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AN ASSESSMENT OF THE EFFECT OF THE ADOPTION OF BIOMETRIC ATTENDANCE TECHNOLOGY ON THE PERFORMANCE OF THE EMPLOYEE OF THE KOMFO ANOKYE TEACHING HOSPITAL.

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DECLARATION

We hereby declare that this project is our own work towards the certification of our degree in Human Resource Management and that to the best of our knowledge, it contains no material previously published by another person or group of persons nor materials which has been accepted for the award of any Human Resource Management in university except where due acknowledge has been made in the text.

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DEDICATION

We dedicate this project work to Almighty God who has seen us throughout the work to its success, our parents for their love, care and support financially.

Our humble supervisor for his support and guidance throughout the work and our loved ones for their support and prayers.

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ABSTRACT

In Ghana, public worker absence is a key obstacle to delivering services to the populace. Beside the educational sector, the health sector is among the leading public sectors with low attendance. The purpose of this study is therefore to investigate the implication of the adoption of the biometric attendance management system on the performance of the employees at the Komfo Anokye Teaching Hospital in Kumasi. The quantitative and cross-sectional design study involved the survey of 200 staff of three clinical directorates (diagnostic, child and oral health) from the total sample size of 203 sampled through a multi-stage sampling method. Data collected through structured questionnaire administration was validated through exploratory factor analysis and further analysed using both descriptive and inferential statistical instruments. The inferential statistical tools used were Spearman's correlation and multivariate regression. The result showed that the biometric fingerprint technology employed at the Komfo Anokye Teaching Hospital largely covers areas such as employee attendance timing and employee identification. The biometric attendance system is perceived to have limited coverage in terms of payroll computation. The fingerprint biometric attendance technology has been installed in some directorates to record the attendance of employees as this system takes lesser time in recording and perceived better than the manual system. With the fingerprint time clocking system, employee attendance is easily captured in the healthcare institution through a computerized biometric clocking system that captures working hours of employees, provide detail audit trail of employee attendance and further ensure high level of data integrity. Thus, the biometric data system installed by the hospital is intrinsically connected to individual employees. The biometric fingerprint attendance management system of the

hospital is described as efficient and effective in the management of employee attendance. The system is perceived as secured, easy to use and capable of reducing the time wastage in recording attendance manually. The biometric attendance timing system, employee identification system and payroll computation system are all perceived to positively influence employee performance. Thus, the installed biometric fingerprint attendance system is perceived to have improved significantly the attendance of employees. The technology is reported to be challenged in several areas such as frequent breakdown, non-recognition of some fingerprints, funds for rolling out the system to other directorates, periodic denial of employee access, irregular power supply, delay or slow detection of fingerprint and possible long queues in front of the machine at closing time. The study therefore recommends the replication of the policy in all directorates and other hospitals in Ghana.

Key words: *Attendance, Absenteeism, Biometric System, Employee Performance, Fingerprint*

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LIST OF ABBREVIATIONS

ACRONYM	MEANING
APA	American Payroll Association
BAMS	Biometric Attendance Monitoring System
BARS	Biometric Attendance Recording System
EENT	Eye, Ear, Nose and Throat
FBI	Federal Bureau of Investigation
FRR	False Rejection Rate
FTE	Failure To Enroll
ID	Identification
IRB	Institutional Review Board
KATH	Komfo Anokye Teaching Hospital
KNUST	Kwame nkrumah university of Science Technology
NSTC	National Science & Technology Council
PC	Personal Computer
SMS	School of Medical Sciences
UK	United Kingdom

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Attendance is described as the action of being present at one place or event (Hoo & Ibrahim, 2019). Low level of attendance in the form of lateness and absenteeism among workers is a growing canker in many public institutions in developing countries (Davidson, 2014). Public sector absence is both common and resistant to reform in the developing world (Kocakulah, Kelley, Mitchell & Ruggieri, 2016). One explanation for this is that politicians provide public jobs with limited work requirements as patronage and hence the lowly nature of public sector performance. The poor performance and low commitment of public institutions in developing countries has largely been attributed to poor infrastructure, limited facilities and poor human resource or personnel (Nwoye, 2016). Nonetheless, these factors may not necessarily be the only reasons for the falling performance standards, but further steered by low attendance in form of high level of worker lateness and absenteeism in public institutions (Gajda, 2015). The records of attendance in public institutions are marked by poor punctuality, irregularity to duty and less useful hours put to work (Antoh-Baffoe, 2017).

In all institutions, staff attendance tracking is a common practice. It is highly important for one organization in order to maintain their performance standards (Shoewu, Olaniyi & Lawson, 2011). Nonetheless, there is enormous difficulty in effective and efficient tracking of attendance in public institutions in developing countries due to the persistent reliance on the manual or conventional staff attendance management system. In developing countries,

attendance control has traditionally been approached using time clocks and timesheets (Md & Rabindra, 2013). The traditional attendance method is done manually with workers having to sign in and out daily, providing details like name, employee ID, date, time, signature, etc., especially where enumeration of staff is based on number of days and hours put to work. This manual system takes little or no considerations on impersonation, falsification and the risk of loss of information in event of misplacement of attendance records, theft or disasters such as fire outbreak or flood (Kadry & Smaili, 2010; Shoewu, Olaniyi & Lawson, 2011). A further weakness of the manual system is error in the computation of the appropriate bonuses and deductions in the salary of employees (Kadry & Smaili, 2010). Also, to maintain the attendance records in the manual approach is a very inconvenient task (Cheng, Xiang, Hirota & Ushijima, 2005).

In an attempt to enhance the effectiveness and efficiency of worker attendance monitoring in public institutions in Ghana and ensure effective delivery of services and higher institutional performance, the Biometric Attendance System is gradually being introduced in some institutions like the Komfo Anokye Teaching Hospital in Ghana. Biometric attendance monitoring mechanism is deemed as human resource disciplinary policy perceived to increase the commitment and performance of employee in public institutions (Franklin &Pagan, 2006; Yudiatmaja et al., 2018). Biometrics is the combination of biological statistical analysis, computer science and engineering to get the physiological or behavioral characteristics of an individual (Ikuomola, 2014). Biometrics technologies verify identity through characteristics such as fingerprints, faces, irises, retinal patterns, palm prints, voice, and hand-written signatures and so on. Among these biometric

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authentication technologies, fingerprint is deemed the most mature and popular biometrics technology used in automatic personal identification (Obansola et al., 2016). The biometric fingerprint technology is therefore the commonest attendance verification and authentication method adopted by many institutions in Ghana. The fingerprint verification method satisfies uniqueness, stability, permanence and ease of capturing (Yudiatmaja et al., 2018). The fingerprint biometrics system offer an effective means of addressing time management by linking individuals to their personal human resource records and computerized employee clocking systems that incorporate biometrics that have the ability to accurately capture real time labour data (Shehu & Dika, 2011). Biometric technology can help in accurately tracking employee time and attendance, which can assist in preventing time theft by ensuring that employees arrive at the work place on time and leave at the right time after duty (Ononiwu & Okorafor, 2012). The adoption of any form of biometric attendance system is perceived to provide a disciplinary direction for employees, enhance commitment and improves institutional performance (Maggay, 2017). This study therefore seeks to investigate the effect of the adoption of biometric attendance technology on the performance of the Komfo Anokye Teaching Hospital in Ghana,

1.2 Problem Statement

In Ghana, public worker absence is a key obstacle to delivering services to the populace. In Ghana, beside the educational sector, the health sector is among the leading public sectors with low attendance. Lateness and absenteeism is recognized as a critical challenge in even developed countries as there was a total of 2.8 thousand days missed among the 113,154 full-time wage and salary employees in the United States of America in 2017

(Pavithra, Barani & Lingaraja, 2017). Lateness is also estimated to cost business in the United States of America more than $3 billion each year (DeLonzer, 2005), with absenteeism also estimated to cost about 15% of payroll cost (Navarro & Bass, 2006). Employees in the UK also anticipate paying at least £500 per employee each year in absenteeism costs (Gajda, 2015). In the Northern Ireland, about £250 million is reported to have been lost to the economy due to absenteeism of staff in the public sector (Maggay, 2017). The situation is likely to be worse in public institution in developing countries like Ghana that is still largely reliant on the manual attendance monitoring system due to the cost of the adoption of biometric attendant system. Nonetheless, the manual or traditional system of attendance management has failed to efficiently and effectively manage attendance to yield high productivity and performance in public institutions in Ghana. The Komfo Anokye Teaching Hospital (KATH) with the view to improve efficiency in monitoring attendance, leave records, payment of responsibility allowance and over all working environment has introduced a Biometric Attendance System which is aimed at ultimately replacing the manual system of monitoring attendance in the Hospital. This Biometric Attendance System stores the digital codes made up of staff fingerprints. This policy covers all KATH-employed staff, KNUST staff who provide services at the hospital, residents from other health facilities pursing various postgraduate programmes in the hospital and National Service personnel without any exception. More so, there is scarcity of research on the shift from the manual attendant management system to a biometric system in Ghana. This study therefore seeks to contribute in filing the research gap by investigating the adoption of biometric attendance technology on the performance of the employee of KATH.

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1.3 Research Objectives

This study looks at two main forms of objectives. They are the general objective and the specific objective of the study.

1.3.1 General Objective

The general objective of the study is to investigate the implication of the adoption of the biometric attendance management system on the performance of the employees at the Komfo Anokye Teaching Hospital in Kumasi.

1.3.2 Specific Research Objective

The study also specifically seeks to:

1. Determine the level of adoption of biometric attendance system at KATH;
2. Examine the effect of the biometric attendance system on employee performance at KATH;
3. Identify the challenges of KATH in the adoption of the biometric attendance system.

1.4 Research Questions

The research questions of this study include:

1. What is the level of adoption of biometric attendance system at KATH?
2. What is the effect of the biometric attendance system on employee performance at KATH?
3. What are the challenges of KATH in the adoption of the biometric attendance system?

1.5 Significance of the Study

This study could be enormously significant to several stakeholders in Ghana. The beneficial stakeholders include policy makers, managers of businesses in Ghana, workers and researchers. The enormity of the problem of lateness and absenteeism in public institutions in Ghana and the hefty cost associated with the problem makes it essential to policy makers. Policy makers in the country are persistently looking for strategies to reduce lateness and absenteeism in the health sector in order to improve healthcare outcomes. This study could therefore provide adequate information on the feasibility and the significance of the adoption of biometric attendance management technology in terms of performance of institutions. Thus, this study could guide policy makers in the design of more effective and efficient policies in the attempt to minimize the level of lateness and absenteeism in the public sector. The managers of public institutions in Ghana could also be guided by the study to examine the feasibility of the adoption of biometric attendance management system as a means of minimizing the level of lateness and absenteeism in public institutions in Ghana. The implementation of the biometric management system in public institutions through the guidance of this study could be beneficial to the workers in the sector. The system would provide adequate information or records on attendance of workers and hence compensate them accordingly. Nonetheless, workers that flout attendance rules could also be detected through the biometric records and punished accordingly.

Notwithstanding the enormity of the problem of attendance in public institutions, studies on the subject of biometric attendance management technology are limited in Ghana. Moreover, the limited studies on the subject of biometric attendance management

technology adoption have largely failed to investigate its nexus with employee performance in the public sector. This study therefore seeks to contribute to the provision of baseline for researchers on the subject of biometric attendance management technology through the examination of the nexus between the adoption of the biometric attendance management technology and the performance public institutions in Ghana.

1.6 Scope of the Study

Conceptually, the study focuses on the level of adoption of biometric attendance system, effect of the biometric attendance system, employee performance attributed to the biometric attendance system, and the challenges of the adoption of the biometric attendance system. Geographically, the study focuses on the clinical and non-clinical directorates of the Komfo Anokye Teaching Hospital in the Ashanti region.

1.7 Limitation of the Study

The researcher encountered several difficulties or limitations in the study. It was extremely difficulty in getting the head of the directorates of KATH to offer their consent and assistants in the data collection process. Most of the staff were also less willing to partake in the administration of the questionnaire as they feared victimization. However, the researcher explained vividly the merits of the study and the possibility of participant anonymity to the participants. This activity eventually increased staff participation in the study.

1.8 Organisation of the Study

The study is organized in five chapters. The Chapter One embodies the introduction to the study. The introductory part of the study constitutes the background to the study, the statement of the problem, research objectives, research questions, significance of the study, scope of the study and limitations of the study. The Chapter Two reviewed both theoretical and empirical literatures related to the adoption of biometric attendance management system. The Chapter Three discussed the methodology of the study and profile of the organisation selected for the study. The Chapter Four involved data presentation, analyses and discussion. The Chapter Five involved summarizing the key findings of the study, concluding and making reasonable recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews literatures related to the concept of biometric attendance management system. The review emphasized on the theoretical foundation of the study, the main concepts of the study and empirical studies related to the study. The concepts discussed were biometric attendance system and employee performance. The empirical review emphasized on the nexus between biometric attendance management system and employee performance. The chapter also discussed the various challenges of the adoption of biometric technology system. The last section also provided a conceptual framework guiding the study.

2.2 Theoretical Framework of the Study

The study adopted Andrew Feenberg's Critical Theory of Technology. Andrew Feenberg argues that technology is neither determining nor neutral, it is in a sense, a mediator of a variety of social activities, and as such he believes that democracy in the workplace must be extended beyond its traditional boundaries to include technology for society (and its relationship with technology) to keep up with the trend and do better than sustain (Gabriel, 2017). Andrew Feenberg further stated two rationales behind this: (1) Modern technology is incompatible with workplace democracy. There can be no democratic theory that would destroy the economic foundations of society. More so, in the workplace technology largely seeks to eliminate lapses and inefficiencies. The second rationale, which is: (2) Technology is not responsible for the concentration of industrial power; that is a political matter. By the

use of this new technology (BARS) in the workplace like the Komfo Anokye Teaching Hospital, it is not just a rational control of nature; both its development and impact are intrinsically social, and broadly economical. This study focused on the analysis of the effect of the use of Biometric Attendance System on the performance of the Komfo Anokye Teaching Hospital. In the context of this study, Andrew Feenberg perceives that the human resource management practices of an Organisation could possibly be mediated by technology in the form of biometric attendance management system, which could eventually result to increasing work outcomes.

2.3 Biometric Attendance System

The identification method of human presence quantitatively is developed by Alphonse Bertillon. The method was used in the United States to identify prisoners until 1920s (Wayman et al., 2005). The method uses biometrics technology to book the presence of the people. Biometrics are measurable physical and behavioural characteristics that enable the establishment and verification of an individual's identity (Hoo & Ibrahim, 2019). Biometrics is the use of computers to recognize people, despite all of the across-individual similarities and within-individual variations (Wayman et al., 2005). Biometrics is one of the branch of Biology combined with statistical data and quantitative analysis. Biometrics technology generates various identification method and verification of the human presence broadly adopted by many organizations. The biometric technology is also employed in many organisations for managing worker attendance. Biometric patterns can be anything from fingerprints, iris (eye) scans, palm prints, gait, facial recognition, or even voice recognition.

Biometric attendance management system is the act of managing attendance or presence in a work setting using biometric technological devices, which maximizes and motivates employee attendance thereby minimizing loss (Shakil & Rabindra, 2013). Several forms of biometric technology have been in existence for centuries for the purpose of identification. One of the oldest forms of biometrics is the recognition of the human face because facial characteristics are matched within the memory of humans (Verma & Khan, 2016). Civilization became larger and other methods arose, such was documenting images in portraiture. For instance, in 1434 the Arnolfini marriage was painted by Jan Van Eyke for the purpose of marriage certificate (Tuller, Dhawan, Simon, Lee & Ward, 2006). In the mid-1960s, the face recognition system as a relatively new concept was developed (NSTCS, 2006). An administrator was required to point out certain body features like eyes, ears, nose and mouth on photographs before the distance and ratio are calculated to a common reference point which is then compared to a reference data (NSTCS, 2006). It is also emphasized that the lip thickness and hair were used as specific subjective markers by Goldstein and Lesk in the 1970s to automate recognition. Biometric technologies include fingerprint, iris, hand geometry, handwriting signatory, voice recognition, facial scan, palm print, keystroke and gait recognition. Fingerprints are considered to be the best and fastest method for biometric identification. They are secure to use, unique for every person and do not change in one's lifetime (Md. & Rabindra, 2013). Fingerprint authentication has been in use for the longest time and bears more advantages than other biometrics. It has been verified through various applications. In 1924, Federal Bureau of Investigation (FBI) is already known to have maintained more than 250 million civil files of fingerprints for the purpose of criminal investigation and the identification of unknown casualties. It now is

being used in numerous field including financial, medical, e-commerce and customer application as a secure and effective authentication method. Fingerprint biometric system is the most common biometric system employed in the management of attendance in many organisations in Ghana and hence forms the base for this study.

2.4 Existing Biometric Technology and Its Usefulness in Various Sectors

The origin of biometrics has been in the public sector; however biometrics is used for the identification and verification of criminals (Jiexun, Wang & Chen, 2011). Other sectors where biometrics has also thrived are the Banking, Education and Health sectors. For example, emerging application markets include biometrically enabled transactional payment solutions and biometrically enables wireless for business use. Some European banks use the 3D facial recognition of employees into bank buildings, thereby eliminating the issue of keys been lost, stolen or misused (Capoor, 2006). Furthermore, biometric application has been useful in various other sectors which include the Government using it for the purpose of stopping terrorist attacks and fighting crimes. After the 9/11 incident, the Yeager Airport in Charleston introduced the biometrics system, which is used to secure access to its control tower (Dubin, 2011). Also, the biometrics system has been very useful in the Education sector where it has assisted students in the borrowing and returning of books out and into the library respectively. The positive impact of biometrics to the health sector cannot be left out has it has helped in stopping fraud where some healthcare bill for services they never performed. A palm scanner which reads a patient's unique vein pattern was implemented in Sharp Healthcare in San Diego for the purpose of stopping patient identity theft, the system was known to be very secure and performed efficiently well for

its purpose (Kreimer, 2010). Furthermore, biometrics can be integrated with other systems for it to carry out its purpose of identification. Various homeland security databases require the use a card access system integrated with a biometric technology to gain access (Zalud, 2010). In the context of this study, the emphasis is on examining the effect of the fingerprint biometric technology adopted at KATH, a premier or tertiary hospital in Ghana.

2.5 Biometric and Staff Attendance

Biometrics is the detailed measurements of the human body. Biometrics deals with automated methods of identifying a person or verifying the identity of a person based on physiological or behavioural characteristics (Bistarelli, Boffi & Rossi, 2003). Fingerprints are graphical flow-like ridges present on human fingers; their formations depend on the initial conditions of the embryonic mesoderm from which they develop (Jain et al., 1997). With fingerprint authentication technology, it is easier to track employee's time and attendance with the touch of a finger. Biometric fingerprint authentication is the most accurate way to collect employee's time and attendance information. It verifies an employee's identity based on the characteristics of their fingerprint (BioElectronix, Inc. 2012).

The American Payroll Association (APA) estimates that time theft, tardy arrivals, buddy punching, lollygagging (wasting time getting to the work area), extended breaks and early departures costs businesses 1.5 to 5 percent of gross payroll, amounting to hundreds of billions of dollars every year. Industry studies support these estimates and in recent APA surveys, employees were reported to be stealing an average of 4.5 hours each week,

equivalent to a six-week paid vacation per year. According to a Nucleus Research study, buddy punching is experienced by 74 percent of organizations (Liz, 2012). However, technological advances in biometrics have now made this surprisingly affordable and popular. The Biometric Fingerprint reading sensor scans any fingerprint in under 1 second; this in turn will make clocking in and out much faster for employees and at the same time save company time and money by paying employees for the exact time they work. The company can also reduce costly payroll and data entry errors caused by the old time card system (BioElectronix, Inc. 2012).

2.6 Level of Adoption of Biometric Attendance System

Biometric technology that involves the identification and verification of individuals by analyzing the human body characteristics has been widely used in various aspect of life for different purposes, most importantly in regard to employee's attendance in the developed world (Verma & Khan, 2016). Currently, 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 (German & Barber, 2018), the 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. The most widely employed biometric technology involves finger scanning that had a market share of 52% and 48% in 2003 and 2004 respectively (McHale, 2003; International Biometric Group, 2005). The finger scan is subsequently followed by facial scan, hand scan and iris scan with market shares of 12%, 11% and 9% respectively in 2004 (International Biometric Group, 2005). In addition to being the most widely used

biometric, fingerprinting is also one of the oldest and most well researched biometric technology. Because it is a widely used, well-documented, and mature technology, costs for the deployment of finger-scan-based technologies are relatively low. The study of Yudiatmaja et al. (2018) emphasized that almost all of public organizations in Indonesia have implemented biometrics technology in identifying the presence and the return of employee from the office, mainly using fingerprint method.

Notwithstanding the fact that biometric timekeeping technologies are more secured, cost effective and less susceptible to frequent breakdown than traditional timekeeping methods, the level of adoption in Ghana is still immature and underdeveloped (Ami-Narh, Aziale & Akanferi, 2014; Hoo & Ibrahim, 2019).

2.7 Employee Performance

Performance of employees related to their jobs has been a major concern for both organizations and researchers. For decades, organizations and researchers have been seeking diverse means to enhance or improve employees' performance. Thus, in its simple definition, job performance is the employees' behaviours or actions associated to the aims or goals of the organization in question (McCloy, Campbell, & Cudeck, 1994). Performance is defined as a variable having multiple dimensions and distinct components and elements according to the job (McCloy et al., 1994). Porter and Lawler (1968) argued that attitudes influence performance. For instance, previous researchers, Ibrahim and Brobbey (2015), Ganta (2014) and Muogbo (2013) provided evidence indicating that employees' motivation as a policy factor affects or influences job performance which is a

behavioral variable. Biometric fingerprint technology is also perceived as an effective human resource tool for stimulating high employee performance through influence on attitude (Akinbowale, Lourens & Jinabhai, 2013; Wanjala & Kimutai, 2015). In the context of this study, employee performance was measured using indicators like quantity/quality of the work, planning/organization, initiative/commitment, teamwork/cooperation, early attendance and communication.

2.8 Effect of the Biometric Attendance System on Employee Performance

Biometric attendance systems are beneficial to firms as they ensure higher level of accountability, accurate identification and time saving which are all associated with increasing output (Verma & Khan, 2016). Several studies carried out in varying sectors of the economy in different geographical environment have reported positive effect of the adoption of the biometric attendance system on worker productivity and eventually firm performance (e.g., Shakil & Rabindra, 2013; Boateng, Asiamah & Lamptey, 2015; Verma & Khan, 2016; Villaroman et al., 2018; Yudiatmaja et al., 2018). These studies have emphasized on improved regulatory compliance, stronger company culture, decreased burden of person(s) or departments, increased productivity and eventually firm performance as the associated positive effects of biometric attendance management system adoption in an organisation. For the industrial sector attendance management system can develop alacrity among the workers to work regularly and also help them to motivate their co- worker to attend work regularly. However, it should be emphasized that biometric attendance management system does not only affect productivity and firm performance, but can cost the company profits or even additional contracts (Shakil & Rabindra, 2013).

The qualitative exploratory study of Verma and Khan (2016) reported that biometric identifier as HR practice is effective and economically efficient for employee attendance management as it has the capacity to increase employee productivity and organizational performance. In the study of 44 public employees from the Board of Cultural Preservation and Language Office of Kepulauan Riau in Indonesia, Yudiatmaja et al. (2018) reported that the adoption of fingerprint and monitoring have significant influence on work discipline that is perceived to be associated with increasing organizational performance (Mangkunegara & Waris, 2015; Thaief et al., 2015). Biometric Attendance Monitoring System (BAMS) have also been reported to greatly contribute in giving employees' ease and improving work values (Gajda, 2015). Likewise, the BAMS is essential in achieving good governance because it helps track day-to-day attendance of the employees (Gajda, 2015). The study of Boateng, Asiamah and Lamptey (2015) indicated that the biometric fingerprint system has impacted positively on the attitude of staff with regard to punctuality and regularity to work. The Aberdeen Group, a Hart-Hanks Company (2008) reported that time and attendance systems have become the very cornerstone for laying the foundation for effective workforce management systems. The new benchmark report stated further that 88% of organisations that achieved Best-in-Class status have partially or fully automated their time and attendance data collection. In doing so, 65% have improved the accuracy of their time data; 60% have increased their revenue per employee; 59 have decreased their overtime as a percentage of total labour costs; and 47% have decreased their labour costs. The study of Nwoye (2016) reported that the the adoption of biometric attendance system saves time, eliminates the crude manual method of signing in/out each day at work and also eliminates the problem of impersonations and falsifications in the management of employee

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attendance to work. In the assessment of the impact of the use of Biometric Attendance Recording System (BARS) on the work performance of Cabanatuan City Government employees, Villaroman et al. (2018) reported that the majority of the respondents perceived that the use of BARS had a positive impact on work performance. This perception was eventually confirmed by the report of a significant increase in respondents' level of performance. The study of Indrayani (2014) emphasized that biometric systems can increase productivity and efficiency as well as reduce job turnaround time in checking the accuracy of the data with the card owner.

2.9 Challenges of the Adoption of the Biometric Attendance System

Beside the various benefits that can attained through the adoption of biometric technologies, the adoption and usage of the technology is deterred by several factors mentioned in several studies (e.g., Boateng, Asiamah & Lamptey, 2015). Despite the numerous advantages of the biometric system and its impact to various work sectors across the globe, most biometric technology users face the issue of defining the right and accurate biometric technology system that will be cost effective in solving particular problems in specific environment (Verma & Khan, 2016). The study of Boateng, Asiamah and Lamptey (2015) indicated that the adoption of the biometric fingerprint system is disturbed by challenges such as irregular power supply, frequent breakdown of the machine, non-recognition of some fingerprints and long queues in front of the machine at closing time of work. The review of Cristian (2016) on the opportunities and challenges for biometric systems in travel reported several challenges of the biometric adoption such as privacy, fear of harm resulting from using the system, and general user anxiety. On the exploration of

the challenges of biometric technology adoption in Namibia, Erastus, Jere and Shava (2015) reported several challenges or factors hindering the adoption of the biometric technology to include the availability of reliable biometric security technology suppliers, finances to fund the rolling out of biometric security, users' or stakeholders' acceptance, electricity to power the equipment, operational challenges as a result of poor coordination between government and service providers, logistics challenges in laying out the design of the distribution of biometric security etc.

A successfully implemented biometrics application can help organizations address complex authentication issues. While it seems natural to expect that biometrics should be booming, in reality, only a few businesses and government agencies are testing or have deployed biometrics. Skeptics say the technology is still too expensive, is not foolproof, can be hard to integrate with other systems and requires employees to change the way they work (Down & Sands, 2004). In circumstances that biometric technologies are not foolproof, interest probably will not start growing until biometrics systems overcome technical problems related to the reliability of the biometrics application. Also, the cost of deploying biometric readers on every door leading into a building or every PC on a network can be an expensive proposition. Hardware and software costs may not be the only consideration as the organization must bear in mind the associated complexity involved in enrolling new users and administering usage training (Down & Sands, 2004). There are also concerns about the accuracy of biometric technology usage as verification and positive identification systems may allow unauthorized users to access facilities or resources as a result of incorrect matches. In a negative identification system, the result of a false match may be to deny access. There are also issues of employee resistance to change (Down &

Sands, 2004). As with many technologies, some users would rather not change the way they do things. For example, some users have the perception that using a username and password to log onto a system is faster than using a fingerprint scanner. This perception may arise from frustration related to the FRR, a performance measure that tracks the percentage of times an individual who should be positively accepted is rejected.

More so, a scanner requires frequent maintenance because screens/sensors tend to retain an obstructing build-up of user skin oil and residue (Bolle, Connell, Pankanti, Ratha, & Senior, 2004). Performance can deteriorate over time, both because of aging of the users (and wearing away of fingertips) and because of the need for system maintenance (Nanavati, Thieme, & Nanavati, 2002). Finger scan biometrics are obviously not appropriate for users with missing hands or hand disabilities. Performance levels deteriorate among users who have hand tremors because the presentation of biometric data will be distorted (Feder, 2003). Performance levels of the device can also deteriorate when users' fingers are either overly dry (a certain amount of normal skin moisture is needed for an accurate reading) or overly moist/oily (as from too much hand lotion) (Feder, 2003).

There is a small but significant failure to enroll (FTE) rate even among a population with hands and without disabilities. The FTE rate for finger scans is estimated at 2–10% and is attributed to persons with genetically indistinct prints, scarred fingers, dry skin, and fingerprints worn down by age and/or manual labor (Bolle et al., 2004; Hill, 2001; Nanavati, Thieme, & Nanavati, 2002). Perhaps the biggest weakness of finger scan, however, has nothing to do with the accuracy and reliability of the technology. Instead, it

relates to user acceptance. Because of finger scan's association with law enforcement and criminality, finger scans are often not readily accepted by users who dislike the technology's "taint" with forensic applications and who may worry that finger scan biometric data will be used for other purposes (Bolle et al., 2004; Hill, 2001; Nanavati, Thieme, & Nanavati, 2002; O'Gorman, 2003; Saccomano, 2003; Zhang, 2002). According to Chirillo and Blaul (2003), "Another reason fingerprint technology is not highly accepted is that it may require individuals to share or touch the same device that others touch" (p. 24).

However, the current landscape of biometric projects is littered with pilots that have been unable to scale through issues including low accuracy performance, high costs and low interoperability between vendors. One problem is that, to date, no biometric system has been built specifically for use in the developing world, especially remote, rural settings where environmental conditions are harsher – high temperatures, pernicious dust and humidity, and worn or rough fingerprints can wreak havoc on sophisticated device performance and longevity. Again, an absence of interoperability standards and open systems creates insurmountable barriers to scale for many governments and development organisations, operating in parallel. Technology and systems turnover leads to rapid obsolescence, often accompanied by loss of support systems for the technologies invested in (Storisteanu et al., 2016).

In similar vein, studies have also enumerated privacy, fear of harm resulting from using the system, and general user anxiety as key challenges to the adoption of the biometric system

(Cristian, 2016). Privacy is generally viewed as a selective disclosure of personal information founded on the equilibrium between one's private life and his/her accepted social identity (Margulis, 2003). Biometrics and privacy have an intertwined history, which serves as a basis for their continuous evolvement. As biometric applications are continuously developed, privacy concerns arise as a critical topic for government agencies, scholars, and, most importantly, for the public (Ratha, Connell, & Bolle, 2001). The intimate character of biometric information is viewed as one of the most important concerns of consumers (Murphy & Rottet, 2009). While some consumers view certain biometric modalities as popular (i.e., fingerprint) due to their historic utilization, others view them as very intrusive (i.e., retinal recognition) (Bolle et al., 2004). Other consumers are concerned that, by using biometric systems, they leave behind a trail of information that is very personal in nature (Jain, Bolle, & Pankanti, 1999), which can reveal sensitive information about themselves (i.e., retinal images can reveal facts about certain medical conditions). Another important drawback of biometrics is irrevocability. Biometrics leave a trace of information that is very personal in nature, which, unlike passwords or tokens, cannot be revoked (Newton, 2009). In addition, the ownership of biometric information is also an important concern. There have been concerns about storing too much personal information (Lumsden & Beldona, 2006) and about the security of that information, since biometric information is always linked with the individual user (Prabhakar, Pankanti, & Jain, 2003). However, as the technology matures, and as there is no evidence of mishandled or leaked biometric information, it appears that natural concerns about data ownership are unjustified.

There is also the possibility of the challenge of fear of physical harm and general user anxiety (Cristian, 2016)**.** Another concern about biometric technology is the fear of suffering physical harm as a result of using the system. As some biometric modalities require that users interact with or touch the reading sensor (i.e., fingerprinting), it is natural that some consumers become concerned about the hygiene of the sensor (Kim, 2009). Others have expressed concerns about getting in the close proximity of the sensor while using iris recognition modalities (Kim, 2009). However, to date, there are no known cases of harm caused by using biometric systems. In addition to the fear of harm, some users may feel generally apprehensive toward the use of information and communication technology (Kim & Forsythe, 2008), developing feelings of anxiety toward technology. Intuitively, biometric technology makes no exception.

2.10 Conceptual Framework

In many public institutions in Ghana, a major human resource challenge is the management of attendance. Attendance management is the act of managing attendance or presence in a work setting, which maximizes and motivates employee attendance thereby minimizing loss (Villaroman et al., 2018). The traditional system of attendance management is done manually with workers having to sign in and out daily, providing details like name, employee ID, date, time, signature, etc., especially where enumeration of staff is based on number of days and hours put to work. This manual system takes little or no considerations on impersonation, falsification and the risk of loss of information in event of misplacement of attendance records, theft or disasters such as fire outbreak or flood (Kadry & Smaili, 2010; Shoewu, Olaniyi & Lawson, 2011). In order to overcome these challenges, the

conventional or biometric fingerprint method of managing attendance has become a perfect alternative. The adoption of the biometric system of managing attendance is justifiable as several researchers reported positive effect of the technology on employee productivity (e.g., Shakil & Rabindra, 2013; Boateng, Asiamah & Lamptey, 2015; Verma & Khan, 2016; Villaroman et al., 2018; Yudiatmaja et al., 2018). Nonetheless, the extent of the effect of the biometric fingerprint system of attendance management on employee performance is reliant on the several control variables like the gender of worker, age, marital status and working experience. The discussed nexus between the dependent variable (employee performance), the independent variable (biometric fingerprint system) and the control variables is shown in Figure 2.1.
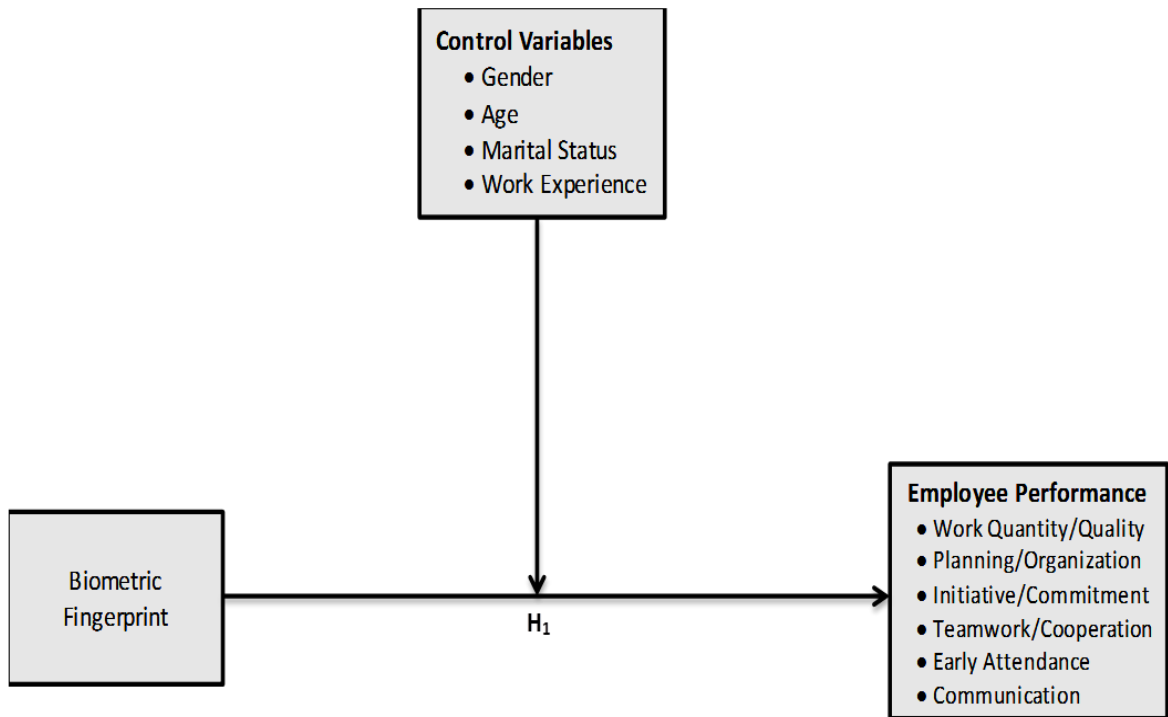
Figure 2.1: Nexus between Biometric Fingerprint and Employee Performance

Source: Author's Construct (2019)

2.11 Chapter Two Summary

This chapter largely discussed the concept of biometric attendance management system. Biometric attendance management system is the act of managing attendance or presence in a work setting using biometric technological devices, which maximizes and motivates employee attendance thereby minimizing loss. The chapter also emphasized the usefulness of the technology in various sectors. The main sectors of the economy mentioned to have provided suitable adoption conditions for the technology were banking, education and health sector. The chapter also discussed the level of adoption of biometric attendance system. The technology has seemingly been employed in many sectors in the developed

world. Nonetheless, the chapter emphasized that there is limited adoption among developing countries, especially among institutions in Africa. The last part of the chapter reviewed empirical literatures on the nexus between the adoption of the biometric attendance management system and employee performance. The extant of literature on the subject reported positive relationship between the biometric attendance management system and employee performance.

CHAPTER THREE

RESEARCH METHODOLOGY AND STUDY SITE

3.1 Introduction

The research methodology of the study and the study site are discussed in this chapter. The chapter initially discusses the merits of the study site selection. The study type and design, the study population, sampling process (size calculation and method of sampling), study variables, data collection techniques and tools, data handling and analysis, ethical consideration, study assumptions, limitations, reliability and validity are also examined in this chapter.

3.2 Study Site

Komfo Anokye Teaching Hospital (KATH) is located in Kumasi, the Regional Capital of Ashanti Region with a total projected population of 4,780,380 (2010 Ghana Population Census). The hospital also known as GEE, is the second-largest hospital in Ghana and the only tertiary health institution in the Ashanti Region and hence an facility in the delivery of quality healthcare within the health system of Ghana. The hospital became a Teaching Hospital in the training of Medical Students following the establishment of the School of Medical Sciences (SMS) of the Kwame Nkrumah University of Science and Technology, Kumasi in 1975.

The Hospital currently has a work force of about 4,000 workers with varied professional backgrounds offering quality clinical and non-clinical care and training to the people of Ghana and beyond. For ease of administration and specialisation, the hospital has been

divided into 17 Directorates made up of thirteen clinical Directorates and four non-clinical Directorates. There also a number of supporting clinical and non-clinical Units. The clinical Directorates are Emergency Medicine, Surgery, Trauma and Orthopaedics, Medicine, Obstetrics and Gynaecology, Child Health and Family Medicine. The rest are Oncology, Eye, Ear, Nose and Throat (EENT), Laboratory Services, Radiology, Oral Health and Anaesthesia and Intensive Care Directorates. The non-clinical Directorates are Domestics Services and Technical Services. Within and among these directorates, information dissemination is essential to in the delivery to timely, efficient and quality healthcare.

The geographical location of this 1200-bed hospital, the road network of the country and commercial nature of Kumasi make it accessible to all parts of the country. No wonder it takes direct referrals from 12 out of the 16 administrative regions in Ghana. These are the Ashanti, Bono, Bono East, Ahafo, Western North, Savannah, Northern, North East, Upper East, Upper West and some parts of the Central and Eastern regions of Ghana. It also receives patients from neighbouring countries such as Ivory Coast and Eastern Faso. Thus, the status of this hospital in healthcare system of Ghana justifies its selection for the study. The Management of Komfo Anokye Teaching Hospital (KATH) with the view to improve efficiency in monitoring attendance, leave records, payment of responsibility allowance and over all working environment has introduced a Biometric Attendance System which is aimed at ultimately replacing the manual system of monitoring attendance in the Hospital. This Biometric Attendance System stores the digital codes made up of staff fingerprints. Staff are required to clock in and out their attendance in the devices designated for their directorates/units in the hospital. The policy aims at ensuring adequate staffing, positive

employee morale and to meet expected productivity standards throughout the hospital. The policy covers all KATH-employed staff, KNUST staff who provide services at the hospital, residents from other health facilities pursing various postgraduate programmes in the hospital and National Service personnel without any exception.

3.3 Study Type and Design

The study is quantitative in approach and cross-sectional in design. The quantitative research approach is deemed appropriate for this study as it seeks to evaluate existing theories on the effectiveness of biometric fingerprint technology in monitoring and supervising employee attendance. Quantitative research study designs are broadly classified either as descriptive versus analytical study designs or as observational versus interventional (Omair, 2015). Descriptive study designs include Case report (Single case), case series (Collection of similar cases), correlational (Population based study - using secondary data), and cross-sectional (Single sample from larger population- no comparison) (Omair, 2015).

Based on the specified objective of the study, the cross sectional design will be employed to evaluate the level of level of adoption of biometric attendance system at Komfo Anokye Teaching Hospital. In medical research and social science, a cross-sectional study is a type of observational study that analyzes data from a population at a specific point in time (Lavrakas, 2008). It is the commonest and easiest design employed in medical journals. Depending on population accessibility and the sample size, this form of survey can be completed in a relatively short time period. This design largely involves taken a

representative (cross-section) from the population to generalize the findings for the population of the study (Levin, 2006). In this study, it is imperative to sample through random selection process. This design is deemed appropriate for this study as it perfectly useful for determine the prevalence of an outcome. In the context of this study, this design will be employed in determine the level of adoption of biometric attendance system and the effectiveness of the system.

3.4 Study Population

The target population of the study constitutes all the staff of the various clinical directorates of the Komfo Anokye Teaching Hospital. The hospital has thirteen clinical directorates. However, not all the clinical directorates were included in the study. Three clinical directorates will be selected for the study. Thus, the accessible population constitutes all the staff of the three selected directorates for the study. Therefore, all staff of clinical directorates outside the randomly selected three clinical directorates and two non-clinical directorates will be excluded from the study. The distribution of the proposed study population or the accessible population is shown in Table 3.1.

Table 3.1: Distribution of the Accessible or Study Population

Clinical Directorates	Health Workers	Administrative	Total
-Diagnostics	108	16	124
-Child Health	118	32	150
-Oral health	122	18	140
Total	**348**	**66**	**414**

Source: HR Department of KATH (September, 2019)

3.5 Sampling

3.5.1 Size Calculation

Two stages were employed in the sample size calculation method. The first stage (Stage I) involved the calculation of the general sample size of the staff of the three directorates using the formula developed by Yamane in 1967. This formula was used to calculate the sample sizes for the total sample size. The total sample size of 302 was obtained using the 95% confidence level and precision (P) of 0.05. The second stage (Stage II) involved the calculation of the sub-sample sizes of the directorates using the Krecjie and Morgan formula developed in 1970. The Krecjie and Morgan formula ensures proportionate distribution of the sample size on the basis of the strength of the sub-populations of the directorates in the total study population. The formulas and their calculation procedures are shown below. The distribution of the sample size by directorates is shown in Table 3.2.

$$n_{ss} = \frac{N_{RP}}{1 + N_{RP}(\alpha_E)} = \frac{414}{1 + 414(0.05)^2} = \frac{414}{2.035} = 203 \text{ Staff ..... Stage I}$$

where
n_{ss} = Sample Size
N_{RP} = Study Population
α_E = Level of Precision

$$s = \frac{XS}{P} \text{............ Stage II}$$

s = Sub-sample size for each directorate

X = Sub-population of staff in each directorate

S = Total sample size for the study

P = Total population of staff of the 3 directorates

Table 3.2: Distribution of Sample Size Directorates

Clinical Directorates	Population	X(S)/P	Sample Size
-Diagnostics	128	128(203)/414	**63**
-Child Health	152	152(203)/414	**75**
-Oral health	144	144(203)/414	**71**
Total	**414**	**414(203)/414**	**203**

3.5.2 Method of Sampling

The staff of the selected directorates will be sampled through a multi-stage sampling procedure. The first stage of the multi-stage sampling procedure will involve the selection of three from the thirteen clinical directorates of KATH through simple random by balloting. Simple random is employed at this stage as all directorates were perceived homogeneous in term of the usage of the biometric fingerprint technology. In the second stage, staff within each selected directorate will be stratified into health and administrative through stratified sampling method. In the third stage, simple random by balloting will also be used in selection of the calculated sub-sample sizes of staff from each directorate. The simple random sampling process involved the representation of staff within each directorate by strips of papers, shuffled in a container and the required sub-sample size picked

randomly without replacement. Simple random is suitable at this stage as staff in each directorate are homogenous in terms of their directorate and being administrative or health workers within a directorate.

3.6 Data Collection

This section of the study discusses the data collection method employed. The selection of the method was based on the specifically defined objectives.

3.6.1 Data Collection Techniques and Tools

Quantitative data collection techniques will be employed in the study. The study will depend on a survey method of data collection. The survey will be carried through questionnaire instrument. The structured questionnaire format will be employed. The survey will be carried out with staff of the selected directorates of KATH. The questionnaire will be designed in five sub-sections. The first section will capture and solicit for information on profile of the surveyed staff. The second section will also solicit for information on the level of usage of the fingerprint biometric system. The third section will also look at the effectiveness and efficiency of the biometric fingerprint attendance management system. The fourth section will also solicit for information on employee performance attributed to the installation and adoption of the biometric fingerprint attendance management system. The fifth section also looked at the challenges associated with the adoption of the biometric attendance management system.

3.6.2 Questionnaire Design and Measurement of Constructs

The study employed a questionnaire instrument in the collection of data. The structured type of questionnaire with primarily closed ended questions was employed. The question types employed in the design of the questionnaire were binary, categorical, and Likert-scale. The questions related to the profile of respondent were designed largely using categorical type of questions. However, the questions on the specific objectives of the study were also designed using the Likert-scale format. The administration process was largely self-administration as the participants are group of people with high level of education and busy schedule. Therefore, questionnaires given to participants to respond to where taken back later in the agreed date.

The questionnaire was in five parts. The Part A contained questions soliciting for information on the background or profile of the participants. The items in this part of the questionnaire included age of the respondent, gender, directorate or division of affiliation, highest level of education, job title and year of experience with the health facility. The Part B solicited for information on the level of usage of the fingerprint biometric system using fifteen items. The items were designed using a Likert-scale ranging between 1(Strongly Disagree) to 5(Strongly Agree). Some of the items employed in the examination of the extent of utilization of the biometric fingerprint management system included attendance timing, employee identification and payroll computation. The selection of these measurement items were based on the study of Kisame (2016).

The Part C also employed items to determine the effectiveness and efficiency of the biometric fingerprint system. In all, 9-items were employed as a measure of efficiency and effectiveness. The factors considered were relevance, capacity, efficiency, timeliness, accessibility, accuracy, reliability, security and user friendly. The Part D also employed 6 items in the measurement of the performance of employees associated with the installation of the biometric attendance management system. The 6 items employed in the measurement of employee performance included punctuality, elimination of wage theft, commitment, productivity, quick resolution of complaints, quick attendants to patients, and planning attitude.

The last section of the questionnaire (Section E) solicited for information on the challenges encountered in the installation and adoption of biometric fingerprint attendance management system. The twelve items employed in this section included irregular power supply, frequent breakdown of the machine, non-recognition of some fingerprints, long queues in front of the machine at closing time of work, delay/slow detection of fingerprint, overcrowding around the place after closing, deprivation of employee privacy, fear of harm resulting from using the system, general user anxiety, finances to fund the rolling out of biometric security, employee resistance to change and employee are sometime denied access. These measurement items were employed from several previous studies (e.g., Boateng, Asiamah & Lamptey, 2015; Erastus, Jere & Shava, 2015; Cristian, 2016). The items in Part E were measured using a scale of 1(Strongly Disagree) to 5(Strongly Agree).

3.6.3 Data Handling

Data compiled from records, surveys and experiments are required to be complete and accurate and hence the need for efficient handling (Sharma, 2018). Before further processing, the data is required to be checked for adequacy and accuracy. The researcher will review all questionnaires thoroughly to eliminate all errors, omissions and inconsistencies in the data collected through post-field editing process. The researcher will subsequently code the edited data. The coded data will be entered into Microsoft Excel Version 10. Data in Excel will further be transferred or imported into STATA 14 for data analysis.

3.7 Data Analysis and Reporting

The objective one, the level of adoption of the biometric attendance system will be analysed using descriptive statistical methods. The descriptive statistical that will be employed are measures of central tendencies like mean and standard deviation. The result will be reported through tabular method. The objective two, the effect of the biometric attendance system on employee performance will be evaluated using ordinary least square multiple regression method. The significant level of relationship between the dependent and the independent variables will be evaluated at 5%. The third objective, the challenges of KATH in the adoption of the biometric attendance system will be evaluated using the Kendall's Rank test and Kendall's Coefficient of Concordance.

3.8 Ethical Considerations

The researcher initially sought for the clearance of the Institutional Review Board (IRB) of Christian Service University after the presentation of a proposal for the study. An introductory letter and a consent form was also obtained from the School and presented to the heads of the three selected directorates of Komfo Anokye Teaching Hospital to seek for authorization for the survey with the selected staff of the three directorates. Included staff in the survey were also briefed on the research and its significance to the staff, the hospital and health sector of Ghana. Participant's inclusion was confirmed through the signing of a consent form after the briefing on the subject matter of the survey. In terms of privacy, confidentiality and anonymity was observed when data is being handled. The researcher also ensured objectivity in the reporting of the result. The data was obtained from the three selected directorates of KATH without offering any form of compensation. The researcher also avoided any form of conflict by serving as the sole financier of the research.

3.9 Reliability and Validity of the Study Conclusions

To ensure the selection of reliable and valid items in measuring the main constructs of the study, the researcher will rely on existing theories and previous studies. The selection of attendance timing, employee identification and payroll computation items is based on reliable and validated from a previous study (Kisame, 2016). Several of the measurement items in the questionnaire were also based on validated and reliable items from several previous studies (e.g., Boateng, Asiamah & Lamptey, 2015; Erastus, Jere & Shava, 2015; Cristian, 2016). The items that will be employed in measuring the constructs will be further validated through factor analysis through the principal component analysis extraction

method. The reliability of the items will also be checked through the Cronbach Alpha analysis method.

CHAPTER FOUR

ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter analyses and discusses the data of the study. The main areas touched in chapter are the socio demographic characteristics of the respondent, the usage of fingerprint biometric attendance system and the effectiveness and efficiency of the biometric attendance system. Inferentially, the chapter examines possible relationship between biometric attendance system and employee performance. From the total 203 questionnaires sent out for administration, 172 were successfully administered and hence produced response rate of 85 percent.

4.2 Socio-Demographic Data of Respondent

The distribution of the respondent in terms of key socio-demographic characteristics like the gender of the respondent, the age bracket of respondent, the highest educational qualification of the respondent, job category or title of the respondent, directorate or department of respondent and years worked with KATH. The result of the socio-demographic characteristic distribution of the respondent is shown in Table 4.1.

The gender distribution of respondent shows that the majority (52.8%) were males whereas 47.2% were females (See Table 4.1). The majority (66.9%) of the respondent were within the youthful and economic active age bracket of 21 and 30 years whereas 22.0% were also between the age bracket of 31 and 40 years. The highest educational qualification of the majority of the respondent was bachelor degree. However, 36.8% and 9.6% of the

respondent have a highest educational qualification of post-graduate degree and diploma respectively.

Table 4.1: Socio-Demographic Information

Demographics	Category	Frequency	Percent
Gender			
	Male	91	52.8
	Female	81	47.2
Age Bracket			
	< 20 years	11	6.3
	21-30 years	115	66.9
	31-40 years	38	22.0
	41-50 years	8	4.7
Education (Highest)			
	Diploma	17	9.6
	Degree	92	53.6
	Post-Graduate	63	36.8
Job Category/Title			
	Nurse	45	26.2
	Doctor	77	44.6
	Administrator	29	16.9
Directorate/Department			

	Diagnostics	25	14.5
	Child Health	98	57.0
	Oral Health	49	28.5
Years worked at KATH			
	< 5 years	21	12.4
	5-10 years	45	26.4
	10-15 years	58	33.7
	16-20 years	41	23.7
	> 20 years	7	3.8

Source: Field Survey (2020)

With regards to the job title or category of the respondent, 26.2% were Nurses, 44.6% were Doctors, and 16.9% were Administrators. Other category of workers surveyed were Transport Engineers, Estate assistants and Laboratory Technicians (See Table 4.1). In terms of directorates or departments, 14.5% were in the Diagnostic Unit, 57.0% were in the Child Health Unit and 28.5% were in the Oral Health Unit. The majority (57.4%) of the respondent have been with the Komfo Anokye Teaching Hospital for 10 to 20 years. However, about 38.8% of the respondent have 10 years or less working experience with KATH.

4.3 Usage of Fingerprint Biometric Attendance System

This part of the study descriptively examines the level of usage of fingerprint biometric attendance system at the healthcare institution. To achieve this, the respondent were

provided with set of measurement items defined under three main constructs to indicate their level of agreement by choosing from Strongly Disagree (1) and Strongly Agree (5). The result is presented in Table 4.2.

Table 4.2: Scope of Biometric Attendance System

Measurement Items	Mean	SD
Attendance Timing	**3.62**	**.87**
Fingerprint input takes lesser time for recording employee attendance	3.73	.89
Fingerprints time clocking is better than manual system.	3.61	1.24
Attendance data can easily be captured via computerized biometric clocking	3.69	1.19
Computerized biometric clocking is effective in capturing working hours	3.86	.92
Biometrics provides a detailed audit trail of employee attendance.	3.56	1.42
Computerized biometric clocking system ensures data integrity.	3.57	1.08
Employee Identification	**3.49**	**.88**
Biometrics-based authentication use individual physical traits	3.72	1.30
Employees don't carry separate hardware tokens when clocking	3.44	1.11
All employee identification aspects of the system are fully secure	3.34	1.13
Biometrics data is intrinsically connected to an individual employee	3.56	.80
Computerized biometric system authenticate employee identity in real-time	3.35	1.16

Payroll Computation	2.97	1.18
Biometric system is a reliable way to determine employee pay	2.47	1.41
Computerized biometric clocking system provides accurate data for payroll	3.22	1.15
Computerized biometric employee clocking system stores payroll accurate data.	2.89	1.29
Computerized biometric clocking system enhances quick payroll processing.	3.54	1.30
Valid N (listwise)		

Scale: [Strongly Agree-5, Agree-4, Undecided-3, Disagree-2, Strongly Disagree-1]

Source: Field Survey (2020)

The fingerprint biometric attendance system is employed by the healthcare institution because fingerprint time clocking system and input takes lesser time for recording employee attendance ($\mu = 3.62, \sigma = .87$), and is also deemed by the respondent to be relatively better than the manual system ($\mu = 3.73, \sigma = .89$) (See Table 4.2). The respondent also agreed that employee attendance data can easily be captured through computerized biometric clocking system ($\mu = 3.69, \sigma = 1.19$), as the computerized biometric clocking system is deemed more effective in capturing the working hours of employees ($\mu = 3.86, \sigma = .92$). The biometric system adopted by the healthcare institution provides a detailed audit trail of the attendance of all employees of the hospital ($\mu = 3.56, \sigma = 1.42$). Thus, the computerized biometric clocking system employed by the

healthcare institution ensures higher level of data integrity ($\mu = 3.57, \sigma = 1.08$). These findings are consistent with the study of German and Barber (2018) that emphasized that main sectors that embrace biometric methods are financial service, technology and government. The healthcare sector is described to be at the initial stages of the adoption of biometric methods. It is therefore not surprising that the health institution is largely employing the biometric system in managing attendance of workers without coordinating it with payroll computation system of the hospital.

In terms of employee identification, the employees agreed that the biometric system employed by the hospital authenticates individuals based on physical traits ($\mu = 3.72, \sigma = 1.30$) and as such as the biometric data generated is intrinsically connected to individual workers of the healthcare institution ($\mu = 3.56, \sigma = .80$) (See Table 4.2). However, the workers are largely uncertain about the full security of all employee identification aspects of the biometric system ($\mu = 3.34, \sigma = 1.13$). There was also high level of uncertainty about the usage of the installed biometric system in the computation of payrolls of workers of the health institution ($\mu = 2.97, \sigma = 1.18$). This finding is supported by the study of Hoo and Ibrahim (2019) that indicated that biometric system is also critical for worker authentication through measurable physical and behavioural characteristics of workers.

4.4 Effectiveness and Efficiency

This part of the study descriptively examines the effectiveness and efficiency of the fingerprint biometric attendance system at the healthcare institution. To achieve this, the respondent were provided with set of measurement items to indicate their level of

agreement by choosing from Strongly Disagree (1) and Strongly Agree (5). The result is

presented in Table 4.3.

Table 4.3: Effectiveness of the Biometric Attendance System

Measurement Items	Mean	SD
Relevant to the needs of the hospital	3.39	1.39
Capacity of the system resolving attendance issues	3.36	.87
Efficient in the management of attendance	4.13	.78
Reduce the time wastage in recording attendance manually	3.52	1.25
Easily accessible to all staff	3.23	1.14
The accuracy of the value of the information generated by the device is high	3.22	1.24
The device is reliable in the management of staff attendants	2.87	1.35
The system is secured	3.60	1.24
The machine is easy to use	4.31	.91
Valid N (listwise)		

Scale: [Strongly Agree-5, Agree-4, Undecided-3, Disagree-2, Strongly Disagree-1]

Source: Field Survey (2020)

In terms of the effectiveness and efficiency of the biometric employee system employed

the Healthcare Institution; Table 4.3 shows that the respondent deemed the technology as

efficient in the management of attendance (μ=4.13, σ=.78). Thus, the respondent described

the biometric attendance technology as efficient as it reduces the time wastage in recording

attendance manually ($\mu = 3.52, \sigma = 1.25$). The respondent also described the installed biometric attendance system as secured ($\mu = 3.60, \sigma = 1.24$) and easy to use ($\mu = 4.31, \sigma = .91$). These findings are consistent with previous studies that emphasizes that biometric attendance system is effective and secured in the management of attendance relative to the traditional manual system (Ami-Narh, Aziale & Akanferi, 2014; Hoo & Ibrahim, 2019).

4.5 Effect of the Biometric Attendance System on Employee Performance

This part of the study examines the association between biometric attendance fingerprint system and the performance of the employees of the Komfo Anokye Teaching Hospital. The considered in independent variables were Attendance Timing, Employee Identification, Payroll Computation and Biometric Attendance system as composite variable. The considered dependent variable was employee performance.

4.5.1 Correlational Analysis

Table 4.4 provides correlational relationship between the main constructs of the study. Correlational analysis produces rho (r) values that lie between -1 and 1. A value of -1 is defined as perfect negative correlation, 1 is perfect positive correlation and 0 is no correlation. Positive correlations lie between 0 and 1, and negative correlation lies between 0 and -1.

Table 4.4: Correlation between the Constructs

	Construct	1	2	3	4	5	6	Reliability (α)
1	Performance	1.000						.822
2	Effectiveness	.456**	1.000					.822
3	Attendance Timing	.362**	.460**	1.000				.803
4	Employee Identification	.364**	.206**	.271**	1.000			.812
5	Payroll Computation	.424**	.489**	.312**	.248**	1.000		.859
6	Biometric Attendance	.395**	.314**	.621	.761	.618	1.000	.936

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Field Survey (2020)

Table 4.4 shows that there is positive correlation between biometric attendance system and employee performance (r=.395, P<.01). This result indicates that any improvement in the biometric attendance system of the hospital is associated with increasing performance of the employees. There is positive correlation between attendance timing system and employee performance (r=.362, P<.01). This result indicates that any improvement in the attendance timing system of the hospital is associated with increasing performance of the employees. This result is consistent with the study of Boateng, Asiamah and Lamptey (2015) that indicated that the biometric fingerprint system has impacted positively on the attitude of staff with regard to punctuality and regularity to work.

There is positive correlation between employee identification system and employee performance (r=.364, P<.01). This result indicates that any improvement in the employee

identification system of the hospital is associated with increasing performance of the employees. There is positive correlation between payroll computation system and employee performance (r=.424, P<.01). This result indicates that any improvement in the payroll computation system of the hospital is associated with increasing performance of the employees. This finding is consistent with the study of Indrayani (2014) that emphasized that biometric systems can increase productivity and efficiency as well as reduce job turnaround time in checking the accuracy of the data with the card owner.

4.5.2 Multiple Regression Result

Table 4.5 summarises diagnostic information of the estimated model of the various elements of biometric fingerprint attendance system and employee performance. The R-Square result of 0.850 shows that about 85 percent of the variations in the performance of employees is well-explained by the biometric fingerprint attendance system dimensions like attendance timing, employee identification and payroll identification. In furtherance of this result, the F-statistical result shows that all the independent variables of the Table 4.6 together also well-explain the dependent variable (F=215.9, P<.01). The Durbin-Watson result of 2.007 is approximately 2.00 indicating the absence of autocorrelation in the estimated model.

Table 4.5: Model Summaryb

Model	R	R^2	Adj. R^2	SE Est.	Durbin-Watson	F-Statistic
1	.922[a]	.850	.846	.38485	2.007	F= 215.902, P<.01
a. Predictors: (Constant), Payroll_Computation, Attendance_Timing, Employee_Identification						
b. Dependent Variable: Performance						

Source: Field Survey (2020)

Diagnostically, the collineariy of the three main elements of the biometric attendance system were tested using both the tolerance values of the predictors and the variance inflation factors of the predictors. Table shows that there is no multicollinearity in the estimated model as tolerance values of all the predictors were below the threshold of 1 and the variance inflation factors of the predictors were below the threshold of 10.

Table 4.6: OLS Multiple Regression

Model	Standardized Coefficients		t	Sig.	Collinearity Statistics	
	Beta	SE			Tolerance	VIF
(Constant)	-.221	.180	-1.226	.223		
Attendance Timing	.266	.050	5.996	.000	.667	1.499
Employee Identification	.388	.052	8.105	.000	.572	1.749
Payroll Computation	.433	.042	8.289	.000	.480	2.083
a. Employee Performance						

Source: Field Survey (2020)

Table 4.6 shows that there is positive and significant relationship between attendance timing and the performance of the employees of the institution (β=.266, P<01). This result implies that statistical significant unit improvement in the installation of attendance timing system is associated with 0.266 unit increase in the performance of employee performance. This result is consistent with the study of Boateng, Asiamah and Lamptey (2015) that indicated that the biometric fingerprint system has impacted positively on the attitude of staff with regard to punctuality and regularity to work.

There is also positive and significant relationship between employee identification and the performance of the employees of the institution (β=.388, P<01). This result implies that statistical significant unit improvement in the installation of employee identification system is associated with 0.388 unit increase in the performance of employee performance. This finding is consistent with the study of Indrayani (2014) that emphasized that biometric systems can increase productivity and efficiency as well as reduce job turnaround time in checking the accuracy of the data with the card owner.

There is also positive and significant relationship between payroll computation system and the performance of the employees of the institution (β=.433, P<01). This result implies that statistical significant unit improvement in the installation of payroll computation system is associated with 0.433 unit increase in the performance of employee performance.

Table 4.7: OLS Multiple Regression of Composite of Biometric Attendance System

Model	Standard Coefficients		t	Sig.	Collinearity	
	Beta	SE			Tolerance	VIF
1 (Constant)	-1.001	.310	-3.233	.002		
Gender	-.055	.078	-1.403	.163	.665	1.504
Age	-.031	.057	-.864	.390	.777	1.287
Education	.158	.037	4.288	.000	.760	1.315
Years with KATH	.198	.079	5.016	.000	.663	1.508
Biometric Attendance	.520	.042	15.343	.000	.656	1.525
Model Summary						
- R	.920					
- R^2	.847					
- Adjusted R^2	.846					
- F-Statistics (df)	42.251(1)***					
- Durbin-Watson	2.063					
a. Dependent Variable: Employee Performance						

Source: Field Survey (2020)

Table 4.7 shows that there is positive and significant relationship between biometric attendance system and the performance of the employees of the institution (β=.520, P<01). This result implies that statistical significant unit improvement in the installation of

biometric attendance system is associated with 0.520 unit increase in the performance of employee performance. This result therefore confirms and implies the acceptance of the study hypothesis (H_1) that the biometric attendance fingerprint system positively influences employee performance. This finding is consistent with several previous studies in the extant literature that reported positive effect of the adoption of the biometric attendance system on worker productivity (e.g., Shakil & Rabindra, 2013; Boateng, Asiamah & Lamptey, 2015; Verma & Khan, 2016; Villaroman et al., 2018; Yudiatmaja et al., 2018).

4.6 Challenges of the Adoption of the Biometric Attendance System

Respondents were presented with a list of 12 constraints usually reported in the literature as hindering efficient installation and adoption of biometric attendance system in health institutions. The task of each respondent was to rank the challenges from Strongly Disagree (1) to Strongly Agree (5) based on their perception of factors as challenges of biometric attendance technology adoption in the health institution. Table 4.8 presents descriptive result and Kendall's rank test result. The Kendall's rank result was largely presented in the form of mean ranks and by extension, the ranks of the challenges as adjudged by the 172 employees of the Komfo Anokye Teaching Hospital in Kumasi.

The result of the Table 4.8 was obtained following the non-parametric test for k-related samples in SPSS 16. The level of agreement between the 172 surveyed workers from three main directorates of the Okomfo Anokye Teaching Hospital was tested using the Kendall's coefficient of concordance since there are three or more judges or workers.

Table 4.8: Challenges of Biometric Attendance System Adoption

Challenges	Descriptive		Kendall's Rank Test	
	Mean	**SD**	**Mean Rank**	**Rank**
Frequent breakdown of the machine	3.20	1.11	7.53	1st
Non-recognition of some fingerprints	3.09	1.13	7.43	2nd
Finances to fund the rolling out of biometric security	3.20	1.32	7.13	3rd
Employee are sometime denied access	3.07	1.44	7.13	4th
Irregular power supply	3.10	1.35	6.92	5th
Delay/slow detection of fingerprint	2.91	1.36	6.76	6th
Long queues in front of the machine at closing time	2.94	1.21	6.65	7th
Overcrowding around the place after closing	2.67	1.39	6.17	8th
General user anxiety	2.81	1.11	5.98	9th
Employee resistance to change	2.70	1.31	5.86	10th
Deprivation of employee privacy	2.47	1.15	5.22	11th
Fear of harm resulting from using the system	2.43	1.07	5.21	12th

Scale: [Strongly Agree-5, Agree-4, Undecided-3, Disagree-2, Strongly Disagree-1]

Source: Field Survey (2020)

Frequent breakdown of the machine was ranked first by 82 employees of the hospital whereas fear of harm resulting from using the system was adjudged the last or more specifically, the twelfth on the list. Non-recognition of some fingerprints, finance to fund the rolling out of biometric security and denying some employees access fell in second, third and fourth positions respectively with mean ranks of 7.43, 7.13 and 7.13 respectively. These constraints are more technically and financially related than human, and hence are in consonance with finding of Boateng, Asiamah and Lamptey (2015) that the adoption of the biometric fingerprint system is disturbed by challenges such as frequent breakdown of the machine and non-recognition of some fingerprints. Other major factors perceived as obstructing the biometric attendance system adoption are irregular power supply, delay or slow detection of fingerprint, long queues in front of the machine at closing time and overcrowding around the place after closing. These factors are also corroborated by the study of Boateng, Asiamah and Lamptey (2015) that also emphasized on power supply and long queues in front of the machine at closing time as major challenges of the biometric attendance technology adoption.

Table 4.9: Kendall's Coefficient of Concordance

Test Statistics	
N	172
Kendall's W[a]	.607
Chi-Square	184.059
Df	11
Asymp. Sig.	.000
a. Kendall's Coefficient of Concordance	

Source: Field Survey (2020)

Kendall's coefficient of concordance (W^a), testing the null hypothesis that there is no agreement (workers differ significantly) among the employees with respect to how constraining the inventory of problems affect the adoption of biometric attendance technology was rejected at a 1% significance level. The degree of unanimity as measured by the W-statistics is about 61% since the score is zero for random ranking and 1 for perfectly unanimous ranking. The surveyed employees in the study area can therefore, be said to unanimously agree that the most constraining factors to efficient installation and management of the biometric technology system are more related first to technical and secondly to financing. Membership of processing based association has expected negative sign but it is not significant.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The summary of the key findings, conclusion and recommendations are provided in this chapter of the study.

5.2 Summary of Key Findings

This section of the study provides a summary of key findings based on the defined specific objectives of the study.

5.2.1 Level of Adoption of Biometric Attendance System at KATH

The biometric fingerprint technology employed at the Komfo Anokye Teaching Hospital largely covers areas such as employee attendance timing and employee identification. The biometric attendance system is perceived to have limited coverage in terms of payroll computation. The fingerprint biometric attendance technology has been installed in some directorates to record the attendance of employees as this system takes lesser time in recording and perceived better than the manual system. With the fingerprint time clocking system, employee attendance is easily captured in the healthcare institution through a computerized biometric clocking system that captures working hours of employees, provide detail audit trail of employee attendance and further ensure high level of data integrity.

The biometric-based system has also been installed by the hospital to help in authenticating all employees through the usage of individual physical traits. Thus, the biometric data system installed by the hospital is intrinsically connected to individual employees.

5.2.2 Effect of the Biometric Attendance System on Employee Performance at KATH

The biometric fingerprint attendance management system of the hospital is described as efficient and effective in the management of employee attendance. The system is perceived as secured, easy to use and capable of reducing the time wastage in recording attendance manually. The biometric attendance timing system, employee identification system and payroll computation system are all perceived to positively influence employee performance. Thus, the installed biometric fingerprint attendance system is perceived to have improve significantly the attendance of employees.

5.2.3 Challenges of KATH in the Adoption of the Biometric Attendance System

Notwithstanding the effectiveness of the installed biometric fingerprint attendance system, the technology is reported to be challenged in several areas such as frequent breakdown, non-recognition of some fingerprints, funds for rolling out the system to other directorates, periodic denial of employee access, irregular power supply, delay or slow detection of fingerprint and possible long queues in front of the machine at closing time.

5.3 Conclusion

In an attempt to minimize issues related to absenteeism, the Komfo Anokye Teaching Hospital as part of its attendance and timing keeping policy introduced the biometric attendance system. The installed biometric attendance system is perceived to cover attendance timing and limited areas of employee identification. Thus, the policy mainly aims to establish guidelines and the expectations of employees regarding their attendance and timeliness for reporting to work. It aims at ensuring adequate staffing, positive employee morale and to meet expected productivity standards throughout the hospital. The policy is perceived by workers to have been effective and efficient in the management of attendance. Beside improvement in attendance, the policy is believed to have had positive effect on employee performance. Notwithstanding the achievement of the biometric attendance system, there are several challenges that requirement attendance. Among these challenges are frequent breakdown of the biometric fingerprint machines, non-recognition of some fingerprints, periodic denial of access and irregular power supply.

5.4 Contribution and Limitations of the Study

Theoretically, this study provides credence to the Andrew Feenberg's Critical Theory of Technology that emphasizes that democracy in the workplace must be extended beyond its traditional boundaries to include technology for society to keep up with the trend and do better than sustain (Gabriel, 2017). Evidence from this study shows that the decision of the hospital to replace the traditional or the manual attendance management system with the biometric fingerprint attendance system has resulted in higher level of attendance

management effectiveness and efficiency. More so, higher level of employee performance is reported to have been achieved through biometric attendance and timing keeping policy.

Notwithstanding this contribution, this study is limited in terms of geographical and conceptual scope. This study is limited in geographical scope as it is case-oriented and focuses on only the Komfo Anokye Teaching Hospital. Conceptually, the study also did not look at any possible moderators or mediator in the relationship between the biometric attendance system and employee performance.

5.5 Recommendations

The installation of the biometric attendance system has been successful in managing effectively employee timing and attendance at the current directorates of the hospital. This study therefore recommends the replication of the policy in all directorates and other hospitals in Ghana. The Ghana Health Service can adopt the biometric attendance system as part of its human resource management policies to reduce absenteeism, increase employee performance and improvement patient care.

The technical team needs to device strategies to improve the efficiency of the machine to ensure that fingerprints are recognized at quicker pace to reduce long queues in morning and closing time.

The challenges related to the long queues and frequent breakdown can be minimized by installing more than one biometric attendance machine in a directorate to reduce the load on a single machine.

5.6 Suggested Areas for Future Studies

Future studies on biometric attendance system in Ghana could widen the geographically scope to include several hospitals in Ghana. Future studies can also widen the conceptual scope of the study by looking at possible moderators like IT infrastructure capabilities, managerial capabilities, and technical team capabilities in the linkage between biometric attendance system and employee performance.

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QUESTIONNAIRE

CHRISTIAN SERVICE UNIVERSITY

School of Business

Department of Management and General Studies

Survey Instrument@2019

Brief background of the study

This study focuses on the adoption of biometric fingerprint attendance management system. The goal of this study is to examine how the installation of biometric fingerprint attendance management system has aided in enhancing the performance of the staff at KATH. Not only is the study aimed at contributing to knowledge but also, it seeks to come out with strategies to help in resolving issues related to attendance and general performance of staff in the various health institutions in Ghana.

The study is purely academic-oriented, as such we would like to assure you that your responses would not be used for any other purpose other than those stated before. For the purposes of improving the quality of the study, we humbly request you to take your time to read and understand the items on this instrument before you respond to them. Objective responses offered will be highly appreciated.

Please read the instruction(s) under each section of the instrument to assist you in your responses.

Thank you so much for your willingness to participate in this study.

SECTION A: DEMOGRAPHIC DATA

1. Gender

[] Male [] Female

2. Your age bracket.

[] Below 20

[] 21-30

[] 31-40

[] 41-50

[] More than 50

3. Highest level of education

[] Primary

[] Secondary

[] Certificate

[] Diploma

[] Degree

[] Post Graduate

Other, Specify ………………………………

4. Job Category/Title:

[] Nurse   [] Doctor   [] Administrator

Others (Please Specify)_____

5. Directorate/Department:

[] Diagnostics   [] Child Health   [] Oral health

5. How many years have you worked at KATH?

[] Below 5   [] 5-10

[] 10-15   [] 15-20

[] More than 20

SECTION B: USAGE OF FINGERPRINT BIOMETRIC SYSTEM

Please indicate your level of agreement to the under-listed statements in attempt to provide

insight into the usage of the fingerprint biometric attendance management system in the

Institution by choosing from strongly disagree (1) to strongly agree (5) [Strongly Agree-5,

Agree-4, Undecided-3, Disagree-4, Strongly Disagree-1]

	Biometric Attendance Management System	1	2	3	4	5
	Attendance Timing					
At1	Finger print input takes lesser time for recording employee attendance.					
At2	Finger prints time clocking is better than manual system.					
At3	Attendance data can easily be captured through computerized biometric employee clocking system					
At4	Computerized biometric employee clocking system is effective in capturing employee working hours					

At5	Biometrics provide a detailed audit trail of employee attendance.					
At6	Computerized biometric clocking system ensures data integrity.					
	Employee Identification					
Ei1	Biometrics-based authentication use individual physical traits					
Ei2	Employees don't carry separate hardware tokens when clocking					
Ei3	All employee identification aspects of the system are fully secure					
Ei4	Biometrics data is intrinsically connected to an individual employee					
Ei5	Computerized biometric system authenticate employee identity in real-time					
	Payroll Computation					
Pa1	Biometric system is a reliable way to determine employee pay					
Pa2	Computerized biometric employee clocking system provides accurate data for payroll computation.					
Pa3	Computerized biometric employee clocking system stores payroll accurate data.					

Pa4	Computerized biometric employee clocking system enhances quick payroll processing.					

Kisame, H. A. (2016). Computerized Biometric Employee Clocking System And

Operational Performance: Case Study Of Moi Teaching and Referral Hospital. Master of

Business Administration Thesis, University of Nairobi.

SECTION C: EFFECTIVENESS AND EFFICIENCY

Please indicate your level of agreement to the under-listed statements in attempt to provide insight into the effectiveness and efficiency of the adopted biometric fingerprint attendance management system at this hospital by choosing from strongly disagree (1) to strongly agree (5) [Strongly Agree-5, Agree-4, Undecided-3, Disagree-4, Strongly Disagree-1]

	Effectiveness and Efficiency of the biometric fingerprint system	**1**	**2**	**3**	**4**	**5**
Ef1	Relevant to the needs of the hospital					
Ef2	Capacity of the system resolving attendance issues					
Ef3	Efficient in the management of attendance					
Ef4	Reduce the time wastage in recording attendance manually					
Ef5	Easily accessible to all staff					
Ef6	The accuracy of the value of the information generated by the device is high					
Ef7	The device is reliable in the management of staff attendants					
Ef8	The system is secured					
Ef9	The machine is easy to use					

SECTION D: EMPLOYEE PERFORMANCE

9. Using 5 point Likert scale where; 1 = Strongly Disagree 2= Disagreed 3 = Neutral 4 =
Agree and 5 = Strongly Agree, to what extent do you agree or disagree with the under-
listed statements in attempt to providing insight into the performance of employees of the
Institution after the installation of the biometric fingerprint system

	Statement	1	2	3	4	5
Ep 1	Enhance employee punctuality					
Ep 2	Eliminates incidents of wage theft					
Ep 3	Increase employee commitment to duty					
Ep 4	Enhance productivity of employees					
Ep 5	Facilitates quick resolution of employee complaints in relation to working hours					
Ep 6	Ensures that patients are attended to timely					
Ep 7	Enhances the planning attitude of employees					

SECTION E: CHALLENGES OF BIOMETRIC TECHNOLOGY ADOPTION

Please indicate your level of agreement to the under-listed factors as challenges encountered in the installation and adoption of biometric fingerprint attendance management system at this hospital by choosing from strongly disagree (1) to strongly agree (5) [Strongly Agree-5, Agree-4, Undecided-3, Disagree-4, Strongly Disagree-1]

	Challenges	1	2	3	4	5
Ch1	Irregular power supply					
Ch2	Frequent breakdown of the machine					
Ch3	Non-recognition of some fingerprints					
Ch4	Long queues in front of the machine at closing time of work					
Ch5	Delay/slow detection of fingerprint					
Ch6	Overcrowding around the place after closing					
Ch7	Deprivation of employee privacy					
Ch8	Fear of harm resulting from using the system					
Ch9	General user anxiety					
Ch10	Finances to fund the rolling out of biometric security					
Ch11	Employee resistance to change					
Ch12	Employee are sometime denied access					