation. It is necessary to define the problem's state space in order to facilitate successful learning. The following list of state definitions includes a variety of viewpoints:

Visualforce and Definition: GR – The parameter we utilised to quantize the game grid was grid resolution. GR values of 1, 2, and 4 were employed. In the findings section, we go into greater detail about it.

Native state space;- The state vector's different elements' ranges are as follows:

Vertical: ~ 0 – 500

Horizontal: ~ 0 – 300

Velocity ~ -9 – 9

(Units for the velocity are pixels and pixels per frame.) It is clear that the state space is larger than 10, which indicates that learning would take too long if we used all of the data from the six states. Accordingly, we chose to apply a variety of space quantization techniques.

Optimized state spaces;- Its choose to employ 4 distinct strategies in an effort to reduce the number of states:

- Using only the vertical and horizontal distances,
- Horizontal relativity and vertical distance
- Vertical distance and horizontal relativity

- A Boolean indication of whether velocity and distance are positive or negative.

In order to further reduce the size of the state space, we established the maximum and minimum distances between pipes after testing each distance with various GR values. We count it as the upper-lower bound of the distance outside of this range.

Its obtained new state space sizes for each technique (corresponding to the approaches above) after all those reductions:

- Vertical Distance ·horizontal Distance/ GR 2.
- 2·Vertical Distance/ GR.
- 2·20·Vertical Distance/GR.
- 2·Vertical Distance ·horizontal Distance/ GR 2.

I made the decision to test out each of those 4 ways to see which one promotes the most effective learning.

Rewards :-

Staying alive between states: 1Dying: -1000.

Scoring +1: 1000.

How Game Work?

Generally speaking, a game's primary execution is divided into iterations by means of a loop that runs continually.

- Games that are constructed from discrete ticks, much like film.
- Each iteration.
- Takes player input.
- Determines the gameworld's new state.
- Shows a new state on the screen.

How to Use the Code

Python 3.6 is the platform we employed. We tried it on a 64-bit Python. In order to create the learning agents, we defined a new game engine based on the open source Pong Bird game.

Files Game.py: It defines a class of abstract games.

PongGame.py: This describes the game Pong.

AgentPongGame.py: Uses an agent to extend the Pong game.

Agent.py: Its uses an agent to extend the Pong game. Different agent classes and state classes are defined.

Main.py: A programm for manually adjusting the game's settings.

TestScript.py: Pong games are executed with agents that have different parameter combinations.

Running the game: Install the pyGame library, please (pip install PyGame). Ensure that the easy GUI library is set up (pip install easy GUI) so that the game may be launched with only one set of settings: Main.py in Python.

Parameters and ranges:

Training runs: The episodes required before the agent quits learning. When the bird strikes the pipe, the episode is over. The likelihood of selecting a random action is known as the exploration rate (Epsilon). 0-1.

Learning rate (Alpha): A new Q-mass with a value of 0-1.

Discount factor (Gamma): The element that increased the cumulative prize. 0-1.

Pipe vertical gap: The separation between the lower and upper pipes is 130-160.

FPS: The game will play more quickly the more frames it has. whichever of the natural numbers.

Agent: True if a learning agent is used. False if human players are used.

GR: 1, 2, and 4 are as described in the section on approach.

Datatype: type of state space definition to use:

- 1: Naïve approach.
- 2: Distance only.

- 3: Horizontal relativity and vertical distance.
- 4: Horizontal relativity and vertical distance with bird velocity.
- 5: Horizontal relativity and vertical distance with binary bird velocity.

Agent Mode: In order to complete the learning phase (much) faster, the game starts in agent mode without the GUI interface. There is a set of keys to press (not those on the NUMPAD) in order to switch the GUI mode (in game):

0: no GUI mode - speed is only limited by the processing power.

- 1: 30 FPS
 - 2: 60 FPS
 - 3: 120 FPS
 - 4: 240 FPS

Human Mode: The space key is the sole key required for leaping and starting a game.

Output: Every 50 episodes, the user will get a message throughout the learning period. The top score and average score from the previous 50 episodes are included in the message.

IV. HYPOTHESES

Its address four primary hypotheses in the current work. The first looks into whether players who perform well in the game have more EEG band power modulation. We estimate that better performance will result in more processing and activity, which will enhance game activity and EEG band power modulation. The second hypothesis looks at whether players who are more skilled in the game exert more mental effort. We anticipate that if game activity and engagement both rise with experience, there will be a corresponding rise in EEG-measured mental effort. The other two hypotheses focus on the relationship between mental effort and two extremely popular game-play design aspects, namely the number of attempts/lives and level of difficulty[12].

Players' performance with the game displays a positive relation with their mental effort. When talking about strong achievers, previous research using standardised assessment exams and game scores showed that higher scores in a learning game do not always equate to higher learning outcomes and effort [13]. By exploring this relationship using brain activity, we may thus gain a better understanding of the link between learning and cognitive ability.

Players' experience with the game has a positive relation with their mental effort. Its believe that because those abilities are key drivers of their mental effort, they would lead to an increase in mental effort as players gain experience [14].

Players' "number of lives left" has a positive relation with players' mental effort (the fewer the lives, the higher the mental effort). In learning games, the quantity of attempts or lives remaining is a key design component [15]. Low life totals (or finishing with one life left) are strange situations [16], and earlier game concepts (such as power ups) have been used to enhance learning [17]. However, further research is required to clarify the relationship between the number of remaining tries and the user's mental effort using objective measurements (such as EEG).

The difficulty of the game has a positive relation with players' mental effort (a more difficult game results in higher degree of mental effort). Researchers have found that users' mental effort is significantly influenced by difficulty [18], []; nevertheless, examining and even quantifying this effect can help us gain new design insights.

V. CONCEPT OF GAME AND ITS WORKING METHODOLOGY

Pong is a 2-dimensional arcade tennis sports video game that is depicted in Figure 1 and is developed in Python. This little project is a remake using the beginner-friendly Python language. In terms of gameplay, it is a two-player game that requires the use of a mouse to control both players from opposite sides. When a player fails to contact the ball and it touches another area of the screen, the game is over. A variety of sounds, JavaScript, and HTML were utilised in the creation of this mini-game. While playing the Pong game, players will be upgraded to a more difficult level as it gets harder and harder. The users of this microproject find it simple to use and comprehend.

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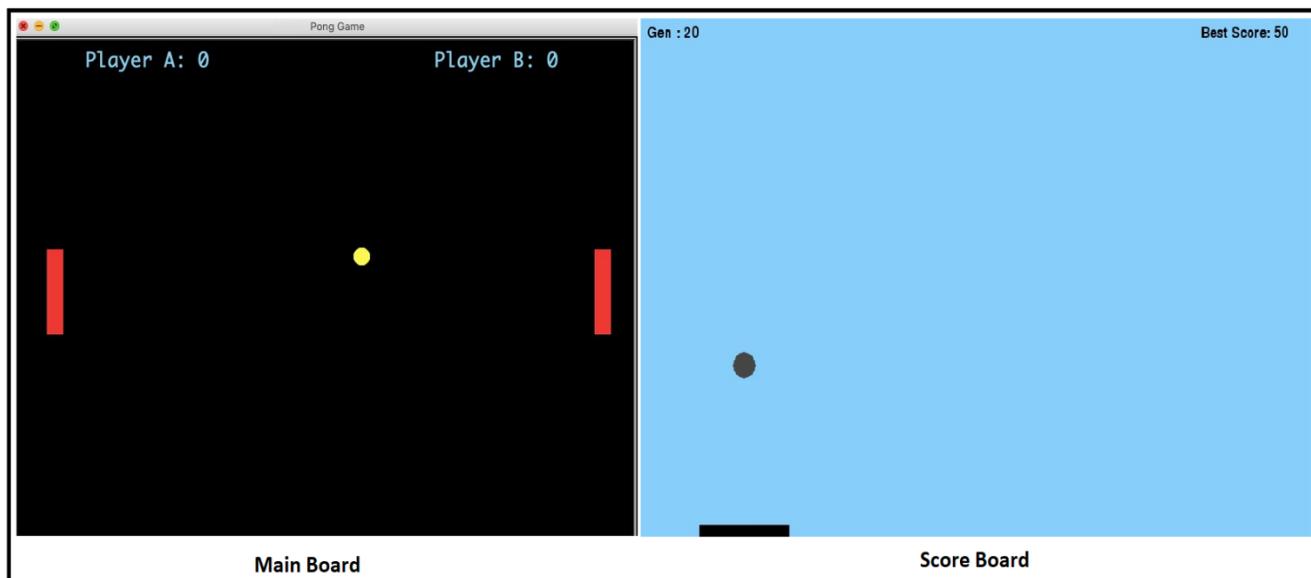


Figure 1: Pong Game

The Game: A controlled experiment concentrating on skill learning was created for this investigation. A phrase with a broad definition, skill acquisition (also known as movement-motor learning [20]) includes both motor adaptation and decision-making [21], [22]. In our study [23], Pac-Man, a time-testing game that has previously been used to gauge particular talents (motor skills), was utilised in our study [23]. In particular, Pac-Man was employed, which offered three lives each session and followed all the rules of the game. The four keyboard arrow buttons were used to control the game. From one session to the next, the game's difficulty rapidly grew.

Participants: In this, recruited a total of 17 participants (7 females) aged between 17 and 49 years (mean = 32.05, SD = 8.84). Participants were recruited from the participant pool of the Norwegian University of Science and Technology in Trondheim. Participants were familiar with the game, but none of them had played the game in the previous 2 years. Prior to completing the tasks, participants were informed about the purpose and procedure of the experiment and of the harmlessness of the equipment. Participants were given a movie theater ticket upon completion of the study, as a compensation for their time.

VI. CONCLUSIONS

Q-Learning works The outcomes clearly demonstrate that an agent equipped with a Q-Learning mechanism is capable of learning the game and achieving results that are superior to those of a typical player. **State space size** It establishes a direct link between the state space's size and the learning time required by the agent. Due to the nature of the Q-Learning algorithm, this is obviously inferred. Additionally, it is the most important parameter (except for the exploration—more on that after this). The learning speed was slower on the bigger state spaces, but it was more constant and monotonous, which is something else we saw. This is because the states are easier to identify when the grid resolution is higher (lower GR factor). The resolution of the actual game doesn't vary with the GR factor; it's always the entire resolution of the game. Thus, on a low-res grid, a good state and a terrible state could be grouped together. **Best** The smallest state space (method #2-distance alone and grid size 4) produced the greatest results. **Exploration During** a frame is a turn and there are many (actually, a lot of) frames in a game, we observed in the experiments that the exploration parameter must be close to 0. The game proved impossible to learn, at least during the time allotted for each run, due to an exploration factor of above 0.0001.

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AUTHORS

First Author – Akash Rawat, B.Tech Student, akashrawat7271@gmail.com

Second Author – Ruchika Panday, B.Tech Student, ruchikapandey028@gmail.com

Correspondence Author – Ashish Kumar Pandey, ashishkumarpandey@rmlau.ac.in, 7317441066

Covid-19 Detection on Chest CT-Scan Image Using GLCM-Based Feature Extraction with K-NN and Naïve Bayes Classification

Rezky Rachmadany Rachman^{1, a)}, Syamsir Dewang^{2, b)}, Sri Dewi Astuty², and Eko Juarlin³

¹ Student of Magister Physics, Mathematics and Science Faculty, Hasanuddin University, Indonesia

² Medical Physics Laboratory, Physics Department of FMIPA, Hasanuddin University, Indonesia

³ Theory and Computing Laboratory, Physics Department of FMIPA, Hasanuddin University, Indonesia

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Abstract- Covid-19 is a virus that has spread and become a global pandemic. This virus infected the vital human organ, which is the lungs. Therefore, this research identified Covid-19 and non-covid-19 diseases based on chest CT-Scan images using K-NN and Naïve Bayes classification methods. The system is constructed through pre-processing, segmentation, GLCM-based feature extraction, and dividing the testing and training data with K-fold cross-validation with the value of 5 and 10, then evaluated using Confusion Matrix. The algorithm accuracy value from the K-NN classification model is obtained as 99,6% and Naïve Bayes got the value of 93,5%. In comparison, the K-NN method obtained the highest sensitivity level with a value of 100% and a specificity value of 98.4% for the two methods used. In this test, the K-NN classifier method is more appropriate than the Naïve Bayes method because some features of GLCM are more accommodating to the KNN classifier.

I. INTRODUCTION

By the end of February 2003 in China, residents of Guangdong were infected by the Severe Acute Respiratory Syndrome (SARS) virus. Then, a new virus emerged at the end of 2019 with the same subgroup; beta Coronavirus—which killed hundreds of lives and spread worldwide rapidly [1,2]. This pandemic was named Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) or Coronavirus 2019 (Covid-19) by the International Committee on Taxonomy of Viruses (ICTV) in 2020 [3,4]. Until now, statistical data from the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU) showed that the total of confirmed worldwide cases is about 388,048,849 and 5,712,849 deaths of February 4th, 2022. New cases continue to occur because Covid-19 can be transmitted from human to human through droplets about microns size from the nose and/or mouth. This virus affects the respiratory tract and causes a wound layer on the thorax. High severity can lead to pneumonia, acute respiratory syndrome, and death [5,6].

To effectively recognize that Covid-19 infects someone is a problem facing today. Antibody and antigen tests, such as Polymerase Chain Reaction (PCR) as a detection tool, require a long time to know the result, so they are not adequate for the number of patients [7]. Meanwhile, to identify the form of infection caused by Covid-19, it is necessary to do a scan or imaging using Computed Tomography (CT-Scan) [8,9]. Based on the literature review [10], CT-Scan thorax images of Covid-19 patients showed air bronchograms, consolidation, and ground-glass opacities (GGO) as indications of thorax damage. However, radiologists in observing thorax images in Covid-19 patients are still subjective, so the analysis results are still biased because they are affected by the observer's experience [11]. For this reason, an automatic identification model is needed when using CT-Scan imaging of Covid-19 patients, reducing manual involvement.

The CT-Scan image detection process can be identified based on color, texture, and other characteristics. Several papers have shown research with various methods. As done, Ahsan, Md Manjurul, et al. [12] detect patients infected from COVID-19 with CT scan using NasNetMobile have the highest accuracy 82.94%. Kadry, Seifedine, et al. [13] has proposed MLS (Machine Learning System) for detection of COVID-19 patients using CT scan Slices (CTS), in which the highest accuracy is found to be of SVM with Fused-Feature-Vector (FFV) of 89.80%. Sahinbas and Catak [14] has proposed Five deep learning CNN models such as DenseNet, ResNet, VGG16, VGG19 and InceptionV3 on COVID- 19 detection. VGG-16 has found to be the best model in terms of performance with an accuracy of 80%.

Furthermore, Abraham, Bejoy, and Madhu S. Nair [15] have used multi Convolutional Neural Network and Bayesian classifier for the detection of COVID-19. Multi CNN achieved an accuracy of 91.16% with the first dataset and an accuracy of 97.44% of accuracy with the second dataset. Hemdan, Ezz El-Din, et al. [16] has proposed a model COVIDX-Net for the detection of SARS-COV-2 with the X-ray images and found to have the best performance with the accuracy of 90% whereas InceptionV3 is found to have worst accuracy of 50%. Ameer and Mohammed [17] detected Covid-19 using a CT-Scan based on GLCM and got an accuracy of 94%. Thepade, et al [18] also used GLCM feature extraction, combined it with wavelet transform, and used K-NN and SVM as classifiers to identify Covid-19 in lung X-Ray images. This study resulted in the highest accuracy value when using the K-NN Classifier, 92.6%.. Then, Bakheet san Al-Hamadi [19] used GLCM feature extraction and LDICRF classifier, resulting in the highest accuracy with an average of 95.88%.

From the previous research, it is clear that the chest CT-scan process required an additional process, namely digital image processing, so that information related to Covid-19 detection in exposed lungs is easier to be detected. Of course, selecting the right feature extraction will improve the performance of Covid-19 detection. Based on the explanation described above, the researchers classified CT-Scan chest image data to identify Covid-19 disease using GLCM feature extraction with the K-NN and Naïve Bayes classification methods. This study was conducted to identify Covid-19 based on chest CT-Scan data, so that the results from the classification can be useful and help medical personnel classify between patients infected by Covid-19 and non-Covid-19.

II. MATERIALS AND METHODS

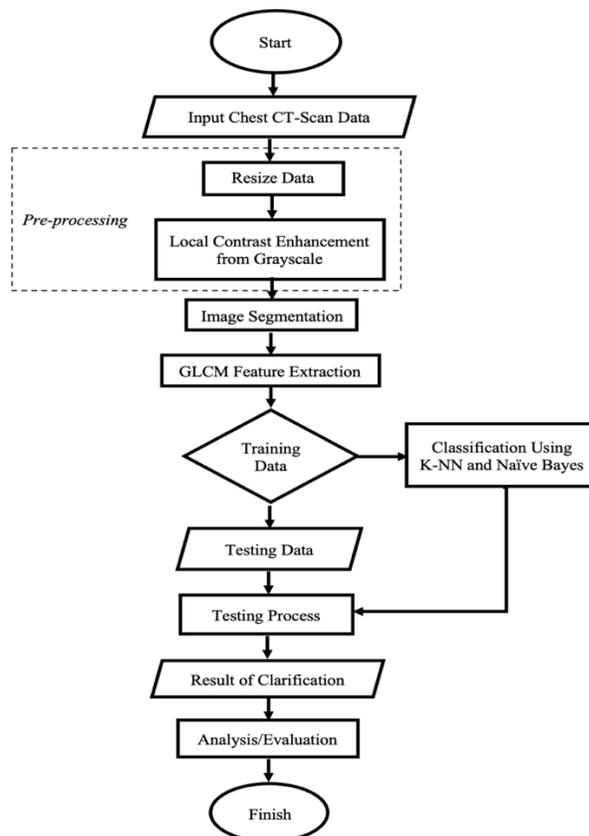


FIGURE 1. Research Flow

FIGURE 1 shows the stages of the research. Chest CT-Scan images are used as input in the classification system in this study. These stages are in the form of preprocessing with resize, RGB to grayscale, and edge-aware local contrast, followed by a segmentation process, image feature extraction using GLCM, classification by K-NN and Naive Bayes methods, and evaluation of the performance of the classifier, namely the level of accuracy, sensitivity, and specificity

Dataset

The dataset was obtained from the Radiology Installation of Hasanuddin University Hospital as many as 62 Covid-19 images and 198 non-Covid-19 images, which were used as input data for processing at the pre-processing, segmentation, and feature extraction stages as well as classification through the K-NN and Naïve Bayes methods. The results of the chest CT-scan image can be seen in Fig. 2.

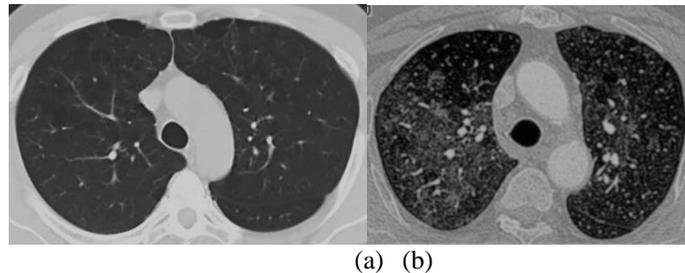


FIGURE 2. (a) The image of chest CT-Scan non covid and (b) covid

Pre-Processing

To begin with, resizing needed to be done, which is changing the initial size of an image to 224×224 . The next step is edge-aware local contrast to increase the local contrast of the grayscale or RGB image. The pre-processing process can be seen in Fig.3.

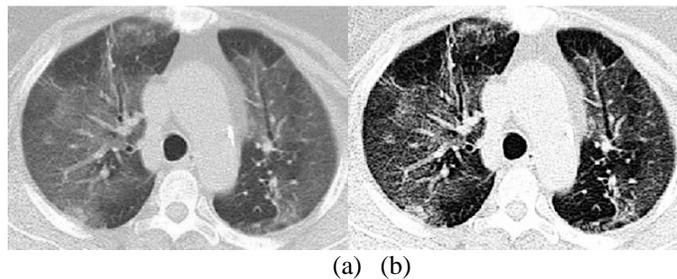


FIGURE 3. (a) Original image and (b) image after the pre-processing process

From **FIGURE 3**, there are several stages:

3. In the first stage, image processing is carried out with the input data, which is a grayscale image generated from the chest CT-Scan process that has been resized.
4. The second stage, the grayscale image is given an edgeThreshold function which defines the minimum intensity amplitude from the edge to be left intact in the range 0-1, where if the value is close to 0 the image will approach the original image, while if it is close to the value 1 the image will increase the contrast intensity of the image.
5. The last stage, after the data is given the edgeThreshold function, then set the edgeThreshold value parameter to adjust the desired contrast level. At this stage, edgeThreshold 0.9 is used to improve the contrast quality of the image, whereas if the edgeThreshold is given a value of 1, the pre-processing process experiences an error which causes the image quality cannot be increased.

In this process, it is necessary to see more clearly which parts of the area have been exposed to Covid-19.

Image Segmentation

Using an active contour model of a closed curve that moves wide or narrow by minimizing the energy of the external image and is also influenced by lines or edges. The segmentation process can be seen in Fig.4 and 5. From Fig.4 and 5, it is known that there are several stages:

In the active contour image process, the initial stage takes the value of n , which is used to initialize the foreground lung section in the segmentation process and is a controlled point that is sequentially from one another. A value of n is used of 500 to select an intact foreground lung. Whereas if the value of n is below 500 lungs, not all of them are selected as foreground.

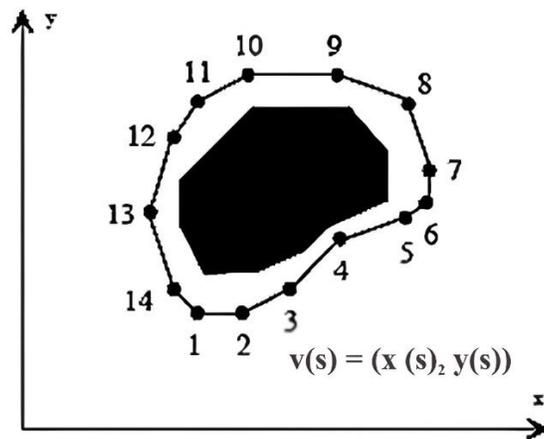


FIGURE 4. Active contour as the controlled point

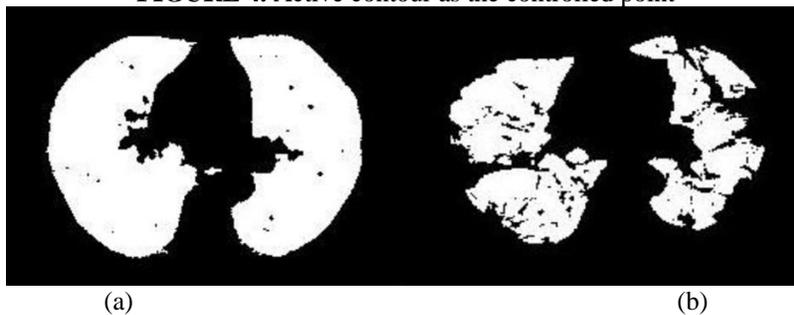


FIGURE 5. The result of active contour segmentation of non-covid (a) and covid (b)

The final stage separates the foreground and background on the lungs using the active contour method. With active contour, part of the lung is selected as the foreground whose image energy has been minimized with a closed curve model, while the part that is not selected is the background part of the lung. With this segmentation, the gray image will be converted into a binary image to know which areas are foreground and background objects.

Feature Extraction

The results of the segmentation image are processed using Gray Level Co-accuracy Matrix (GLCM) feature extraction with an orientation of 0° by looking for the feature values of contrast, dissimilarity, homogeneity, ASM, or energy, and correlation.

1. Energy

Energy or ASM is used to determine the intensity of gray with a measure of the concentration of a particular pair.

$$Energy = \sum_i \sum_j P(ij)^2 \quad (1)$$

2. Contrast

Contrast is a calculation related to the amount of intensity variation in the gray image.

$$Contrast = \sum_i \sum_j (i - j)^2 (Pij) \quad (2)$$

3. Homogeneity

Homogeneity is used to determine the amount of higher grey levels.

$$Homogeneity = \sum_i \sum_j \frac{P(i,j)}{1+|i-j|} \quad (3)$$

4. Correlation

Correlation is a calculation to indicate the linear structure in the image by showing a linear dependence of the gray's degree.

$$Correlation = \sum_i \sum_j \frac{(i-\mu_x)(j-\mu_y)P(i,j)}{\sigma_x \sigma_y} \quad (4)$$

Classification

Classification is a process that provides conclusions to categorize classes. The k-nearest neighbor (K-NN) and Naïve Bayes algorithms are used in this test. K-NN is a simple classification algorithm that stores all conditions and classifies them into new conditions based on the shortest distance. This method is processed on the shortest distance from the query instance to the training data and takes the closest k data. Eucliden distance is one of the calculations to calculate the distance between new and old data.

$$d(x,y) = \sqrt{\sum_{i=1}^n (x_i - y_i)^2} \quad (5)$$

Naïve Bayes is a simple probabilistic classifier that calculates a set of probabilities by calculating certain frequencies and combinations of data. $P(A|B)$ is the probability that event A occurs when event B occurs, $P(A)$ is the probability that event A occurs, $P(B|A)$ is the probability that event B occurs when event A occurs, $P(B)$ is the probability that event B occurs.

$$P(A|B) = \frac{P(A)P(B|A)}{P(B)} \tag{6}$$

There are two classes used in the classification process: non-covid and covid. The classification process uses the Scilab application's help to make it easier to classify the features used. The first stage, Scilab data input, is excel data that contains feature extraction values that have been categorized as class 0 for non-covid and 1 for covid. In the second stage, the extraction value is normalized to change the scale of attribute values to fit within a certain range. This process uses proportion range normalization, where each attribute value is normalized as a proportion of the total number of each attribute, namely the attribute value divided by the total number of attribute values. In the third stage, the normalized data is then separated into testing and training data using a cross-validation operator to estimate the statistical performance of the data used. In the fourth stage, testing and training data are combined with being classified using the K-NN classifier and Naïve Bayes. In the last stage, the classifier obtained results to determine the performance of Covid-19 detection.

Evaluation Method

The results obtained are the results of feature values that have been classified against the training data and testing data that have been combined and classified using the K-NN and Naïve Bayes methods with the algorithm made on Scilab.

Cross-validation

Operators that perform cross-validation to estimate the statistical performance of learning operators are mainly used to estimate how accurate the model is using the K-fold value parameter. The principle of the K-fold is to divide each group of data used for training and testing data into a number of K, where the K-fold values used in this study are 5 and 10. This training and testing data will be input for classification by combining the two data as the structure of the actual and predicted diagnostic procedures.

Confusion Matrix

The confusion matrix is necessary as the general structure of the actual and predicted diagnosis procedure. The table Confusion is explained in Table 1.

TABLE 1. Confusion Matrix

	Actual True	Actual False
Predicted True	True Positive (TP)	False Negative (FN)
Predicted False	False Positive (FP)	True Negative (TN)

- TP = *true positive* (the number of images of covid that have been detected as covid).
- TN = *true negative* (the number of images of non-covid that have been detected as non-covid).
- FP = *false positive* (the number of images of covid that have been detected as non-covid).
- FN = *false negative* (the number of images of non-covid that have been detected as covid).

Performance on the system is calculated based on the following parameters:

1. *True Positif* (TP), *False Positif* (FP), *False Negatif* (FN) dan *True Negatif* (TN)
2. Accuracy

Accuracy is the exactness of a measurement result close to the true value. The accuracy value is calculated using equation (7).

$$Accuracy = \frac{TP+TN}{TP+TN+FP+FN} \times 100 \% \tag{7}$$

3. Sensitivity

The sensitivity indicates the possibility of testing being true by identifying subjects who are indeed detected as infected with COVID. The sensitivity value is calculated using equation (8).

$$Sensitivity = \frac{TP}{TP+FN} \times 100 \% \tag{8}$$

4. Specificity

Specificity indicates the possibility of testing being true by identifying people who are indeed detected as non-covid patients. The specificity value was calculated using equation (9).

$$Specifity = \frac{TN}{TN+FP} \times 100 \% \tag{9}$$

4. Results and Discussion

Feature Extraction

TABLE 2. GLCM Features

	Image	Contrast	Homogeneity	Energy/ASM	Correlation	Class
Feature	1	6.52845747e+01	4.18816589e-01	6.04274327e-02	9.94101842e-01	0
	2	6.40219455e+01	4.18814963e-01	5.97541640e-02	9.94035956e-01	0
	3	6.13606652e+01	4.14571122e-01	5.84586378e-02	9.94244866e-01	0
	4	2.99364954e+02	1.16831756e-01	1.94655938e-02	9.48990658e-01	1
	5	2.63284027e+02	1.19009329e-01	1.96581008e-02	9.53609970e-01	1
	6	2.41351379e+02	1.23131281e-01	1.99601671e-02	9.52971306e-01	1

	255	6.58400806e+01	4.17843689e-01	5.42153085e-02	9.93507846e-01	0
	256	6.63793422e+01	4.09748336e-01	5.41042559e-02	9.93352529e-01	0
	257	6.36394970e+01	4.12465303e-01	4.79797383e-02	9.93772483e-01	0
	258	2.85187466e+02	1.21735465e-01	1.97264972e-02	9.49374562e-01	1
	259	3.12035659e+02	1.19327647e-01	2.00059155e-02	9.45969663e-01	1
	260	2.83695274e+02	1.22746277e-01	1.96053999e-02	9.52102478e-01	1

extraction is the process of finding information from an image. In this research, using GLCM feature extraction, The co-occurrence matrix is formed from four orientation directions, 0°. **TABLE 2** is the result of the feature extraction of GLCM features. The value was obtained based on the calculation using the equation of (1)-(4) on “Feature Extraction” part. This feature value is used as input classification, giving the code 1 for covid and 0 for non-covid class.

From the value of the feature data, it can be seen in the contrast column, or inertia, which states the amount of variation in the gray intensity of the image. The contrast value will be higher if the degree of gray of each pair of pixels is farther away. In the table above, the inertia value for non-covid images is much lower than for covid images. There is a high difference in gray level in the covid image, while non-covid has a gray level almost the same as its neighboring pixels. These matches Figure 2(b), where there are white spots on the Covid chest CT-Scan image compared to Figure 2(a).

The homogeneity value shows the number of similar gray levels in the image. If the pixels are more uniform, the homogeneity value is higher. The table above clearly shows that the value in class 0 gets a higher value than class 1. The calculation results from the algorithm that have been executed are in match the existing theory, where the non-covid image appears clean with lungs full of air without any white spot.

The GLCM results table shows that the correlation has almost the same value in each case, that the non-covid value is > 0.99 and all covid are 0.94 - 0.95. This result is in the match with correlation as a feature that performs calculations to show a dependence of the gray degree measurement to indicate the presence of a linear structure in the image.

Similar to the energy characteristic, called uniformity or ASM, expresses the concentration of pairs with gray intensity in the matrix. Class 0 produces energy extraction with a higher value than class 1, which matches the energy value requirements. Uniformity will get a high value when the image has good homogeneity, or pixel values are almost similar. Because no lesions or haze were seen on the chest CT-Scan image for non-covid cases, the lungs were clear, represented by the same gray color.

From the explanation above, it can be concluded that the value of the calculation results of the GLCM-based feature extraction algorithm on both Covid and non-covid chest CT-Scan images matches the applicable theory.

Classification and Performance Evaluation

After the image data has gone through pre-processing with resizing, RGB to grayscale, edge-aware local contrast or local contrast enhancement, segmentation, and extraction, then dividing the dataset. Classification is done using the k-nearest neighbor (K-NN) and Naïve Bayes algorithm. The evaluation of the classification results, whether the prediction does or does not match with the actual data received from the Universitas Hasanuddin Hospital.

In the research that has been done, Scilab is used to classify data from the results of feature extraction on images done in Python. Each feature has several characteristic values, which will be processed using the K-NN and Naïve Bayes classification methods. This classification method determines two classes: non-covid (0) and covid (1).

Classification is done by dividing the training and testing data using K-fold Cross-Validation with k-fold values of 5 and 7. This method aims to validate the accuracy by predicting models built based on certain datasets and testing the accuracy's stability when using different training and testing data.

From the experiments tested, the values of TP, TN, FP, and FN are the result of the combined value of the training and test data. A high TP value and a low FN value will increase the sensitivity value, while a high TN value and a low FP value will increase the specificity value. In the classification used, the performance at accuracy, sensitivity, and specificity levels obtained high scores. The performance results are presented in the Table 3 below.

TABLE 3. Performance of the GLCM Feature Classification

Method	Number of Fold	TP	TN	FP	FN	Accuracy	Sensitivity	Specificity
K-NN	5	198	61	1	0	99.6%	100%	98.4%
	10	198	61	1	0	99.6%	100%	98.4%
Naïve Bayes	5	182	61	1	16	93.5%	91.9%	98.4%
	10	183	60	1	16	93.5%	92.4%	98.4%

From **TABLE 3**, it can be seen that from the two methods used, K-NN has high accuracy and sensitivity values compared to Naïve Bayes. The highest level of accuracy with a value of 99.6% has the same value on the K-fold parameter used. While the highest level of sensitivity is also obtained in the K-NN method with a value of 100%. Followed by a specificity value of 98.4% for both methods used. With the K-NN classification, it is known that the GLCM feature with k-fold values of 5 and 10 can detect non-covid and covid with good performance. In this test, the K-NN classifier method is more suitable than the Naïve Bayes because some of the features of GLCM are more accommodating to the KNN classifier.

Extraction Method Performance Comparison

TABLE 4. Extraction Method Performance Comparison

No.	Literature	Data Source	Methodology Used	Dataset	Accuracy
1	Ahsan, et al.	Kaggle	NasNet Mobile	400 CT-Scan	82.94%
2	Kadry et. al	LIDC-IDRI and RIDER-TCIA	SVM with FFV	500 images CT-Scan	89.80%
3	Sahinbas and Catak	Github	DenseNet & InceptionV3	140 images X-Ray	90.00%
4	Abraham, et.al.	Kaggle	Multi CNN	77 images X-Ray	80.00.%
5	Hemdan, et al.	Github	COVIDX-Net	50 images X-Ray	97.44%
6	Ameer and Mohammed	Github and Kaggle	GLCM, Gaussian Filter	244 images CT-Scan	94.00%
7	Present Method	Radiology Installation of Hasanuddin University Hospital	GLCM, K-NN&Naïve Bayes	260 images CT-Scan	99.60%

In **TABLE 4**, the results of the tests that have been carried out will be compared with studies from various researchers. Ahsan, Md Manjurul, et al. [12] aimed to detect patients infected from COVID-19 with X-ray or CT scan using NasNetMobile have the highest accuracy 82.94%. Local Interpretable Model-agnostic (LIME) is used in this paper to help in screening and differentiating healthy people from COVID-19 patients by identifying the characteristics or features that help in deep learning models.

Kadry, Seifedine, et al. [13] has proposed MLS (Machine Learning System) for detection of COVID-19 patients using CT scan Slices (CTS). MLS involves Image multi- Thresholding that involves Kapur’s Entropy and Chaotic- Bat- Algorithm (CBA+KE). The image is separated into 2 parts with the chosen threshold. Then features are extracted from the image and to improve the accuracy feature fusion is employed. Using different feature vectors performances of different classifiers including Support Vector Machine using linear kernel (SVM), Random Forest (RF), Decision Tree (DT), Naive Bayes (NB) and k-Nearest Neighbors (KNN) are compared in which the highest accuracy is found to be of SVM with Fused-Feature-Vector (FFV) of 89.80%.

Sahinbas and Catak [14] has proposed a model on COVID- 19 detection.The dataset is obtained from GitHub and is divided into training data set that includes 100 images(50 images for patients who are suffering from COVID-19 and 50 images for healthy people) and testing data set consisting of 40 images (20 images for positive COVID-19 patients and 20 images for negative). The images are resized by scaling to 256x22. Five deep learning CNN models such as DenseNet, ResNet, VGG16, VGG19 and InceptionV3 are discussed. VGG-16 has found to be the best model in terms of performance with an accuracy of 80% whereas ResNet has shown the lowest performance with an accuracy of 50%. The accuracy can be increased in these models by enhancing the dataset by including more images in it.

Abraham, Bejoy, and Madhu S. Nair. [15] have used multi Convolutional Neural Network and Bayesian classifier for the detection of COVID-19. The enhanced performance of Multi CNN is discussed as compared to single CNN. Multi CNN includes many pre-trained CNN for extracting attributes from the X-ray. It is used with the combinaton of Bayesian classifier for detection.Two public datasets are used, one with the more number of images (453 COVID-19 positive images and 497 COVID negative images) and the other with the less number of images (71 COVID-19 images and 7 non-COVID images). Multi CNN achieved an accuracy of 91.16% wit the first dataset and an accuracy of 97.44% of accuracy with the second dataset.

Hemdan, Ezz El-Din, et al. [16] has proposed a model COVIDX-Net for the detection of SARS-COV-2 with the X- ray images. The public dataset is used which is divided into 2 classes including positive COVID-19 cases and negative normal cases and consist of 50 images. Dataset is divided into training and testing phase in which 80% i.e, 40 images are used in the training phase. For experimental

setup, all images were scaled to 224×224 pixels in size. The COVIDX-Net framework includes seven models of deep learning that are compared including InceptionResNetV2, Xception, ResNetV2, MobilenetV2, VGG19, InceptionV3, and DenseNet121 are compared in which VGG19 and DenseNet201 models are found to have the best performance with the accuracy of 90% whereas InceptionV3 is found to have worst accuracy of 50%. Furthermore, Aseel Qasim and Raghad obtained an accuracy of 94% using GLCM as image extraction and Gaussian filter as a classifier [17].

By using the method tested in this research, it is known that the accuracy value is higher than previous studies, with a value of 99.6% for K-NN and 93.5 for Naïve Bayes. This is because the amount of data used is more, the stages of the method used are different, such as preprocessing the dataset first, such as resizing, RGB to grayscale, local contrast enhancement, and segmentation. Not only that, before classifying the feature data, it is normalized to change the scale of attribute values to fit within a certain range. From the studies that have been carried out, of course, it is possible that some suitable features can be used to accommodate the classifier to produce good performance. So, the steps to produce the value of feature features must be with the right selection to improve the resulting performance.

III. CONCLUSION

Based on the results of the GLCM extraction with various features used, it shows that the extracted image produces good values and the classification of COVID-19 and non-COVID-19 using the K-NN and Naïve Bayes methods show very good performance results with an accuracy performance of 99.6 % and 93.5% in analyzing Covid-19 and non-Covid-19 images. The algorithms and approaches utilized in this system, particularly in the feature extraction stage, are simple and utilize less memory. It is easy to understand and involves no complicated mathematical formulas. The system's ability can be increased by using additional characteristics in the input dataset. Time-consuming for executing all steps in the proposed system is less than two seconds. Determine whether there is a COVID-19 or not, as well as in order facilitate the doctor's work in the diagnosis and alert if nothing is noticed in the picture. The filters were used to filter CT scan images, mostly snouted due to the patient's movement or the device picked up poorly.

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AUTHORS

First Author – Rezky Rachmadany Rachman, Student of Magister Physics, Mathematics and Science Faculty, Hasanuddin University, Indonesia, kikirezkyrr@gmail.com

Second Author – Syamsir Dewang, Medical Physics Laboratory, Physics Department of FMIPA, Hasanuddin University, Indonesia, dewang1163@gmail.com

Third Author – Sri Dewi Astuty, Medical Physics Laboratory, Physics Department of FMIPA, Hasanuddin University, Indonesia

Fourth Author – Eko Juarlin, Theory and Computing Laboratory, Physics Department of FMIPA, Hasanuddin University, Indonesia

Extend of satisfaction of people who wearing Smile Hollywood-veneers

Akram Kharir Saleh Edkheil *, Khaled Elgergeni **, Abdurraouf Muktar Taboun *

* phd. candidate
** phd

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Abstract- With a beautiful smile, one can convey to be pleasant, attractive, likeable and confident. As believed that people who are attractive are more likely to get good jobs, life partners, experience a happy and fulfilling life Rodrigues,

Aim and objective.

The purpose of this research paper is to evaluate the population knowledge about using Hollywood veneer.

Material and methods

This research paper relied on the distribution of questionnaires via the Internet (Google.doc), The study was designed on a questionnaire that includes many questions focused on the success of Snap-On after wearied by patient. The questions were selected in a way that facilitates the identification of the patient's acceptance of the Snap-on.

Result

This research paper showed that, female more interest to wear Snap-On rather than male. The percentage was (64.6%), (35.4%) respectively. The young people tend to were the Snap-On more than elderly people, which was (68%) in age from 20 to 30 years old, (18%) in age from 31-40 years old, 12.5% of people in age 41-50, and in age over 50 the percentage was very low (2.2%). The majority of people residing in the western region who wear the restoration so that, the proportion was(77.3 %), On the other hand, the use of the restoration is less in the the Snap-On was to improve the esthetic, which was (35.2%), followed by distortion of teeth was (30.1%). However, the missing teeth come in the last reason, which was (15.3%). This research paper presented that, most patients followed the dentist's instruction at home after wear the restoration (83.8%), on the other hand (16.2%) of patient do not follow the instruction. Regarding the question, the period during which the color of the restoration changed, the answer was close between changing its color after a year or more and changing it from six months to a year, which were (38.8%, 36.9%) respectively. However, the restoration showed that its color does not change in the period from one to six months, so that the percentage was (24.3%). (90.6%) of patients in this study felt a significant improvement in the aesthetic appearance after wearing the restoration, while (9.4%) responded that the aesthetic appearance did not improve. This research paper showed that the majority of patients do not suffer from bad breath after wearing the composition, their percentage was (63.6%). As for the patients

who suffered from emitting a foul smell in the mouth, it was (36.4%). This study showed that the highest percentage of patients, which was (84.4%) did not suffer from the fall of the structure while speaking, and (15.6%) , only suffered from the fall during the speech. (75.6%) of the patients did not suffer from any inflammation or eastern and southern regions, which were (12.5%, 10.2%) respectively.

The main reason for wearing the Snap-On was to improve the esthetic, which was (35.2%), followed by distortion of teeth was (30.1%). However, the missing teeth come in the last reason, which was (15.3%). This study presented that, most patients followed the dentist's instruction at home after wear the restoration (83.8%), on the other hand (16.2%) of patient do not follow the instruction. This research paper showed that, the main reason for wearing sensitivity of the gingiva during the period of wearing the restoration, as this research paper showed, but (24.4%) their answer was that they were exposed to some inflammation and sensitivity in the gingiva. (69.9%) of patients the restoration continued with them without being broken, but (30.1%) the formula broke from them.

Conclusion

It can concluded that, the Snap-On more interested in west region more than people lived in other region. In addition, most patients satisfied with wearing this kind of restoration.

I. INTRODUCTION

With a beautiful smile, one can convey to be pleasant, attractive, likeable and confident. As believed that people who are attractive are more likely to get good jobs, life partners, experience a happy and fulfilling life (Rodrigues), C. D, et al., (2009). Such societal expectations start from childhood and lasts a lifetime. A perfect dazzling smile could enhance the self-esteem of a person and helps to affect people personally and professionally Cold stein, R.E. (1969). With the help of social media, television and fashion magazine, many of the people are aware of the aesthetic smile or aesthetic dentistry.

The present young generation give more significance to the overall appearance and the key role of a beautiful smile is undeniable Golub-Evans, J. (1994). The aesthetic dentistry treatment planning may include a wide variety of dental disciplines like endodontic, orthodontics, periodontics

prosthodontics, and restorative modalities Morley, J. (1999). Females are more cautious about their physical appearance when compared to males, especially regarding their dental appearance Dion, K, et al., (1972).

According to the World Health Organization, oral health is often inter-twisted with the general health that determines the quality of life of a person and a good oral health reduces mortality. Increasing the overall health of the patient by managing the oral health is the moral of dentistry Bull, R., & Rumsey, N. (2012). The teeth framed by lips, contoured by gingiva and number of spaces and gaps define the smile aesthetics. The harmony veneer restorations with a more conservative preparation for the tooth structure were proposed as an alternative anterior aesthetic restoration. The success of laminate veneers relies primarily on proper tooth reduction with the aim of providing sufficient space for the fabrication of properly contoured ceramic veneers without over reduction of the tooth structure . The laminate veneers give a beautiful appearance to the teeth, they became highly required from many people in different ages because they have been more aware that the attractive smile can have a positive effect on self-confidence and give a good impression to others about the person himself.

Laminate veneers have been a common treatment strategy in dental clinics, resin composite veneers can be used to cover tooth discolorations and/or to correct unaesthetic tooth forms and/or positions. However, such restorations still suffer from a limited durability, because resin composites remain liable to discoloration, wear and marginal fractures reducing by this means the aesthetic results in the long term.

In order to achieve durable aesthetics, ceramic veneers have been suggested to be durable anterior restorations with superior aesthetics. The ceramic laminate veneer technique includes bonding of a thin ceramic laminate to the tooth surface using adhesive luting composite in order to change the color, form and/or position of anterior teeth. Ceramic laminate veneers are steadily increasing in popularity among today's dental practitioners due to stable aesthetic, excellent biocompatibility and minimum destructive technique. Laminates can be used to mask and symmetry of the aesthetic smile is determined by the gingival exposure at smiling, arc of smile, teeth proportions, mid-line shift, axial inclination change, buccal corridors, gingival contours and height, Diastema, and teeth color Schabel, B. J., et al., (2009). For several decades, the most predictable aesthetic restoration of anterior teeth has been achieved with full crowns, yet, full coverage restorations remains to be the most invasive to the remaining sound tooth structure with adverse effects on the pulp and periodontal tissues. Therefore, laminate tooth discolorations, alter contours of malformed tooth and teeth with improper positions, also it can close interproximal spaces and diastema (Joiner et al., 2004). With the advancement of aesthetic medicine in recent decades, new doors have opened in various fields related to it, including cosmetic dentistry, and perhaps getting whiter teeth and smile similar to the smiles of celebrities represented a goat the many aspired to achieve.

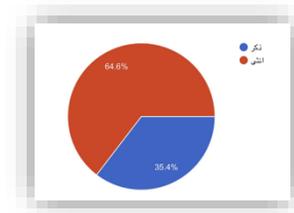
Which is what medical progress gave them on plate of gold. Getting perfect teeth is no longer an impossible process, but there are many procedures that can be 2. The prevalence of wearing the restoration in the geographical area of Libya,

3. The mean reasons for wearing the restoration
4. Follow the dentist's instructions at home
5. The period when the color of the Snap-on changed
6. How much improvement in the aesthetic appearance after wearing it
7. The extent to which it causes bad odor from the mouth,
8. The ability to speak without fallen while wearing it.
9. Infections or sensitivity of gingival may cause by wearing the restoration.
10. The restoration is not subjected to breakage during the period of wearing

All the previous questions were filled out by (183) patients who used the Snap-on via google.Doc, and due to the lack of wearers, it was supported by a paid advertisement in order to get the largest number of answers from different regions of Libya.

II. RESULT & DISCUSSION

This study showed that, female more interest to wear Snap-On rather than male. The percentage was (64.6%), (35.4%) respectively.



The young people tend to wear the Snap-On more than elderly people, the percentage of people wear the Snap-resorted to reach that including teeth whitening, orthodontics and veneers. Generally, the traditional fixed veneer is the most popular, which, consists of an outer shell of the teeth, usually made of ceramic, and sometimes of plastic or resin, and placed on the front side of the teeth, to obtain a perfect smile and flawless teeth .

On the other hand, movable veneer, it consists of an artificial dental mode of plastic or resin. And it is designed according to the size of a person's teeth, and is used temporarily to hid dental defects and obtain a natural smile. In general, veneer, both fixed and mobile, however, the mobile veneers are the last options that dentists resort to, as it is difficult to use it for a long time, and it may be negatively affected by some kind of drink.

III. AIM AND OBJECTIVE

The purpose of this research paper was to evaluate the population knowledge about using Hollywood veneer, and the extent of satisfaction of the people who wear the snap-on in Libya.

IV. MATERIAL AND METHODS

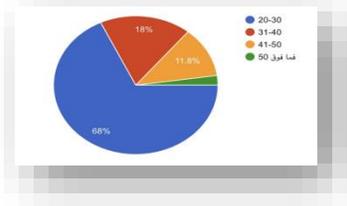
This research paper relied on the distribution of questionnaires via the Internet (Google.doc), and, the questionnaire was published on the pages of dental clinics around Libya, and after a month, the results were collected according to their analysis by (google.Doc).

The research paper was designed on a questionnaire that includes many questions focused on the success of Snap-On after wearied by patient. The questions were selected in a way that

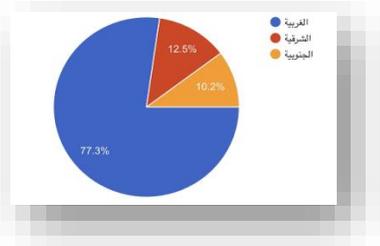
facilitates the identification of the patient's acceptance of the Snap-on. In this study had chose the most important questions from the questionnaire that give the desired results for this study. And the questions were,

1. Age and sex people wearing the restoration

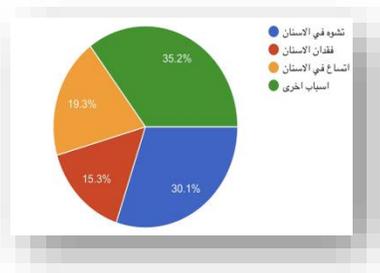
On decrease with age. Which was (68%) in age from 20 to 30 years old, (18%) in age from 31-40 years old, 12.5% of people in age 41-50, and in age over 50 the percentage was very low (2.2%).



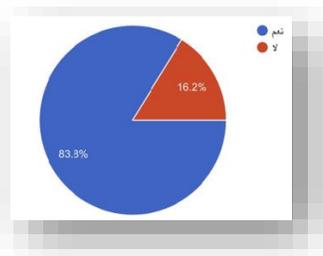
This study appeared that, the majority of people residing in the western region who wear the restoration so that, the proportion was (77.3 %), On the other hand, the use of the restoration is less in the eastern and southern regions, which were (12.5%, 10.2%) respectively.



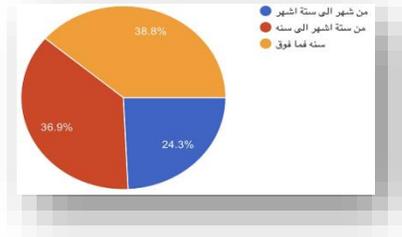
This study showed that, the main reason for wearing the Snap-On was to improve the esthetic, which was (35.2%), followed by distortion of teeth was (30.1%). However, the missing teeth come in the last reason, which was (15.3%).



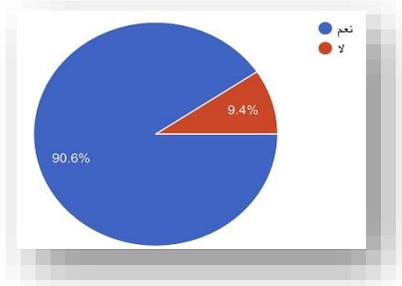
This study presented that, most patients followed the dentist's instruction at home after wear the restoration (83.8%), on the other hand (16.2%) of patient do not follow the instruction.



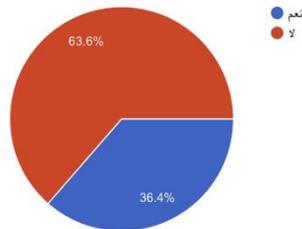
Regarding the question, the period during which the color of the restoration changed, the answer was close between changing its color after a year or more and changing it from six months to a year, which were (38.8%, 36.9%) respectively. However, the restoration showed that its color does not change in the period from one to six months, so that the percentage was (24.3%).



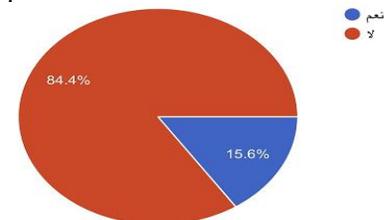
(90.6%) of patients in this study felt a significant improvement in the aesthetic appearance after wearing the restoration, while (9.4%) responded that the aesthetic appearance did not improve.



This study showed that the majority of patients do not suffer from bad breath after wearing the composition, their percentage was (63.6%). As for the patients who suffered from emitting a foul smell in the mouth, it was (36.4%).

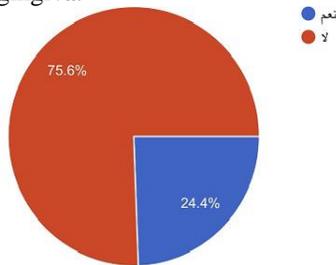


This study showed that the highest percentage of patients, which was (84.4%) did not suffer from the fall of the structure while speaking, and (15.6%) only suffered from the fall during the speech.

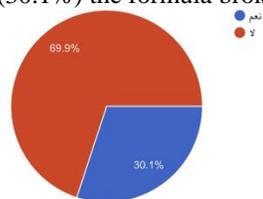


Identify the constructs of a Journal – Essentially a journal consists of five major sections. The number of pages may vary depending upon the topic of research work but generally comprises up to 5 to 7 pages. These are:

(75.6%) of the patients did not suffer from any inflammation or sensitivity of the gingiva during the period of wearing the restoration, as this study showed, but (24.4%) their answer was that they were exposed to some inflammation and sensitivity in the gingiva.



This study appeared that (69.9%) of patients the restoration continued with them without being broken, but (30.1%) the formula broke from them.



V. DISCUSSION

Snap on Smile can create a person's image and also inspire his self-confidence. In the present times, the people are more concerned about their looks and appearances Ritter, D, et al., (2006). For a dazzling, beautiful and youthful smile the patients depend on their dentist. In recent age, a paradigm shift has been seen in the field of dentistry.

The patient is ready to undergo surgery or anything that takes to get an aesthetic pleasant smile Pithon, M et al., (2013). The patient seems to be satisfied seeing the change when they look in the mirror, that creates a renowned confidence in them. This study appeared low percentage of Libya looking for Snap-On smile according to respondents to study's questionnaire.

This study showed that (90.6%) of patients in this study felt a significant improvement in the aesthetic appearance after wearing the restoration, while (9.4%) responded that the aesthetic appearance did not improve. There occur a strong association between smile and the facial more attractive in the photograph than the individual with no aesthetic smile.

The Snap on Smile depends on the face shape, placement pattern, buccal corridors, tooth shape, tooth size, tooth position and tooth colour. The influence is made on the smile by the presence or absence of buccal corridors Richards, M, et al., (2015). Ritter et al.

Ritter, D, et al., (2006) Reported in his study that the aesthetic smile is not effected in the photograph by the negative spaces. Tjan et al.,(1998) in his study classified smile as high smile, average smile and low smile depending on the gingival display. Grososky et al., (2003) reported in his study that white teeth didn't positively affect the attractiveness. Beall et al.,(2003) whereas reported that smile had an impact on the attractiveness of individuals.

Another study showed that a white and bright smile had a positive impact on the smile of a person Smile, Makeover. (2018), and Snow, S.R. (1999).

This study appeared that, the period during which the color of the restoration changed, the answer was close between changing its color after a year or more and changing it from six months to a year, which were (38.8%, 36.9%) respectively. However, the restoration showed that its color does not change in the period from one to six months, so that the percentage was (24.3%).

This result agreed with the literature, Alanazi et al (2020) reported that, The Durability of Snap on Smile is less when compared with Veneer and Dental Implants; that is about 2 to 5 years only. The Snap on Smile may not look like the natural teeth as there may be missing gaps between the teeth, the Veneer and Dental Implants looks more natural when compared with the Snap on Smile. Snap on Smile can give a fake smile, easily predictable by anyone. Unlike Veneer and Dental Implants; Snap on Smile directly fits over the natural teeth and hence may appear bulky. There is an increased risk of decay and development of plaque when compared with Veneer and Dental Implants.

attractiveness. The individuals with aesthetic smile appear

VI. CONCLUSION

Even the number and rependet were very low which was 180 responded around Libya cities it concluded than It can concluded that, the Snap-On more interested in west region more than people lived in other region. In addition, most patients satisfied with wearing this kind of restoration

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AUTHORS

First Author – AKRAM KHARIR SALEH EDKHEIL phd. candidate

Second Author – Khaled Elgergeni phd

Third Author – Abdurraouf Muktar Taboun phd candidate