

**Challenges For Biometric Attendance Systems Implementation At National Housing
Corporation**

In Dar Es Salaam-Tanzania

By

Mussa Patrick Kamendu

Supervised by Dr. Thadei Kiwango

**A Research Proposal Submitted for Partial Fulfillment of the Requirements for the
Award of Master's Degree in Information Security (MIS) of the Institute of Accountancy
Arusha.**

DECLARATION

I, **Mussa Patrick Kamendu**, declare that this research proposal is my original work and that it has not been presented and will not be presented to any university for a similar or any other degree award.

Signature.....

Date.....

CERTIFICATION

I, the undersigned certify that I have read and hereby recommend for acceptance by Institute of Accountancy the dissertation entitled: analysis on challenges for biometric attendance systems implementation in national house corporation (NHC) in Dar es salaam-Tanzania in fulfillment of the requirements for the degree of Masters in Information Security (MIS) of the Institute of Accountancy Arusha

.....

Dr. Thadei Kiwango

(Supervisor)

Date

ACKNOWLEDGEMENT

I sincerely thank God for His mercy and power that He granted me during my studies and during this proposal writing, I would like to express my heartfelt appreciation to my supervisor Dr. Thadeo Kiwango for his guidance and patience during my Research Proposal writing. Further, I express my gratitude to my family, teachers and fellow-students for their cooperation during my studies. May God bless them all for their material and moral support during my proposal writing.

ABSTRACT

The study assessed the challenges of biometric attendance systems implementation in public sectors in Tanzania, a case of National Housing Corporation (NHC).. The sample 205 employees sampled from total of 431 NHC employees. The study used case survey research design and quantitative research approach in meeting the study objectives. Random sampling technique was used to select sample for the study. Data were collected using interview and structured questionnaires and were analyzed through descriptive statistics and correlation analysis with the aid of SPSS version 22. The study concludes that technological factor affects much the implementation of biometric attendance system at NHC. The findings further concluded that electricity/power supply also influence or affects biometric attendance system implementation at NHC with the mean score of $M=3.80$ and $S. D=0.495$. The findings imply that Electricity/power supply affects biometric attendance system implementation at and can affects the whole process of employee's attendance. In the second objective, the study concluded that environmental factors affects the biometric attendance system implementation at NHC. This seriously guarantees that the Biometrics fingerprint system is easy to use as the most employees. The findings imply that these factors that affect the adoption and implementation of biometric attending system like fingerprint, iris-biometric and facial recognition which are caused by changes in political system, national policies, political ideologies and legal aspects. This could mean that these employees would prefer to use other Biometric features rather than using the biometric fingerprint or they don't trust fingerprints for security verification. This seriously guarantees that Biometrics fingerprints as security management measure are the most preferred feature to be used by employees as the most employees. In the last objective, the study concluded that organizational factors affects or influence biometric attendance system implementation at NHC. The findings imply that these includes all factors affecting the implementation of biometric attendance system which are born by the organization itself

including organization structure, organizational communications, degree of leadership support for the change, organization teamwork and organizational culture. It is recommended that, NHC should continue providing training to its workers on the use of biometric. Like with any other technology that people are unfamiliar with, training is a necessity when the system is introduced for the first time. when users are supported and trained during their first time use of the biometrics authentication system, this can create an interest to use the system. NHC staffs should be ready to accept new technology. New technology can be unpredictable and can create possible negative impacts. People tend to use or not use a system until they believe it will help them improve on their job performance or on other hand to perceived usefulness. Leaders at NHC should be the first pioneer to use biometric in order for followers to follow them. During the time in and time out, leaders should show examples by action

Table of Contents

DECLARATION	i
CERTIFICATION	ii
ACKNOWLEDGEMENT.....	iii
ABSTRACT	v
Table of Contents	vii
List of Tables	xi
List of abbreviations.....	xiii
CHAPTER ONE	1
GENERAL INTRODUCTION.....	1
1.1 Introduction.....	1
1.2 Background of the Problem	1
1.3 Statement of the problem	4
1.4 Objective of the study	5
1.4.1 Main objective.....	5
1.4.2 Specific objectives	5

1.5 Research questions.....	5
1.6 Significance of the study.....	6
1.7 Scope of the study.....	6
1.8 Limitations of the study.....	7
1.9 Organization of the study.....	7
CHAPTER TWO.....	8
LITERATURE REVIEW.....	8
2.1 Introduction.....	8
2.2 Definition of key terms.....	8
2.2.1 Attendance management.....	8
2.2.2 Biometrics.....	9
2.2.3 Biometric attendance system.....	9
2.2.4 The manual attendance system.....	9
2.2.5 Fingerprint Sensor Biometric.....	10
2.3 Theoretical literature review.....	10
2.3.1 The technology-organization-environment framework (TOE).....	10
2.3.2 Technological acceptance model.....	13
2.4 Empirical studies.....	14
2.4.1 Technological challenging factors for biometric implementation.....	14
2.4.2 Environmental challenging factors for biometric implementation.....	18
2.4.3 Organizational challenging factors for biometric implementation.....	19
2.5 Summary of literature review and research gap.....	20

2.6 Conceptual framework.....	22
Source: Researcher, 2022.....	23
2.6.1 Technological factors.....	23
2.6.2 Organizational factors.....	23
2.6.3 Environmental.....	23
CHAPTER THREE	23
RESEARCH METHODOLOGY	23
3.1 Introduction.....	23
3.2 Research Design.....	24
3.3 Research Approach.....	24
3.4 Study Area.....	24
3.4 Population, Sampling procedures and Sample size.....	25
3.4.1 Study population.....	25
3.4.2 Sampling procedures.....	25
3.4.3 Sample Size.....	26
3.5 Data collection methods.....	28
3.5.1 Questionnaire.....	28
3.5.2 Interviews.....	29
3.6 Validity and Reliability.....	30
.9.1 Validity.....	30
3.7 Data analysis.....	31
3.8 Ethical issues.....	31

CHAPTER FOUR	32
PRESENTATION AND DISCUSSION OF FINDINGS	32
4.1 Introduction.....	32
4.2 General Information of the Respondents.....	32
4.2.1 Age analysis	32
4.2.2. Gender Analysis	33
4.2.3 Education Level	34
Source, Research Findings (2022)	34
4.2.4 Working experience	34
Source, Research Findings (2022)	35
4.3 Test of Reliability and Validity	35
4.3.1 Reliability Test	36
4.3.2 Validity Test	36
Table 4.6: KMO and Bartlett's Test.....	37
4.3.1 The technological challenges for biometric attendance system implementation at NHC	37
In the interview, one of respondent said;	44
In the interview, one of respondent said;	45
In the interview, one of respondent said;	46
CHAPTER FIVE	50
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.....	50

5.1 Introduction	50
5.2 Conclusion of the study	51
5.4 Recommendations of the Study.....	52
REFERENCES	53
APPENDICES	58
Appendix I: Research Questionnaire	58
Appendix II: Interview Guide	65
Appendix III: Research Budget	67
Appendix IV: Research Time Schedule	69

List of Tables

Table 3.1: population sampling.....	22
-------------------------------------	----

List of abbreviations

ATM	Automatic Teller Machine
ID	Identity Card
ISP	Internet Service Provider
NHC	National Housing Corporation
NGO	Non-Government Organization
OSS	Open Source Software
TOE	Technology Organization Environment Framework

CHAPTER ONE

GENERAL INTRODUCTION

1.1 Introduction

This chapter introduces the research problem, its roots, the study objectives, and the research questions, how the study will be organized (in chapters) and its significance to different people, organizations and ministries depending on required needs. Problem backgrounds dig in dip on how the problem emerged and its global, regional and national impacts. Statement of the problems shows the problem to be solved and how different researchers tried to solve it and how did they fail and establish the gap seen by the researcher

1.2 Background of the Problem

Before the invention of biometrics, different organizations used manual system to attend their customers and employees. This involved each employee signing in a logbook. The manual attendance system was exposed to the risk of being manipulated by the employees and increases the laziness at work and the overall unproductiveness of the many organizations at large (Mir et al, 2018). According to Kirmani (2017) manual attendance system allows for the impersonation and the attendance book can easily be stolen or lost. In addition, the manual system made the monitoring of the employee's attendance difficulties evidenced through the poor tracking practices of employees' attendance records and hence it reduces efficiency in the organizations.

Many organizations both public and private organizations applied the use of biometric attendance system to replace the manual system due to various advantages offered by this system. The biometric attendance system helped in eliminating employee's time theft and

increases productivity which in turn increases raise profits while minimizing labor costs. The use of biometric attendance system is more conveniently in term of time consuming for the employees and the ones who are monitoring the attendance compared to the use of manual practice. It also helps in provision of the accurate labor data to payroll system and hence it enhances the work culture and the overall efficiency in the organization (Mir et al, 2018).

Biometric technology has gained much popularity in the market for both public owned organizations and private organizations. This has been attributed by the needs of these organizations especially on the security issues and attendance monitoring purposes (Mandari & Koloseni, 2016). The use of biometric technology on attendance monitoring purposes have been mostly applied in educational institutions, in industries, in airports, borders, Automated Teller Machines (ATM) for authentication, in jail management to maintain the criminal attendance and records and other work places (Bais et al., 2016; Mandari & Koloseni, 2016).

Globally, biometrics are employed in a wide variety of domains. According to a 2018 report by German and Barber from the Center of Identity, University of Texas at Austin, and the global top three sectors which embrace biometric methods are financial services, technology, and government. This is followed by the workplace, recreation, and healthcare and with the least usage in the education domain. In financial services and technology domains, a person can use a mobile wallet to purchase goods. This is because most of the current mobile phones are integrated with a biometric scanner. By adding a credit card to a mobile wallet, payment for in store or web purchase can be done through Apple Pay or Samsung Pay. In Apple Pay, Face ID or Touch ID is used while Samsung Pay utilized the fingerprint or iris for authentication. In addition, the banking industries are also adopting biometric measures to authenticate their customers at ATMs. For instance, almost 90% of the ATMs globally are installed with "Know-Your Customer" facial recognition technology.

Biometric attendance systems has been globally applied to the great extent by various organizations in management of the employee's attendances through maintaining attendance records of people in an institution or an organization (Bais et al., 2016). The ease of operation and the individual identification of employees has popularized the technology which attracted many organizations to apply the system (Ahmad et al, (2012). The biometric technology has been designed with the ability of recognizing people's unique physiological and behavioral characteristics and hence it can be applied in monitoring the employee's attendance efficiently (Mir et al, 2018).

In Africa, biometric technology came as late as 2000's when technology took its pre-maturity stage. Biometric systems started to rely on measurable physiological or behavioral characteristics that can be utilized to identify or verify the identity of an individual (Hoo & Ibrahim, 2019). Physiological-based biometric systems include fingerprints, retina, iris, hand geometry, hand vein, ear shape and facial recognition systems (Hoo & Ibrahim, 2019). On the other hand, the behavioral biometric characteristics traits were acquired and learned, which later stabilized over a period of time such as voice recognition, keystroke dynamics, signature verification and gait analysis (Ahmad et al, 2012). According to Dey et al (2014) the biometric attendance system was initial applied through the use of fingerprint or face image/video.

In Tanzania, the introduction of biometric attendance systems can be traced back from 2005's where law enforcement agencies applied the systems purposed for identifying criminals through fingerprint recognition (Ahmad et al, (2012). The organizations or companies in Tanzania are feeding the biometric data of their employees into the devices and then this data is used as the reference for authenticating the right employee for making attendances on the device. Though this system, the attendances of employees can be monitored electronically on real time basis

or can be retrieved at the agreed specific time (Said et al, 2014). Basically, the system has replaced the manual attendance system used by various organizations previously.

1.3 Statement of the problem

The implementation of a biometric attendance system is one method to address the management of employees to confirm attendance and ensure the effective delivery of services (Cupido, 2011). With rise of globalization, it is becoming essential to find the easier and more effective system to help an organization to improve their employee productivity and efficiency. Employee attendance management system is an easy way to keep track on attendance of staff within Organization. (Rghu and Agrawal, 2016).

Managing and monitoring attendance of employees is very important aspect for smooth functioning of any public or private organization. To obtain and maintain the attendance of employees in an organization has become a challenging aspect to deal with due to the presence of some employees who are taking liberties in response to the environment they are working in (Mir et al, 2018). In order to avoid human bias and direct human intervention, different public organizations have implemented biometric attendance system to record employees' attendance on daily basis (Liyanage & Liyanage., 2018).

Basically, various studies conducted on the biometric attendance systems agreed that the system helps the organizations or companies to monitor the employees' attendance effectively and efficiently (Kirmani, 2017). The main objective of public sector in Tanzania to attend to its employees is to maximize productivity and increase employee's relation (Morosan, 2016). Despite the efforts to reinforce the use of biometrics attendance system to track the employee' attendance, many employees' in Tanzania perceive its adoption negatively (Cupido, 2011).

This provide the good reason for conducting this study so as to assess the challenges pertaining the implementation of biometrics attendance system in Tanzania.

1.4 Objective of the study

1.4.1 Main objective

To assess the challenges of biometric attendance systems implementation in public sectors in Tanzania, a case of National Housing Corporation (NHC).

1.4.2 Specific objectives

- i. To examine technological challenges for biometric attendance system implementation at NHC
- ii. To assess environmental challenges for biometric attendance system implementation at NHC
- iii. To examine organizational challenges in biometric attendance system implementation at NHC

1.5 Research questions.

- i. What are technological challenges affect biometric attendance system implementation at NHC?
- ii. What are environmental challenges affect biometric attendance system implementation at NHC?
- iii. What are organizational factors affect biometric attendance system implementation at NHC?

1.6 Significance of the study

The findings of this study will be very useful to various stakeholders such as public organizations, private organizations, non – Government Organizations (NGO) and others to explore on the various ways of capitalizing the implementation of biometric attendance systems in their organizations. The findings will provide the alert to the other organizations which are not yet implemented the biometric attendance systems in their organizations to work out on those issues and challenges for the successfulness implementation of biometric attendance systems.

The findings from this study will specifically provide the inputs to the management of NHC and other organizations on how to successful work out on the challenges identified which are resulted from the implementation of biometric attendance system. This will help the management and the employees in general to come with the practical improvement so as to benefits with the biometric attendance system implementation in the corporation.

The findings from the study will suffice the existing literature gaps regarding the adoption and challenges of the biometrics attendance systems in Tanzania. Following this, the study will be applied by academicians and researchers as the useful reference in conduction of other studies by using the findings that will be explored from this study.

1.7 Scope of the study

The scope of the study is to assess the biometric attendance systems implementation in Tanzania. The study targeted the assessment of issues and challenges that the public sectors are experiencing following the implementation of the biometric attendance systems in their organizations. This was achieved by using the case of NHC which is one of the public organizations charged with the responsibilities of provision of housing and other buildings to the general public on sound commercial principles (NHC Strategic plan, 2016). NHC was a good

representative of public organizations mainly because the organization is the leading real estate developer in the country.

In undertaking this study at NHC, the researcher contacted NHC staff who are directly involve in monitoring of the attendance records such as IT staff, Administration and Human resources department. On the other hand, the study will include NHC staff who are working in Dar es Salaam in all six offices which include Ilala, Temeke, Kinondoni, Upanga, Metropolitan and Dar es Salaam office. Basically, this was done through employing of the survey approach to make sure that the targeted sample were reached and answers to the research problem are provided.

1.8 Limitations of the study

The ideal attempt is to conduct the survey to all public organizations so as to come out with the deep understanding on associated issues and challenges of biometric attendance systems implementation in the country. This cannot be achieved from this study due to the time and financial constraints. In making sure that the study is achieving its intended objectives, the researcher will use the case of National Housing Corporation as the one of the reputable public organization in the country. Practically, the use of one organization which is NHC and leaving out other public organizations unattended limit the generalization of the findings from this study to all public organizations in the country.

On the other hand, the study is facing with the limited literature revenue on the assessment of biometric attendance systems implementation in the country.

1.9 Organization of the study

The report was organized in three chapters. Chapter one provided the introduction, which consists of background to the problem, statement of problem, research objectives, and research questions, significance of the study and scope of the study. Chapter two presented the review

of related literature on the challenges of biometric attendance systems implementation in public sectors in Tanzania, covering such aspects as theoretical framework, empirical part and conceptual framework. Chapter three described the methodology employed in the study, chapter four discusses findings of the results and the last chapter of this report made a conclusion and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter provides the literatures review from different studies in order to capture ideas which guided the development of this study. It is based on theoretical literatures, empirical literatures from earlier studies and conceptual framework of the study. Literature Review is an account of what has been published on a topic by accredited scholars and researchers (Taylor, 2017). In this chapter reviews studies associated with challenges of implementing biometrics in public sector in Tanzania. A huge focus on the concepts, definition, theoretical, empirical literature review, conceptual frame work and the research gap.

2.2 Definition of key terms

2.2.1 Attendance management

Attendance management is an act of managing attendance or presence in a working setting so as to minimize loss due to employee downtime. Attendance management is applied for various purposes which include record keeping, overtime payments and promotions (ArunPrasad et al., 2017).

2.2.2 Biometrics

Biometrics is the Greek word which comprises with two words which is 'bio' and 'metrics'. The word 'bio' means 'life' and the word 'metrics' means 'measurement'. The biometric system is the system that is using the specific physiological or behavioural characteristics to identify the individuality. Physiological characteristics include hand, fingers, facial, gait, palm geometry and iris whereas behavioural characteristics are traits that are learned or acquired like dynamic signature verification, voice verification and keystroke dynamics.

2.2.3 Biometric attendance system

This is the biometric system that has been adopted purposively for monitoring employee's attendance or any other individual's attendance (Mir et al, 2018). Biometric attendance systems has been applied to the great extent by various organizations in management of the employee's attendances through maintaining attendance records of their employees in an institution or an organization (Bais et al., 2016). The application of biometric attendance system removes the bias and human intervention and hence it more effective and efficient than the manual attendance system.

2.2.4 The manual attendance system

This is the attendance system which is managed traditionally through registers whereby individuals mark their attendance upon arrival in the office or premises of work. The manual attendance system use sheets of paper or books in recording attendance. The challenges associated with manual attendance system include difficult in supervision and intensive human intervention.

2.2.5 Fingerprint Sensor Biometric

Fingerprint sensor is an electronic device used to capture a digital image of the fingerprint pattern (Cappelli et al., 2016). The captured image is called a live scan. This live scan is digitally processed to create a biometric template (a collection of extracted minutiae points) which is stored and used for matching. Minutiae are defined as the pattern created and the uniqueness of how ridges end, split and join, or appear as a simple dot. The Minutiae consists of bifurcations, ridge dots, ridge endings and enclosures, to ensure further uniqueness, the minutiae are further broken down into sub minutiae such as pores, crossovers, deltas. The pores are tiny depressions within the ridge on a fingerprint; the crossover creates an X pattern within the ridge of a fingerprint and deltas create a triangle shaped pattern within the ridge of a fingerprint. Identification in a fingerprint technology exists when an individual fingerprint is compared against a known source called the fingerprint template (Chirillo & Scott, 2017). Fingerprint sensors are very intricate and continue to grow more complicated. They are becoming a vital part of the transformation to a more technologically integrated society. Current fingerprint technologies are generally susceptible to acquiring poor quality images due to different skin conditions and environmental effects. These poor quality images adversely affect the ability to accurately determine a person's identity. Poor fingerprint image can be enhanced through several stages of enhancement (Wayman et al., 2015).

2.3 Theoretical literature review

The study was guided by the following theories

2.3.1 The technology-organization-environment framework (TOE)

The technology-organization-environment framework, also known as the TOE framework, is a theoretical framework that explains technology adoption in organizations and describes how

the process of adopting and implementing technological innovations are influenced by the technological context, organizational context, and environmental context as it was formulated and published by Louis G. Tornatzky and Mitchell Fleischer in 1990.

Numerous application examples of the TOE framework have been summarized by Olivera and Martins (2011). As Awa, Ojiabo & Orokor (2017) reiterated, the TOE framework is for organizational level analysis. TOE framework of Tornatzky and Fleischer 1990, identifies three aspects of an enterprise's context, that influence the process of adoption and implementation of technological innovation: The context portrays both the internal and external technologies relevant to the firm. The technological context denotes the internal current practices and equipment of the firm, and available technologies external to the firm. The organizational context refers to the descriptive measures about the organization, such as scope, size, and managerial structure. The environmental context is the arena in which a firm conducts its business, which consists of its industry, competitors, and government involvement.

The TOE framework was developed in 1990 (Tornatzky and Fleischer 1990). It identifies three aspects of an enterprise's context that influence the process by which it adopts and implements a technological innovation: technological context, organizational context, and environmental context (Figure 2). (a) Technological context describes both the internal and external technologies relevant to the firm. This includes current practices and equipment internal to the firm (Starbuck 1976), as well as the set of available technologies external to the firm (Thompson 1967, Khandwalla 1970, Hage 1980). (b) Organizational context refers to descriptive measures about the organization such as scope, size, and managerial structure. (c) Environmental context is the arena in which a firm conducts its business its industry, competitors, and dealings with the government (Tornatzky and Fleischer 1990).

The framework focuses on higher level attributes (i.e. the technological, organizational, and environmental contexts) and that there is a challenge in detailed behaviors of individuals in the organization. To understand technology adoption at individual level, behavioral models such as the theory of reasoned action, the theory of planned behavior, and the technology acceptance model should be applied. While this classification of organization level theory and individual level theory is generally accepted, it also leads to the difficulty of how to investigate the higher-level attributes. Information can only be obtained from individuals in the target organization and hence inevitably biased by individuals' viewpoints. Li (2020) has demonstrated a rough equivalence of behavioral models and TOE framework when individual perception has been taken into account.

Despite the TOE framework having been widely used, it is still challenging in adoption information system model in developing countries especially Tanzania as there are theoretical developments since introduction of biometrics. According to Innocent and Chacha (2015), the reason for the lack of development implementation of biometrics in Tanzania is that the TOE framework is "too generic" and offers a high degree of freedom to vary factors and measures so there is little understanding in copying with new technology in Tanzania especially biometric security.

The TOE framework has a solid theoretical basis, consistent empirical support and the potential of application to biometric system, though specific factors identified within the three contexts may vary across different studies. Emphasized individual characteristics, and both the internal and external characteristics of the organization, as drivers for organizational attendance and productivity (Hsu et al. 2006). These are identical to the technology and organization context of the TOE framework, but the TOE framework also includes a new and important component, environment context. The environment context presents both constraints and opportunities for

technological innovation. The TOE framework makes Rogers' innovation diffusion theory better able to explain intrafirm innovation diffusion (Hsu et al. 2006).

2.3.2 Technological acceptance model

Technology Acceptance Model (TAM) was developed by Davis (1995) based on the Theory of Reasoned Action. TAM is an information systems theory that models how users come to accept and use a technology. It is the degree to which a person believes that using a particular system would be free from effort.

The purpose of this model is to explain and predict the acceptability of an information technology, analyzing and exploring factors influencing the acceptability of a certain information technology. TAM points out that perceived usefulness (PU) and perceived ease of use (PEOU) are two factors that can affect the attitude. According to TAM, behavioral intention has a positive and substantial effect on actual behaviors. The model explains that employees' perceived usefulness, perceived ease of use, and usage of the software were significantly and positively correlated (Neil, Walter and Boot, 2016).

Because new technologies such as personal computers are complex and an element of uncertainty exists in the minds of decision makers with respect to the successful adoption of them, people form attitudes and intentions toward trying to learn to use the new technology prior to initiating efforts directed at using. Attitudes towards usage and intentions to use may be ill-formed or lacking in conviction or else may occur only after preliminary strivings to learn to use the technology evolve. Thus, actual usage may not be a direct or immediate consequence of such attitudes and intentions (Rosli, and Songip, 2017).

The theory therefore is directly related to the study under investigation since the study is about challenges of biometric attendance systems implementation in public sectors in Tanzania, a

case of National Housing Corporation (NHC). The study seeks to know how the biometric attendance system application has an effect on performance of the public institutions. Thus through this theory, the researcher will be able to achieve the main objective of the study and come up with recommendations.

2.4 Empirical studies

2.4.1 Technological challenging factors for biometric implementation

Kirmani (2017) studied on the impact of biometric attendance system on education system by assessing the employees' punctuality in education institute. The study findings revealed that biometric modalities are universally secure and accurate though there are loopholes which are existing in the biometric attendance system. Some of these challenges included less acceptance of the biometric acceptance system by the stakeholders, insufficient electricity power supply to cater for the consumption requirements for biometric attendance system affects the smooth operation of the system (Chong et al, 2009). add innovation attributes (relative advantage, compatibility, and complexity) and an additional new factor in the adoption study called information sharing culture characteristics to the TOE framework. Zhu et al. (2006a) combined relative advantage, compatibility, cost, and security concern from DOI with the TOE framework. Wang et al. (2010) add relative advantage, complexity, and compatibility from DOI to the TOE framework.

Morosan (2016) studied on the opportunities and challenges for biometric systems in travel. The study identified the several opportunities that the biometric systems offers in the travel industry which include identity management, increased convenience, and better human resource management. On the other hand, the study identified some of the user's acceptance challenges whereby the privacy, fear of harm resulting from using the system and general user anxiety

were identified to be challenges of biometric attendance systems. The study conducted by National Research Council, & Whither Biometrics Committee (2010) agreed that social, cultural, and legal issues can affect a biometric attendance system's acceptance by users, its performance, or the decisions on whether to use it in the first place

Yonazi (2012) concluded that biometric system includes threats to data, equipment, networks, and people, and respective measures intended to address them were challenges in adopting biometric attendance in Tanzania. Biometric system becomes even more important as ICT inventions and innovations are increasing and advancing in Tanzania. Technological environment in Tanzania is still inadequate for cyber security in the country. This is because the technological infrastructure is far back the development of computer technology. The technology were made to facilitate the traditional attendance based business environment. Security and punctuality was a major issue for all kinds of biometric applications. In emerging countries like Tanzania this problem was exacerbated by insufficient and out of date ICT system (Pani and Agrahari, 2017). Tanzania needs to fast track the development and enactment of a comprehensive framework to ensure a safer biometric systems in Tanzania (Yonazi, 2012).

Suhail (2017) declared that inappropriate technology was a challenge in adopting biometric system as many of the smaller rural Internet Service provider (ISPs) lack the necessary technical know-how and experience to deploy the most appropriate technologies. For example, a simple billing solution was of paramount importance. An ISP with technical capabilities could deploy Open Source Software (OSS) that would perform this function satisfactorily. An ISP without these skills had to go for more expensive proprietary software which increases investments and operational costs. Some ISPs did not deploy technologies to optimize the use of their resources, such as bandwidth management systems. As a result, network congestion

occurs and the ISP had to purchase more bandwidth. Again, the extra costs were borne by customers instead of simply managing the limited resources more effectively

In addition, Ahmad et al (2012) documented some challenges of biometric attendance system to include some of the fingerprints of staff working in laboratory are affected, age also affect the use of voice in biometric system and some diseases also affect the eyes of the individual which affect the biometric attendance system implementation. The study found out that the implementation of biometric attendance system requires the high cost with high cost in maintenance of the system itself.

Iqbal & Qadir (2012) conducted a study on the biometrics technology with the main aim of exploring and clarifying influencing factors and attitudes concerning biometrics security technology. The study employed the use of informal interview by gathering expert opinions and using web based survey. The findings revealed that people have trust on biometrics system and as the users, they have accepted the system and ready to adopt the implementation of biometric system.

Ali et al (2018) studied on the relationship of biometric attendance system with teachers' performance in Hazara University. The study contacted 150 employees who were selected through stratified randomly sampling. The results showed that the positive employees' altitude towards the installation of biometric attendance system. In addition, the findings revealed that biometric ensures teachers attendance on time and hence it influences the employees' performance.

Trabelsi & Shuaib (2011) studied on the implementation of biometrics based student attendance system. The study aimed to discusses the design, implementation and evaluation of biometric in recording the attendance of students by using both the fingerprint and iris readers. The

findings revealed that the e- attendance system helped to drop the absenteeism rate among the students and in addition, the system has provided the reliable solution to prevent any student impersonation resulted from fake attendance.

2.4.1.1 TEO Variables

Environments are crucial in shaping organizational structure and actions (Scott & Christensen 1995). Organizational decisions are not driven purely by rational goals of efficiency, but also by social and cultural factors and concerns for legitimacy. Institutions are transported by cultures, structures, and routines and operate at multiple levels. The theory claims that firms become more similar due to isomorphic pressures and pressures for legitimacy (Dimaggio & Powell 1983). This means that firms in the same field tend to become homologous over time, as competitive and customer pressures motivate them to copy industry leaders.

The technological context denotes the internal current practices and equipment of the firm, and available technologies external to the firm. The organizational context refers to the descriptive measures about the organization, such as scope, size, and managerial structure. The environmental context is the arena in which a firm conducts its business, which consists of its industry, competitors, and government involvement.

Leadership as an individual (leader) characteristic describes the leader attitude toward change. The Internal characteristics of organizational structure include; centralization of power and the control in a system are concentrated in the hands of a relatively few individuals, complexity is an organization member possess a relatively high level of knowledge and expertise, formalization is an organization emphasizes its members' following rules and procedures, interconnectedness is the units in a social system linked by interpersonal networks, organizational slack is uncommitted resources are available to an organization and size is the

number of employees of the organization. The External characteristics of an organization refer to system openness (Scott, 2001).

Organizational culture, it is absolutely necessary to understand employees culture in order to successfully do business or organize with that culture (Montana & Charnov 2008). Having a broad view on the saying, understanding the other's culture have heavy effect on managing work force in current multicultural business world. According to Schein 1985 culture is the deeper level of basic assumptions and beliefs that are shared by members of an organization that operate unconsciously and define in basic taken for granted fashion an organization's view of itself and its environment. Simplifying it, culture is the way we do the things around either in personal life or professional life (Schein, 1985).

Longman and Guttman (2016) conducted a study on factors that influence technological development in attending system in public sector in Bangladesh in which they rated project leaders and found that very few senior leaders understood the importance of their involvement in supporting the biometric attendance system and modeling the behaviors required by the project. (Dulewicz et al, 2015) have all referred to the importance of leadership in attendance system technological change. According to their research, certain types of leadership behaviors, specifically leaders with greater self-awareness, are more useful in implementing changes. Pellegrinelli et al. (2017) supported this idea and suggested that change fatigue or readiness to accept changes can be improved by choosing the right leadership style.

2.4.2 Environmental challenging factors for biometric implementation

Socio-cultural interferences through conflicts and incessant opposition to public projects have been established to confer impediments to project implementation in Nigeria. Similarly, the lack of continuity in information communication technology projects established which has seen

succeeding governments fail to allocate funds for completion of such projects started by their predecessors (Nweze, 2016). Such a lack of coherence in the political class towards development more so, the implementation of information system has seen ICT system project fail across Nigeria. For instance, the Iris-Biometric in Igbo county, Ogidigben in Delta State and the Fingerprint biometric system Seaport in Edo State, have both failed to start despite the preparedness of the foreign and local governments towards the projects (Yusuf, 2018; Okoromadu, 2019). This is because of the conflicts and sabotage caused by them on the implementation of these two projects.

(Sonuga et al. 2012), Poor leadership and corruption in the design, contracting, estimation and implementation of projects have seen biometric system projects balloon in costs, rack up time overrun become too costly for governments across Tanzania which have led to abandonment and failure. Corrupt public servants who embezzle funds, engage in dubious contracts for self-gain have led to financial issues which have caused failures, stalling of projects, delays and abandonments across infrastructural projects.

Ogundelea & Somefunb (2018) and Dim (2018), Political interference could be from the central government and State local government, government and the private stakeholders enjoined in the adaptation of biometric system in public authorities, the government and the local communities, and project implementation parties. The aspect of poor political management has also been linked to delays in the implementation of biometric attendance system projects in Nigeria which in turn results in project abandonment and failure altogether.

2.4.3 Organizational challenging factors for biometric implementation

Waldersee, Griffiths, & Lai (2013) when assessing factors affecting adoption of Biometric technology in Mauritius spotted that if the organizational structure does not support the requirements of the Biometric attendance technology, it can negatively influence the project. In

these cases, the change biometric technology projects may need to take action to influence the organizational structure. If a side effect of the biometric attendance project implementation is to change people's jobs and the structure of the organization, there is likely to be opposition to the project by staff and resistance to its implementation. The following provides insights into the limitations that the organizational structure had for achieving the project goals

Hoogervorst, Flier, and Koopman (2014) claimed in implementation of biometric attendance system, the organizational communication can be seen as a tool to engage people or as a mechanism to transfer a certain message. Organizational communications are also part of the organization's culture and both influence and are influenced by the projects' activities. Morrison et al. (2016) included communications in their 12 cultural dimensions. The project may develop certain communication channels that are specific to its' requirements, however, it relies on the organization's acceptance of communication to implement these channels and disseminate the project information.

Ahmad et al (2012) studied on the technical issues and challenges of biometric applications as access control tools of information security. The study employed the use of questionnaire which were distributed to administrative staff, teaching staff and staff from other departments. The findings revealed that the attitudes toward biometric attendance system differs between groups of staff. The administrative staff and the teaching staff believe that biometric machine strengthen their commitment to work as they are being monitored and paid accordingly whereas the other staff believe that the use of biometric contribute to the shortage in their salary.

2.5 Summary of literature review and research gap

Various studied conducted on the biometrics attendance system analyses the benefits, issues relating to its implementation and challenges in various angles. Most of the previous studies

were concentrated on the issues concerning the implementation of biometric attendance system whereby the benefits of the system and users' acceptance were measured. In assessing various studies which were conducted in relating to attitude of users towards the implementation of biometric attendance systems, the findings revealed that the users' attitude towards the use of biometric attendance system do differ. The study conducted by Liyanage et al (2018) pointed out various factors that influence the users' attitude towards biometric attendance system, such factors are job category, age, work experience and gender. This congruent with the study conducted by Ahmad et al (2012) which listed the same factors with addition to other factor which is the presence of some diseases that affect the eyes of individual and hence bring challenges to biometric systems.

Some of the users are having positive attitudes towards the use of biometric attendance system while other are not comfortable with the new system. The study conducted by (Liyanage et al, 2018; Iqbal & Qadir, 2012; Shoewu et al, 2013; Ali et al (2018) revealed that employees experienced much difficulties with manual system and hence they are having positive attitude with biometric attendance system. The study conducted by Ahmad et al (2012) revealed the presence of two groups of staff regarding their attitude towards biometric attendance system, the administrative staff and the teaching staff believe that biometric machine strengthen their commitment to work whereas the other staff believe that the use of biometric contribute to the shortage in their salary. This contradiction calls for the need to conduct further assessment concerning employee's attitude towards biometric attendance system in public sector.

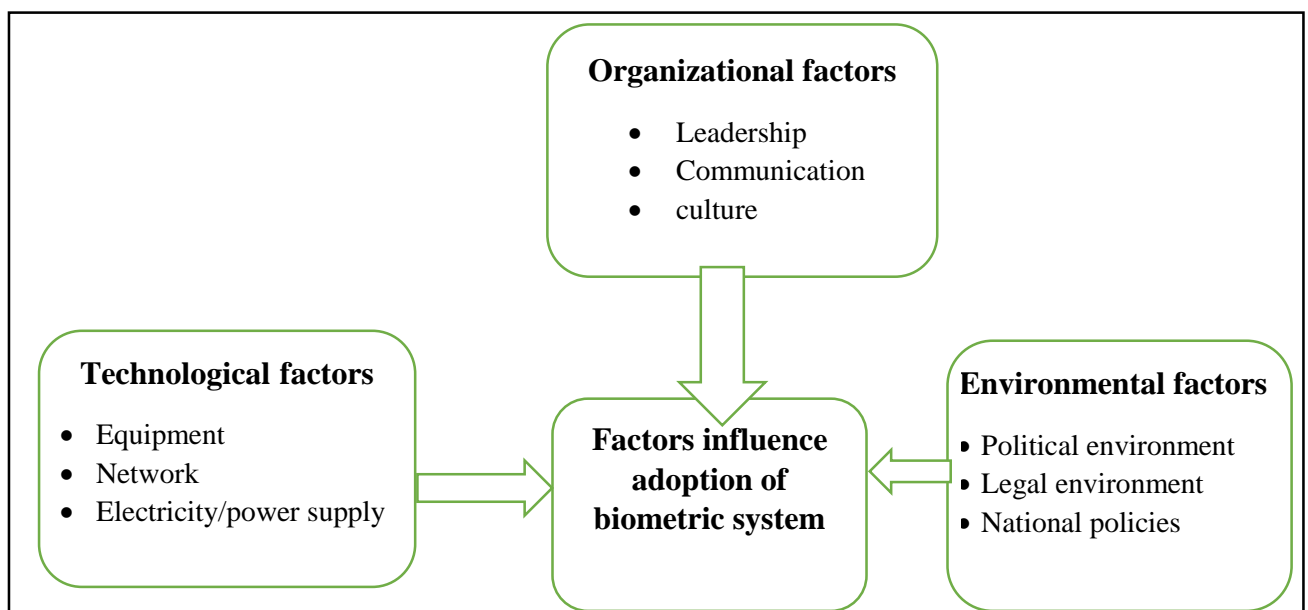
On the other hand, various studies have been conducted on exploring the challenges associated with the use of biometric attendance systems. According to Liyanage et al (2018) biometric attendance challenges included the possible misconducts done by operators, inability to ensure the presence inside the office and the issues in marking attendance when working outside the

working stations. Ahmad et al (2012) argued that the one of the challenges of biometric system is the high cost involved in maintaining the system. Kirmani (2017) argues that less acceptance of the biometric acceptance system by the stakeholders, insufficient electricity power supply to cater for the consumption requirements for biometric attendance system are the main challenges associated with the system. Basically, the challenges experienced by employees or staff towards the use of biometric system are not the same in various institutions/organisation as stipulated in arguments from various studies. This call for the need to investigate on challenges experienced by employees following the biometric attendance implementation in the public sector.

2.6 Conceptual framework

According to Mugenda (2008), defined conceptual framework as the brief description of the phenomenon under study accompanied by a graphical or visual depiction of the major variables of the study. This study was guided under the following conceptual framework;

Figure 1.2: Conceptual Framework Model



Source: Researcher, 2022

2.6.1 Technological factors

These includes all factors affecting the implementation of biometric attendance system which are born by technological aspects. These includes threats to data, equipment, networks, human resource skills, user competency, power breakdown and technological infrastructures

2.6.2 Organizational factors

These includes all factors affecting the implementation of biometric attendance system which are born by the organization itself including organization structure, organizational communications, degree of leadership support for the change, organization teamwork and organizational culture

2.6.3 Environmental

These include all factors that affect the adoption and implementation of biometric attending system like fingerprint, iris-biometric and facial recognition which are caused by changes in political system, national policies, political ideologies and legal aspects

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the road map of undertaking this study, it describes the methodology adopted in collecting data and analyzing data. The research methodology has been clearly described by Mark et al (2009) as the guidance on how the research should be undertaken. Basically, the chapter provides the detailed information concerning the research design and

approaches adopted, the areas of the study, sampling procedures and sample, data sources and types, data collection techniques and data analysis.

3.2 Research Design

Research design is the general plan that provide the answers on how the research questions were answered, how the data were collected and analyzed (Kothari 2004). In undertaking this study, the researcher adopted the use of case study research design so as to portray the accurate situations of the problem under the review. According to Garrett (2008), a case study research design condense the researched area to a modarte size that is manageable by the researcher in time, financial and physical considerations.

3.3 Research Approach

The study used a mixed research approach where by both quantitative and qualitative were employed. Quantitative approach is characterized by the collection of information which can be analyzed numerically while qualitative approach is characterized by the collection of narratives from respondents (Bouma, 2010). Therefore, the use of mixed approach enabled the researcher to achieve the main objective of this study. The advantage of the mixed research approach is that they complement each other thus the researcher was able to associate the information collected from respondents.

3.4 Study Area

The study was conducted at NHC head office located at Kambarage House – Upanga and other branches that are found in Dar es Salaam. The main reason of choosing this organization is because NHC has been one of the leading real estate development and management firm in

Tanzania (NHC Strategic Plan, 2016) and hence it is the perfect representative of the real estate developers and the public corporations in Tanzania. Second NHC has employed big number of employees and many of them are in Dar es Salaam.

In undertaking this study at NHC, the researcher contacted NHC staff who are directly involve in monitoring of the attendance records such as IT staff, Administration and Human resource department. On the other hand, the study included NHC staff who are working in Dar es Salaam in all six offices which include Ilala, Temeke, Kinondoni, Upanga, Metropolitan and Dar es Salaam office. Following this, the researcher was in good position to contact the right respondents regarding the subject matter of this study.

3.4 Population, Sampling procedures and Sample size

3.4.1 Study population

This study's target population were employees who are working at NHC organization specifically in Dar es Salaam region. NHC Corporation has 6 offices in Dar es Salaam and hence large number of its staff are working from these offices in Dar es Salaam. Currently, the corporation has the total number of 431 employees, this has been reported on the report of the controller and auditor general on the financial statements of NHC for the financial year ended 30th June 2021. The corporation has implemented the biometric attendance systems in its offices, so the researcher was in the right position of contacting the users of this system and to get the answers of the research problem.

3.4.2 Sampling procedures

This study mainly used probability sampling technique which provide equal chance of every individual to be included in the sample. Probability sampling means that every item in the

population has an equal chance of being included in the study to represent the general population of the study. Probability sampling includes simple random sampling, systematic sampling, cluster sampling, multi stage sampling, in this case the simple randomly sampling was applied in selecting individual staff to be included in the sample. Basically, this offered the equal chance for individual staff to be included in the sample and hence remove bias that might be involved in inclusion of cases in the sample. Employees were grouped into strata as according to their departments and then sample was drawn randomly from each strata

3.4.3 Sample Size

The sample size has been defined by Kothari (2004) as the small group of respondents who are involved to offer opinions or views of the others. In undertaking this study, the researcher used the sample size of 205 respondents which represents NHC staff who are working in Dar es Salaam region. Basically, this sample size comprised with the staff working in various sections and branches in Dar es Salaam. According to the report of the controller and auditor general on the financial statements of NHC for the financial year ended 30th June 2020, the total number of staff in this corporation is 422. Following the presence of the total population, the study used the formula in determining the desired sample size to use. The following formula has been applied to obtain the sample of the study.

$$n = \frac{N}{1+N (e^2)}$$

N = Population 422

e = Level of precision (sampling error) 5 percent or 0.05

$$n = 422 / (1 + 422(0.05)^2)$$

$$n = 422 / (1 + 422(0.0025))$$

$$n = 422 / 2.055$$

$$n = 205.352$$

$$n = \text{Sample Size} = 205$$

The proposed sample size is 205 staff which is approximately 50% of all NHC staff.

Table 3.1: population sampling

No	Department			Sample
1	Construction of engineering directory			35
	Department	Population	sample	
	Electrical department	15	5	
	Construction	45	20	
	Processing	15	10	
2	Business support services directory			29
	Department	Population	sample	
	Administration	40	20	
	Human resources	10	5	
	Planning and budget	15	4	
3	Director general			46
	Department	Population	sample	

	Procurement	40	25	
	Internal audit	15	5	
	Legal services	5	1	
4	Finance and accounting	31	15	15
5	Property and marketing directory			30
	Department	Population	sample	
	Sales and Marketing	45	20	
	Facility management	20	10	
6	Business development directory			65
	Department	Population	sample	
	Project design and management	75	40	
	Quantity survey and architecture	60	25	
Total	14	431	205	205

3.5 Data collection methods

The researcher used both primary and secondary sources to find answers to all the research questions stated in Chapter I. The study employed the use of questionnaire method and interview method in collecting the relevant data. Due to the nature of this study, the main method of data collection were questionnaire method while the interview method was used to complement the data collected through the use of questionnaires.

3.5.1 Questionnaire

Questionnaire is data collection tool with a series of questions related to a particular study in which selected sample of respondents provide their views on the variables of the study's

objectives (Kane 2001). It consisted of series of questions relating to employees' attitudes towards challenges faced by factors influenced the adoption of biometrics attendance system at NHC, system challenging factors in biometric attendance system implementation at NHC and human challenging factors in biometric attendance system implementation at NHC. Closed ended questions were distributed to all employees at low and middle level management (head of departments and normal employees). The researcher employed the use of questionnaire method as the main method of data collection in this study mainly because of the large number of respondents the study has intended to contact. In addition, due to time required to undertake this study and financial constraints, the use of questionnaires is relatively more economy than the other options of data collections.

The researcher adopted the use of Likert scale in measuring the extent of adoption to biometric attendance system, its effectiveness and challenges in general. The use of Likert scale provided the room for the respondent to rate various statement in regard to the variables used in this study. The use of Likert scale adopted in monitoring various questions under this study, this has been supported by the study conducted by Liyanage (2018) on the effectiveness of biometric attendance system whereby the use of Likert scale was adopted to monitor all questions under the study.

3.5.2 Interviews

Interview guide is series of questions usually open-ended questionnaire used on one to one dialogue like discussion between the researchers and responded in order to gather information about a certain issues (Foddy, 1994). In this study interview guide were employed in order to complement the data collected through the use of questionnaires. The researcher contacted few staff in the selected sample (top level management) to discuss the particular matter in detail so as to come out with the deep insights concerning the subject matter.

3.8 Pilot study

In order to assess the reliability of the instruments of the study (questionnaires) and validity of the data to be collected, a pilot study was conducted prior to the main study. As suggested by Leedy and Ormrod (2006), a pilot study is an excellent way to determine the feasibility of the study. The researcher understands the importance of conducting a pilot study that include gathering field experience, to be aware of the logistics involved and most importantly, to get the overall view of the responses to the survey questions. This in turn enabled the researcher to adjust any observed weaknesses in the data collection tools before the actual survey was conducted.

3.6 Validity and Reliability

.9.1 Validity

Validity is the degree to which a study accurately reflects the specific concept that the instruments intended to measure (Kombo, 2006). The validity of the instruments for data collection in this study was done through expert review. Experts in research reviewed the data collection instruments and any correction or adjustments were made accordingly in relation to the topic under study. This ensured the validity of data collection tools. Also questionnaires and interview guides were checked by the supervisor and the language used was simple to every respondents involved in this study.

Comments and guidance provided by the research supervisors and other experts in the field of procurement were of great and valuable inputs in validating the research instruments.

3.9.2 Reliability

Reliability is the degree to which a test is consistent and stable in measuring whatever it is measuring. Reliability requires the administration of the same test to the same respondents

twice (Kothari, 2011). After pilot study, data were tested through SPSS to ensure the internal consistency.

The instruments were pre-tested through a pilot study before the actual data collection to enhance reliability. The research instruments were tested to identify possible problems during the main study and clarify on the instrument and appropriateness of the language. The importance of pre- testing a questionnaire according to Creswel (1999) is to help the researcher understand the meaning of the questions to be respondents and how they arrive at their response. The researcher carried out a pilot testing on 13 employees of ACC. Test re-test method was applied, where the questionnaires were administered to the same respondents twice in the span of two weeks.

3.7 Data analysis

The study had two types of data to be analyzed. The data was analyzed using Statistical Package for Social Sciences (SPSS) version 20 descriptively. Quantitative data were analyzed using descriptive statistics such as frequencies, percentages, mean and standard deviation. Quantitative data were entered and coded on SPSS version 20. Qualitative data were analyzed using content analysis. Data were grouped into themes and analysed into categories accordingly. Direct quotations from respondents were used as justification to their answers. In presentation of findings, the researcher showed how the data from descriptive statistics and content analysis relates or not.

3.8 Ethical issues

Research studies must adhere to the terms and condition of conducting research study. In regard to this, the researcher will make sure that the undertaking of this study adhere to IAA

research ethics and policy. Each individual who is forming the targeted sample of this study engaged to make sure their consent to provide data from them have been considered.

The researcher had an obligation of making sure that the subject matter of the study and the intention of the study is well understood to the selected participants before involving them in the study. The collection of data ensured the sense of confidentiality and the data collected from respondents in this study strictly be used for the purpose of this study only.

CHAPTER FOUR

PRESENTATION AND DISCUSSION OF FINDINGS

4.1 Introduction

This chapter presents, analyzes and interprets data on the challenges of biometric attendance systems implementation in public sectors in Tanzania. The study had three objectives namely; to determine technological challenges for biometric attendance system implementation at NHC, to assess environmental challenges for biometric attendance system implementation at NHC and to examine organizational challenges in biometric attendance system implementation at NHC

4.2 General Information of the Respondents

Demographic characteristics of the respondents were analyzed in this chapter. The characteristics were in terms of age, gender, working experience and level of education.

4.2.1 Age analysis

51% of respondents with the frequency of 106 aged between 29-39 years and this was the largest age group in the sample. The second category of age was between 40-50 with the percentage of 37, the smallest frequency of 3 respondents showed that they were aged above 62+ years old with the percentage of 1%. The data indicated that majority of the respondents

were old enough to provide relevant information concerning the challenges of biometric attendance systems implementation in public sectors in Tanzania.

Table 4.1 Age Analysis

Age	Frequency	Valid Percent
20-28	14	7
29-39	106	51
40-50	75	37
51-60	4	2
62+	3	1
Total	205	100

Source, Research Findings (2022)

4.2.2. Gender Analysis

Gender of the respondents was analyzed in this study by the researcher. 55% of the respondents who are the majority were females and the minority who were the males consisted of 45%.

Table 4. 2 : Gender analysis

Gender	Frequency	Valid Percent
Male	92	45
Female	113	55
Total	205	100

Source, Research Findings (2022)

4.2.3 Education Level

Academic and professional education has been remarked for its contribution towards shaping professional behaviours among employees, therefore the study was interested to know the level of education among the respondents. Among 205 respondents involved in this study, 89 (45%) of the respondents had attained a bachelor degree and who are the majority. Those with diplomas were 51 (24%) of the respondents, certificate were 65 (31%) of the respondents.

Data from the field indicated that majority of the respondents involved in this study were considerably trained in order to perform their duties diligently. Basically, training have been remarked to instill professional and ethical behavior among employees which in turn enable them to act diligently and also, the levels of academic qualification show that the respondents could give response that are actual of factual.

Table 4. 3 Education Level

Education	Frequency	Valid Percent
Certificate	65	31
Diploma	51	24
Degree	89	45
Total	205	100

Source, Research Findings (2022)

4.2.4 Working experience

In this part, a researcher was interested to know whether working experience of the respondents had any influence to the challenges of biometric attendance systems implementation in public sectors. Data from table 4.4 indicated that 57% of the respondents had 7-10 years working

experience. 28% of respondents having 4-6 working years and minority of the respondents having Over 10 years of experience and this were represented by 4%. This therefore implies that staffs at NHC are well informed on challenges of biometric attendance systems implementation in public sectors because majority of them consists of employees with work experience of between 7-10 years.

Furthermore, Baxter (2008) in his study discovered that employees with high working experiences assists in providing reliable data on the sought problem since they have technical experience on the problem.

Table 4. 4 Working experience

Working experience	Frequency	Valid Percent
1-3	23	11
4-6	57	28
7-10	117	57
Over 10 years	8	4
Total	205	100

Source, Research Findings (2022)

4.3 Test of Reliability and Validity

In order to determine if data collected are reliable and valid, researcher conducted validity and reliability test. Cronbach's alpha and KMO were used as a scale to measure reliability and validity of data collected respectively.

4.3.1 Reliability Test

In this study the results from the findings of Cronbach's Alpha was above 0.6 for all items, the coefficient are significant as shown in the table 4.1 below.

According to Leedy (2006) when Cronbach alpha is greater than 0.9 (>0.9) it means that the internal consistency reliability is excellent. When it is greater than 0.8 (>0.8) the reliability is good, while greater than 0.7 is accepted and greater than 0.6 is still acceptable. When it is 0.5 to 0.58 is poor and when it is less than 0.5, internal consistency in unacceptable.

The test yielded the Cronbach's Alpha of .890 for three items of objective one, .933 for four items of objective two and .965 for six items of objective three as shown in table 3.2. These results proved that the data collection tools were reliable.

In Cronbach's Alpha, in order to say the data is reliable, the reliability result should be above 0.7.

Table 4.5 Reliability Statistics

Variable	Cronbach Alpha	No. of items	Internal consistency
Objective one	0.890	3	Acceptable
Objective two	0.933	4	Acceptable
Objective three	0.965	6	Acceptable

Source: Field Data (2022)

4.3.2 Validity Test

Factor Analysis was used to assess the structural validity of the 5- Point Likert scale used. Factor Analysis is a technique used to find out and explore few unrelated and conceptually significant new variables (factors) by bringing together related variables. Before factor analysis method can be employed, KaiserMeyer- Oklin (KMO) test should be conducted to test the

sufficiency and adequacy of the data obtained and Barlett test should be conducted to test the normality of the distribution in the population (Pallant, 2005). The KMO tests whether partial correlations are small and whether the distribution is sufficient for factor analysis. The KMO value ranges from 0-1, it is interpreted as normal between 0.5 and 0.7, as good between 0.7 and 0.8, as very good between 0.8 and 0.9 and as perfect when it is over 0.9 (Field, 2005). After analyzing data collected on SPSS v.20 the result of KMO was 0.843. This implies that the results of this study were valid.

Table 4.6: KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.843
Bartlett's Test of Sphericity	Approx. Chi-Square	1.169
	df	136
	Sig.	.000

Source: Field Data 2022

4.3.1 The technological challenges for biometric attendance system implementation at NHC

The first research objective of the study was to determine the technological challenges for biometric attendance system implementation at NHC. Using a five- point likert scale, the study thought to know respondents rate of agreements on various statements relating to technological challenges for biometric attendance system implementation at NHC.

Under this research objective, the researcher sought to determine the technological challenges for biometric attendance system implementation at NHC. Respondents were to respond by ticking most appropriate option ranging from 1=strongly disagree 2=disagree 3=Neutral 4=agree

5=strongly agree. Respondents indicated their perception toward three items in the questionnaire as shown below. Scale of mean score interpretation was as follows: Based on the mean values, mean score of 1 to 1.8 represent Strongly Disagree, 1.81 To 2.60 represent disagree, 2.61 To 3.40 represent neutral, 3.41 To 4.20 represent agree and 4.21 To 5.00 represent strongly agree.

Table 4.7: The technological challenges for biometric attendance system implementation at NHC

Statements	N	Mean	Std. Dev	Interpretation
Equipment	205	3.13	.570	Neutral
Network	205	2.83	.663	Neutral
Electricity/power supply	205	3.80	.495	Agree

Source: Field Data (2022)

As reflected in Table 4.7, mean score differed from one item to another. This shows that respondents had different opinion about how technological affects biometric attendance system implementation at NHC. Specifically, they were neutral that equipment and network can affects or influence biometric attendance system implementation at NHC in one way or another (M=3.13 and S. D= 0.570) and (M=2.83 and S. D=0.663) respectively.

The findings further indicated that respondents agreed that Electricity/power supply also influence or affects biometric attendance system implementation at NHC with the mean score of M=3.80 and S. D=0.495. The findings imply that Electricity/power supply affects biometric attendance system implementation at and can affects the whole process of employee's attendance.

The use of biometric technologies and systems is expanding significantly within the public and private sectors. Biometric technologies (for example facial recognition, voice, fingerprint or iris scanning technologies) are becoming cheaper, more advanced, and more accurate.

This concludes that the implementation of Biometrics has added value to service delivery as most employees have agreed though in most developing countries like Tanzania, the challenge is power problem, network problem and equipment. According to Giesing (2003), biometrics is accepted by individuals when it adds value to service delivery that will include a security factor and increased accessibility through speed and ease of use.

4.4.2. The environmental challenges for biometric attendance system implementation at NHC

The researcher sought to examine the environmental challenges for biometric attendance system implementation at NHC. Respondents were to respond by ticking most appropriate option ranging from 1= Strongly Disagree, 2 = Disagree, 3 = Neutral, 4= Agree, 5= Strongly Agree. Scale of mean score interpretation was as follows: Respondents had to respond to five items in the questionnaire under this section. The results of analysis are shown in Table 4.8. Based on the mean values, mean score of 1 to 1.8 represent Strongly Disagree, 1.81 To 2.60 represent disagree, 2.61 To 3.40 represent neutral, 3.41 To 4.20 represent agree and 4.21 To 5.00 represent strongly agree.

Table 4.8: the environmental challenges for biometric attendance system implementation at NHC

Statements	N	Mean	Std. Dev	Interpretation
Political environment	205	3.80	1.126	Agree
Legal environment	205	3.87	1.277	Agree
National policies	205	3.13	1.375	neutral

Source: Field Data (2022)

Table 4.8 presents findings about how environmental challenges affects biometric attendance system implementation at NHC. The mean score differed from one item to another. This shows that respondents had different opinion about how environmental challenges affects biometric attendance system implementation at NHC. Specifically, they agreed that political and legal environmental can affects or influence biometric attendance system implementation at NHC in one way or another (M=3.80 and S. D= 0.126) and (M=3.87 and S. D=0.277) respectively.

The findings further indicated that respondents neutral that national policies also influence or affects biometric attendance system implementation at NHC with the mean score of M=3.13 and S. D=0.375. This seriously guarantees that the Biometrics fingerprint system is easy to use as the most employees. The findings imply that these factors that affect the adoption and implementation of biometric attending system like fingerprint, iris-biometric and facial recognition which are caused by changes in political system, national policies, political ideologies and legal aspects. This could mean that these employees would prefer to use other Biometric features rather than using the biometric fingerprint or they don't trust fingerprints for security verification. This seriously guarantees that Biometrics fingerprints as security management measure are the most preferred feature to be used by employees as the most employees

4.4.3 The organizational challenges in biometric attendance system implementation at NHC

To achieve the study objective, the researcher sought to examine the organizational challenges in biometric attendance system implementation at NHC. Respondents were to respond by ticking most appropriate option ranging from 1= Strongly Disagree, 2 = Disagree, 3 = Neutral, 4= Agree, 5= Strongly Agree. Scale of mean score interpretation was as follows: Respondents had to respond to five items in the questionnaire under this section. Based on the mean values, mean score of 1 to 1.8 represent Strongly Disagree, 1.81 To 2.60 represent disagree, 2.61 To 3.40 represent neutral, 3.41 To 4.20 represent agree and 4.21 To 5.00 represent strongly agree. The results of analysis are shown in Table 4.9

Table 4.9: the organizational challenges in biometric attendance system implementation at NHC

Statements	N	Mean	Std. Dev	Interpretation
Leadership	205	3.19	1.278	Neutral
Communication	205	2.99	1.503	Neutral
Culture	205	2.84	1.368	Neutral

Source: Field Data (2022)

As seen in table 4.9, there were no varying views on how organizational influence or affects biometric attendance system implementation at NHC. Respondents Neutral on all three items from the questionnaires. Specifically, they were Neutral that leadership, communication and

culture affects or influence biometric attendance system implementation at NHC, leadership (M=3.19 and S. D=0.278), communication (M=2.99 and S. D= 0.503) and culture (M=2.84 and S. D= 0.368) respectively.

The findings imply that these includes all factors affecting the implementation of biometric attendance system which are born by the organization itself including organization structure, organizational communications, degree of leadership support for the change, organization teamwork and organizational culture

In this regard, the research will confirm that the employees think that the Biometrics system is mainly implemented to monitor and track them in their duties as most employees. For some people, it is very intrusive to use fingerprint because they still relate it to criminal identification techniques

This suggests that though most of the employees were neutral, employees are more divided on whether re-enrolment and enrolment of multiple fingers mitigate errors. The reason could be that most respondents are not Biometrics Enrolment Offices hence they would not know the technicalities of Biometrics which is why so many respondents were neutral

4.1.2.2 Content Analysis Findings of Interview Data

The study collected qualitative data using interviews. The data were collected from employees at NHC. The data were analyzed using qualitative content analysis.

4.2.2.2.1 Interview Question one: the influence of biometric on employees attendance

In the interview, one of the interviewee said;

Biometrics systems also assist by excluding huge files of paper in a manual system and the problematic issues of ghost employees. Its presence provides a crucial method for tracking the attendance of employees in an organization. The olden day

methods, where presence was taken and managed manually, were not only troublesome but also inadequate in handling the increasing need for security. Earlier registers and roll calls were utilized for recording signatures of employees on day-to-day activities.

He added that, registers have information about employees with an authenticity that could not be verified. Employees could simply tick the presence of another employee. To address this issue, smart cards and card readers were introduced as a solution to prevent an individual to simply sign in and sign out. The issue regarding the cards was that an employee could simply swipe the card of another employee who was absent

4.2.2.2 Interview Question two: The influence of technology aspects

In the interview, one of the interviewee said;

Biometric is affected by many factors including technology. These includes all factors affecting the implementation of biometric attendance system which are born by technological aspects. These includes threats to data, equipment, networks, human resource skills, user competency, power breakdown and technological infrastructures

Another interviewee had the opinion that;

Today biometrics has been successfully deployed in various fields like security, identification and authorization system. Biometrics fingerprint has gained significant importance in this technical world for analysing of biological data. Biometrics is a technology that is used for analysing person characters based on physiological traits such as the face, fingerprint, iris, retina, voice, signature, etc.

He adds that, Fingerprint technology specifically can produce the most reliable and accurate user authentication mechanism. The Biometrics authentication mechanism

is a fast progressing mechanism that is concerned with individuals' physiological characteristics identification

They concluded that the technology used is secure and reliable as most respondents (63.3%) have agreed. Biometrics as biometrics identification due to the fact that a person can be automatically recognised based on their physiological characteristics, therefore, every person has their own exclusive characteristics that explain their personal identity.

4.2.2.2.3 Interview Question three: the role of biometric in security purpose

In the interview, one of respondent said;

Using Biometrics in Security Management is very important as it provides the purpose for granting access in line with the access rights of the authorized users, disallow unauthorized entities from accessing the system and builds a good impression on employees. This is for purposes of security audit or billing, the system can collect information on the accessions made.

Another interviewee had the opinion that;

Its availability is critical because users constantly need it to be able to perform their duties on these systems, biometric identification in an organisation can ensure that only authorised users are granted access to the information kept by the organisation. biometrics uses the distinctive characteristics of an individual to be able to identify that person

Another interviewee had the opinion that;

The biometrics mechanism prevents fraud and ensures accurate accountability for any fraud conducted. Biometrics allows users to securely authorize. The biometrics authentication aims at identifying information on the user's biometric trait or

identity. The goal is to control security and privacy matters that have a serious impact on users' lives, particularly considering the reversibility of biometrics templates and user traceability. Biometrics enables an authorized party to track a user's authentication attempts over different transactions or applications. Results of productive traceability are cross-matching, profiling, and tracking of individuals.

She added that, accurateness identification is important to allow organisations to deliver a better service to their clients and to prevent individuals from distorting themselves to the organisation. The successful and accurate identification, will enhance administrative productivity, keep organisational resource secured.

4.2.2.2.4 Interview Question three: the influence of biometric on employee's performance

In the interview, one of respondent said;

most of the employees consider that the utilising of the Biometric Attendance Recording System (BARS) provides an optimistic influence on work performance and the results in using Biometrics confirmed a significant growth in employees' level of performance, biometrics is accepted by individuals when it adds value to service delivery that will include a security factor and increased accessibility through speed and ease of use.

This technology have also challenge, Organizations are failing to comprehend the motives when employees take on or discard new technology. The motive to adopt change with the new technology is not easy for the users and they have no interest in using it, eventually resulting in possible business financial losses. There is an extensive lack of employee participation in implementing of biometric security technology in organizations

Another interviewee had the opinion that;

There is an issue that training is needed to use biometrics device appropriately, currently, the use of fingerprint recognition to authenticate had a major positive perception of the scheme's security that influenced employee participation in using Biometrics. User acceptance is a factor that must be considered in the implementation of the biometric system. Like with any other technology that people are unfamiliar with, training is a necessity when the system is introduced for the first time

4.2.2.2.5 Interview Question three: the influence of biometric on employee's attendance

In the interview, one of respondent said;

The old manual method had gaps allowing an increase in dishonest actions. The Biometrics Attendance Record System (BARS) was implemented to verify employees' attendance by using both finger and face authentication. Biometrics system validates the individuality and keeps records of entrance and departure intervals with completed particulars of the employee. An instant when an employee uses Biometrics Attendance Record System, the complete particulars are systematically captured in the system. Biometrics is most reliable, secure and does not permit an unauthorized person to utilize.

BARS do not allow fraudulent activity as the employee has to mark his attendance in real-time with his physical characteristics. The BARS prevented ghost employees. The Biometrics system is also operative when permitting or rejecting access to restricted areas. It provides help in monitoring security in such cases.

4.3 Discussion of Findings

This part provides the discussion of the findings. The discussion related the findings presented in chapter four and those from past studies.

4.3.1 The technological challenges for biometric attendance system implementation at NHC

Findings from research question one found that although the concept of attendance systems has been carried over the years, in recent times the forms of its application has changed. NHC being aware of the importance of personnel attendance to overcome the problems raised from manual attendance systems have started to take advantage of biometric systems. Particularly, fingerprint and facial recognition are the two most used forms for biometric identification, since it is considered as the most reliable and secure method in terms of its uniqueness. Because manual attendance systems are time-consuming and ineffective, NHC review their control mechanisms for personnel attendance to integrate new technologies in their operations, during the field it was discovered that, biometrics promotes transparency and employee performance even though it faces many challenges like network problem, power problem and equipment

Findings agree with Villaroman et al. (2018), claims that Biometrics promotes transparency to the organization to save the duration of employees preparation records as the system continuously updating in real time. Implementing BARS saved the organization with several resources which would have been utilised to monitor the attendance of employees, therefore, it creates an increase in work performance. The organisation uses biometrics system time and attendance clocks for the Human Resource personnel to gain sufficient time in handling employee absences and identifying the ghost employees which means that the use of Biometrics will have a significant impact on their attendance (Villaroman et al., 2018).

Furthermore, Villaroman et al. (2018), concluded that most of the employees consider that the utilising of the Biometric Attendance Recording System (BARS) provides an optimistic influence on work performance and the results in using Biometrics confirmed a significant growth in employees' level of performance. According to Giesing (2003), biometrics is accepted by individuals when it adds value to service delivery that will include a security factor and increased accessibility through speed and ease of use

4.3.2 The environmental challenges for biometric attendance system implementation at NHC

Findings from the second research question on the environmental challenges for biometric attendance system implementation at NHC revealed that. This seriously guarantees that the Biometrics fingerprint system is easy to use as the most employees. The findings imply that these factors that affect the adoption and implementation of biometric attending system like fingerprint, iris-biometric and facial recognition which are caused by changes in political system, national policies, political ideologies and legal aspects. This could mean that these employees would prefer to use other Biometric features rather than using the biometric fingerprint or they don't trust fingerprints for security verification. This seriously guarantees that Biometrics fingerprints as security management measure are the most preferred feature to be used by employees as the most employees

According to van Maanen (2016), this occurs when a template for biometric information cannot be successfully created. This may be due to a number of factors, such as low-quality reference information (for example, due to sensors or poor environmental conditions – such as lighting –

at the time of enrolment), or a person may have a physical or medical condition that prevents them from enrolling into the system. Ensuring effective enrolment rates is crucial to the successful operation of a biometric verification or authentication system.

In addition to technical issues and physical or medical conditions, cultural or religious factors may also limit a group or individual's ability to participate or enrol in a biometric system (Berini et al., 2016).. For example, the collection of a facial image or other type of bodily information may be considered inappropriate in some cultures or religions. Limits to enrolment should not be thought of as barriers – they should be considered a normal part of a diverse society. Organisations using biometric systems should be sensitive to these matters when requesting individuals to provide biometric information, and system designers need to ensure they consider this diversity when planning any biometric implementation.

There is an issue that training is needed to use biometrics device appropriately (Kukula and Proctor, 2009). According to Bhagavatula et al. (2015), currently, the use of fingerprint recognition to authenticate had a major positive perception of the scheme's security that influenced employee participation in using Biometrics. User acceptance is a factor that must be considered in the implementation of the biometric system (Kukula and Proctor, 2009).

4.3.3 The organizational challenges in biometric attendance system implementation at NHC

Findings in the third research question on the organizational challenges in biometric attendance system implementation at NHC revealed that that these includes all factors affecting the implementation of biometric attendance system which are born by the organization itself including organization structure, organizational communications, degree of leadership support for the change, organization teamwork and organizational culture. The organization should

strive to overcome the challenges hindering biometric implementation because the system help the management in various ways.

Giesing (2003), Biometrics technology is a fast-developing field and their acceptance is also rapid. Biometric fingerprint attendance systems are preferred and considered as the most efficient and economical solution to mark entry and exit times of employees belonging to different industries. The HR departments of most industries make extensive use of biometric attendance management systems. Fingerprint sensors are used to grant preferential access to employees in sensitive areas of the facility. It is also integrated with payroll systems to provide and integrate attendance data for compliance with labor laws. Payroll deduction, in addition to simplifying and streamlining the employee salary processing procedure, a biometric system enables the maintenance of leave records accurately as it remains linked to the HRM software as well as the access control system (Morosan, 2016),.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

Three sections were involved in this chapter namely conclusions and recommendations originated from the study findings and research objectives.

5.2 Conclusion of the study

From the above discussion, it can be deduced that technological affect affects much the implementation of biometric attendance system at NHC. The findings further concluded that electricity/power supply also influence or affects biometric attendance system implementation at NHC with the mean score of $M=3.80$ and $S. D=0.495$. The findings imply that Electricity/power supply affects biometric attendance system implementation at and can affects the whole process of employee's attendance.

In the second objective, the study concluded that environmental factors affects the biometric attendance system implementation at NHC. This seriously guarantees that the Biometrics fingerprint system is easy to use as the most employees. The findings imply that these factors that affect the adoption and implementation of biometric attending system like fingerprint, iris-biometric and facial recognition which are caused by changes in political system, national policies, political ideologies and legal aspects. This could mean that these employees would prefer to use other Biometric features rather than using the biometric fingerprint or they don't trust fingerprints for security verification. This seriously guarantees that Biometrics fingerprints as security management measure are the most preferred feature to be used by employees as the most employees

In the last objective, the study concluded that organizational factors affects or influence biometric attendance system implementation at NHC. The findings imply that these includes all factors affecting the implementation of biometric attendance system which are born by the

organization itself including organization structure, organizational communications, degree of leadership support for the change, organization teamwork and organizational culture

5.4 Recommendations of the Study

5.4.1 Training of employee

NHC should continue providing training to its workers on the use of biometric. Like with any other technology that people are unfamiliar with, training is a necessity when the system is introduced for the first time. when users are supported and trained during their first time use of the biometrics authentication system, this can create an interest to use the system. Training grants users with basic knowledge on the system functionalities and the basic steps for interaction with it. The biometrics systems have similar functions allowing the biometrics training to be the same throughout the entire biometrics systems, enforcing that users do not require any extra training when a new biometrics feature is introduced, for instance if the organization is moving from facial authentication to fingeraprint authentication, therefore there will be no training required

5.4.2 User technology acceptance

NHC staffs should be ready to accept new technology. New technology can be unpredictable and can create possible negative impacts. People tend to use or not use a system until they believe it will help them improve on their job performance or on other hand to perceived usefulness. Technology is a ubiquitous complex system with intellectual features that have a bearing on every aspect of human life. In this regard, the technology adoption model is in connection with an individual's perceptions and attitudes towards forming part of an adoption process that could have an influence on the user adoption of biometrics as an identification technique

5.4.3 Management support

Leaders at NHC should be the first pioneer to use biometric in order for followers to follow them.

During the time in and time out, leaders should show examples by action

REFERENCES

- Adewole, K. S., Abdulsalam, S. O., Babatunde, R. S., Shittu, T. M., & Oloyede, M. O. (2014). Development of fingerprint biometric attendance system for non-academic staff in a tertiary institution. *Development*, 5(2), 62-70.
- Ahmad, S. M. S., Ali, B. M., & Adnan, W. A. W. (2012). Technical issues and challenges of biometric applications as access control tools of information security. *international journal of innovative computing, information and control*, 8(11), 7983-7999.
- Ali, A., Mustafa, J., & Khan, I. U. (2018). Relationship of Biometric Attendance System with Performance, Job Related Stress and Satisfaction of University Teachers in Pakistan. *Liberal Arts and Social Sciences International Journal (LASSIJ)*, 2(2), 42-49.
- Bais, M., Rawat, D., & Kaur, G. (2016). Biometric attendance system circuit. *Int. Journal of Engineering Applied Sciences and Technology*, 1(6), 2455-2143.
- Chong, A.Y.L., Ooi, K.B., Lin, B.S. and Raman, M. (2009) Factors affecting the adoption level of c-commerce: An empirical study, "Journal of Computer Information Systems", Vol. 50, No. 2, pp 13-22.
- Cupido, U. (2011). MPA Thesis on the Implementation of a Time and Attendance System At Stellenbosch University, Germany.

- Dey, S., Barman, S., Bhukya, R. K., Das, R. K., Haris, B. C., Prasanna, S. M., & Sinha, R. (2014, February). Speech biometric based attendance system. In *2014 twentieth national conference on communications (NCC)* (pp. 1-6). IEEE.
- Dulewicz, V. (2012). Assessment of Management Competences by Personality Questionnaires. *Selection and Development Review*, 8, 1–4.
- Dulewicz, V. & Higgs, M. (2015). Assessing leadership styles and organisational context. *Journal of Managerial Psychology*, 20, 105–123.
- Harakannanavar, S. S., Renukamurthy, P. C., & Raja, K. B. (2019). Comprehensive study of biometric authentication systems, challenges and future trends. *International Journal of Advanced Networking and Applications*, 10(4), 3958-3968.
- Henry, E., Echa, E. A., & Alfred, M. (2017). The Importance and Challenges of Biometric Machine in School Supervision. A Case Study of Access High School, Calabar. *Equatorial Journal of Education and Curriculum Studies*, 2(2), 34-39.
- Hoo, S. C., & Ibrahim, H. (2019). Biometric-based attendance tracking system for education sectors: A literature survey on hardware requirements. *Journal of Sensors*, 2019.
- Hoogervorst, J., Flier, H., & Koopman, P. (2014). Implicit communication in organisations: the impact of culture, structure and management practices. *Journal of Managerial Psychology*, 19, 288–311.
- Hsu, P.F., Kraemer, K.L. and Dunkle, D. (2006) Determinants of e-business use in us firms, "International Journal of Electronic Commerce", Vol. 10, No. 4, pp 9-45.
- Iqbal, I., & Qadir, B. (2012). *Biometrics Technology: Attitudes & influencing factors when trying to adopt this technology in Blekinge healthcare.*

- Kirmani, M. M. (2017). Impact of Biometric Attendance System on Secondary and Higher Secondary Educational Institutions Across J&K. *Oriental journal of computer science and technology*, 10(2), 291-297.
- Liyanage, P. M. T., & Liyanage, C. M. (2018). EFFECTIVENESS OF USING BIOMETRIC ATTENDANCE SYSTEM (FINGER PRINT) IN PUBLIC SECTOR: A CASE STUDY OF ABC UNIVERSITY, SRI LANKA.
- Longman, A. & Guttman, H. M. (2016). Project teams: how good are they? *Quality Progress*, 39, 59–65.
- Mandari, H., & Koloseni, D. N. (2016). Biometric authentication in financial institutions: the intention of banks to adopt biometric powered ATM.
- Mark, S., Philip, L., & Adrian, T. (2009). Research methods for business students.
- Mir, G. M., Balkhi, A. A., Lala, N. A., Sofi, N. A., Kirmani, M. M., & Mir, I. A. (2018). The benefits of implementation of biometric attendance system. *Oriental Journal of Computer Science and Technology*, 11(1), 50-54.
- Morosan, C. (2016). Opportunities and challenges for biometric systems in travel: a review.
- Morrison, J. M., Brown, C. J., & Smit, E. (2016). The impact of organizational culture on project management in matrix organizations. *South African Journal of Business Management*, 39, 27–36.
- Morrison, J. M., Brown, C. J., & Smit, E. V. D. M. (2016). A supportive organisational culture for project management in matrix organisations: A theoretical perspective. *South African Journal of Business Management*, 37, 39–54.
- National Housing Corporation Strategic Plan for 2016 - 2025
- National Research Council, & Whither Biometrics Committee. (2010). Biometric recognition: Challenges and opportunities.

- Pani A and Agrahari A, (2007), **Biometrics in emerging economies**: Theories and cases, Idea group publishing, USA.
- Pellegrinelli, S., Partington, D., Hemingway, C., Mohdzain, Z., & Shah, M. (2017). The importance of context in programme management: An empirical review of programme practices. *International Journal of Project Management*, 25, 41–55.
- Raghu V. and Agrawal D. (2016). *To assess the utility of biometric attendance system in improving the work efficiency of employees working in All India Institute of Medical Sciences, New Delhi*, *Sinhgad e-Journal of Nursing*, Vol. IV.
- Said, M. M., Misran, M. H., Othman, M. A., Ismail, M. M., Sulaiman, H. A., Salleh, A., & Yusop, N. (2014). Biometric attendance. In *2014 International Symposium on Technology Management and Emerging Technologies* (pp. 258-263). IEEE.
- Trabelsi, Z., & Shuaib, K. (2011). Implementation of an Effective and Secure Biometrics-Based Student Attendance System. *International Journal of Computers and Applications*, 33(2), 144-153.
- Waldersee, R., Griffiths, A., & Lai, J. (2013). Predicting organisational change success: matching organisation type, change type and capabilities. *Journal of Applied Management and Entrepreneurship*, 8, 66–81.
- Wang, Y.M., Wang, Y.S. and Yang, Y.F. (2010) Understanding the determinants of RFID adoption in the manufacturing industry, "Technological Forecasting and Social Change", Vol. 77, pp. 803-815.
- Yonazi J, (2012), **Biometric attending in Tanzania**: Report on from the biometric Security Mini-Conference (online): retrieved 31/12/2012:

Zhu, K., Kraemer, K.L. and Xu, S. (2006b), The process of innovation assimilation by firms in different countries: A technology diffusion perspective on e-business, "Management Science", Vol. 52, No. 10, pp 1557-1576.

APPENDICES

Appendix I: Research Questionnaire

My Name is **Mussa Patrick Kamendu**, a student at the Institute of Accountancy Arusha pursuing Masters of Information Security (MIS)). I request your humble and kind assistance to fill in the questionnaire supplied to you for a while. My research title is **“Challenges for biometric attendance systems implementation at National Housing Corporation in Dar es Salaam-Tanzania.”**

All the information will be used and kept confidentially and purposely for academics only.

Thank you in advance for your kind cooperation and dedicating your time.

PART A: GENERAL INFORMATION:

Tick (√) in the appropriate block

i. **Age** 20-28 29--39 40-50 51--61 62 and above

ii. **Gender:** tick the appropriate: male female

iii. **Marital status:** (Please tick the appropriate)

Single	Married	Divorce	Widowed

iv. **Educational level:** (Please tick the appropriate)

Primary and below education	Secondary education	Certificate	Diploma	Degree and above

v. Title

Management level	Senior officers	Middle level officers	Officers

vi. Working experience

Laborer	Services	Business	Formal Employed
1 – 3 years	4 – 6 years	7 – 10 years	Over 10 years

Part B: General questions regarding manual attendance system and biometric attendance system

- i. Were you facing difficulties in using manual attendance system?
 - a) Yes b) No
- ii. Were you facing more difficulties in using manual attendance system compared to biometric attendance system?
 - a) Yes b) No
- iii. Are you facing more difficulties in using biometric attendance system compared with manual attendance system?
 - a) Yes b) No
- iv. What is your general attitude towards biometric attendance system implementation in NHC?

- a) Positive attitude
- b) Neutral
- c) Negative attitude

Part B: CHALLENGES OF BIOMETRIC ATTENDANCE SYSTEMS IMPLEMENTATION AT NATIONAL HOUSING CORPORATION (NHC)

Research Question Two: What are the technological challenging factors in biometric attendance system implementation at NHC?

Please indicate your selections, based on your level of acceptance, by marking [✓],

5 = Strongly Disagree, 4 = Disagree, 3 = Neutral, 2= Agree, 1= Strongly Agree

Items		Rating				
		1	2	3	4	5
1	Frequently power failures compromise the use of biometric attendance system at NHC					
2	Internet failure affect Biometric attendance system performance					
4	user experience has negatively influence the implementation of biometric attendance system					
5	The biometric attendance system emphases on entry and exit details only					
6	Technological infrastructures discourage the biometric attendance system Implementation at NHC					
7	There is no enough monitoring on the implementation of biometric attendance system at NHC					
8	Remote monitoring by system officials compromise the biometric attendance system trust					

9	Maintenance costs for biometrics attendance system at NHC are relatively high					
---	-------------------------------------------------------------------------------	--	--	--	--	--

Research Question Three: What are the environmental challenging factors in biometric attendance system implementation at NHC?

Please indicate your selections, based on your level of acceptance, by marking [✓],

5 = Strongly Disagree, 4 = Disagree, 3 = Neutral, 2= Agree, 1= Strongly Agree

Items		Rating				
		1	2	3	4	5
1	Politicians use public biometric attendance system project as means of gaining popularity and power					
2	The government does not provides full support to the biometric attendance system in terms of maintenance costs					

3	The country policies has negative regards towards the use of biometric attendance system					
4	The biometric attendance system is legally recognized					
5	The nature of NHC organization discourage the implementation of the Biometric attendance system					

Research Question Four: What are the organizational factors affecting the implementation of biometric attendance system at NHC?

Please indicate your selections, based on your level of acceptance, by marking [✓],

5 = Strongly Disagree, 4 = Disagree, 3 = Neutral, 2= Agree, 1= Strongly Agree

Items		Rating				
		1	2	3	4	5
1	NHC Organizational structure has negative impact on biometric attendance system implementation					
2	Organizational systems and processes discourage the extent to which the biometric attendance system is going to be successful					
3	The organizational communications system discourage the use of biometric attendance system					
4	Degree of leadership in supporting the change on the implementation of biometrics attendance system					
5	The organization teamwork discourage the use of biometric attendance system					
7	Organizational culture influence the implementation of biometric attendance system					

THANK YOU FOR YOUR PARTICIPATION

Appendix II: Interview Guide

- I. What are technological challenges for biometric attendance system implementation at NHC?
- II. What are environmental challenges for biometric attendance system implementation at NHC?

- III. What are organizational challenges in biometric attendance system implementation at NHC?
- IV. What are employees' attitudes towards biometric attendance system implementation at NHC?
- V. What are the possible solutions towards biometric attendance system challenges at NHC?

Appendix III: Research Budget

S/N	ACTIVITIES	ITEMS	COST (TSH)
1	Research Preparation	Internet services	30,000
		Typing and Printing	80,000
		Photocopies	20,000
		Binding	60,000
		Transport	80,000
		Subtotal	220,000
2	Data Collection	Transport	450,000
		Meals and Accommodations	250,000
		Subtotal	750,000
3	Data Processing and Report Writing	Printing and Photocopies	100,000
		Binding	20,000
		Meals and Accommodations	80,000

		Subtotal	250,000
		Grand Total	1,170,000

Source: Researcher (2022) ****Source of fund:** Self sponsored

Appendix IV: Research Time Schedule

Activities	Dates (YEAR 2022)						
	Jan-Feb 2022	Feb -Mar 2022	July 2022	Aug 2022	September 2022	October 2022	November 2022
Topic Preparation							
Proposal Preparation							
Proposal Presentation							
Data Collection & Data Analysis							
Research Report Preparation & External Examiner							
Research Report Presentation							

