

**COMPUTERIZED BIOMETRIC EMPLOYEE CLOCKING SYSTEM
AND OPERATIONAL PERFORMANCE: CASE STUDY OF MOI
TEACHING AND REFERRAL HOSPITAL**

HILDER ALIVITSA KISAME

D61/75757/2014

**A Research Project Submitted in Partial Fulfillment of the Requirement
for the Award of the Degree of Master of Business Administration, School
of Business, University of Nairobi**

November, 2016

DECLARATION

STUDENT

I, the undersigned, declare that this Research Project is my original work and has not been submitted to any other university.

Signed.....

Date.....

Hilder Alivitsa Kisame

Reg. No: D61/75757/2014

SUPERVISOR

This Research Project has been submitted for examination with my approval as the University supervisor.

Signed.....

Date.....

Dr. J. T. Kariuki

School of Business, University of Nairobi

COPYRIGHT

No part of this project may be used or reproduced in any form, or stored in a database or retrieval system without prior written permission of the author or the University of Nairobi, except in the case of brief quotations or references universally acceptable for purposes of reviews, articles or research papers.

DEDICATION

To my dear loving children, Sasha Ayuma, Dan Kisame, Jan Sagwa, and Beryl Minayo

ACKNOWLEDGEMENT

I am grateful to the University of Nairobi for the opportunity to undertake the Master of Business Administration at the School of Business. I wish to acknowledge the support and assistance received from different sources in the process of undertaking the MBA course work and project work. I acknowledge the guidance obtained from the project supervisor Dr. J. T. Kariuki, project moderator Mr. J. K. Lelei, and the Chairperson Department of Management Science Dr. K. Litondo, who were readily available for consultation at short notice despite their tight work schedules.

I am grateful to all Lecturers in the School of Business who handled various course units, who include Prof. M. Ogutu, Dr. X. N. Iraki, Dr. M. Njihia, Mr. Karwega, Dr. K. Litondo, Mr. J. K. Lelei, Dr. Z. Kiruthu, Dr. Magutu, and Mr. Ndambuki.

I wish to acknowledge all the sources of information that provided the much needed references on the basis of which this study stands. I have provided a reference list on which these sources have been indicated. I am equally indebted to the management of Moi Teaching and Referral Hospital, Eldoret, respondents to the study questionnaire and my course colleague who made learning a fruitful encounter.

TABLE OF CONTENTS

DECLARATION	ii
COPYRIGHT	iii
DEDICATION	iv
ACKNOWLEDGEMENT	v
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF ABBREVIATIONS	xi
ABSTRACT	xii
CHAPTER ONE: INTRODUCTION	1
1.1 Background	1
1.1.1 Computerized Biometric Employee Clocking System.....	2
1.1.2 Operational Performance.....	4
1.1.3 Moi Teaching and Referral Hospital	5
1.2 Research Problem.....	6
1.3 Research Objectives	7
1.4 Value of the Study.....	8
CHAPTER TWO: LITERATURE REVIEW	9
2.1 Introduction	9
2.2 Theoretical Framework	9
2.2.1 Resource Based Theory.....	9
2.3 Computerized Biometric Employee Clocking System.....	11
2.4 Attendance Timing	11

2.5 Employee Identification	13
2.6 Payroll Computation	14
2.7 Computerized Biometric Employee Clocking System and Operational Performance	15
2.8 Conceptual Framework	17
2.9 Knowledge Gap.....	18
2.10 Summary of the Reviewed Literature	18
CHAPTER THREE: RESEARCH METHODOLOGY	19
3.1 Research Design.....	19
3.2 Population.....	19
3.3 Sample Design.....	20
3.4 Data Collection.....	21
3.5 Data Analysis	22
CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION.....	23
4.1 Introduction	23
4.2 Response Rate	23
4.3 Distribution of Respondents by Gender	24
4.4 Distribution of Respondents by Grade	25
4.5 Distribution of Respondents by Age Bracket.....	26
4.6 Distribution of Respondents by Years Worked at MTRH	26
4.7 Distribution of Respondents by Highest Level of Education.....	27
4.8 Attendance Timing	28

4.9 Employee Identification	29
4.10 Pay Computation	30
4.11 Operational Performance.....	31
4.12 Correlation Analysis.....	32
4.13 Regression Analysis	33
4.14 Discussion of the Findings	35
CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS .	38
5.1 Introduction	38
5.2 Summary	38
5.3 Conclusion.....	39
5.4 Recommendations	39
5.5 Limitations of the Study	40
5.6 Areas for Further Study.....	40
REFERENCES	41
APPENDICES	44
Appendix 1: Letter of Introduction	44
Appendix II: Questionnaire for Employees of Moi Teaching and Referral Hospital, Eldoret	45
Appendix III: Table for Determining Sample Size for a Given Population.....	49

LIST OF TABLES

Table 3.1: Target Population	20
Table 3.2: Sample size	21
Table 4.1: Distribution of Respondents by Employment Grade	24
Table 4.2: Distribution of Respondents by Gender	24
Table 4.3: Distribution of Respondents by Grade	25
Table 4.4: Distribution of Respondents by Age Bracket.....	26
Table 4.5: Distribution of Respondents by Years Worked at MTRH.....	27
Table 4.6: Distribution of Respondents by Highest Level of Education	27
Table 4.7: Distribution of Respondents Mean Scores, Means and Standard Deviations on Statements for Attendance Timing	28
Table 4.8: Distribution of Respondents Mean Scores, Means and Standard Deviations on Statements for Employee Identification.....	29
Table 4.9: Distribution of Respondents Mean Scores, Means and Standard Deviations on Statements for Payroll Computation	30
Table 4.10: Distribution of Respondents Mean Scores, Means and Standard Deviations on Statements for Operational Performance	31
Table 4.11: Pearson’s Correlation for Attendance Timing, Employee Identification, Payroll Computation and Operational Performance	32
Table 4.12 Model Summary	33
Table 4.13 ANOVA ^b	34
Table 4.14 Coefficients ^a	34

LIST OF FIGURES

Figure 1: Conceptual Framework	17
--------------------------------------	----

LIST OF ABBREVIATIONS

AMPATH	:	Academic Model Providing Access to Healthcare
ANOVA	:	Analysis of Variance
MBA	:	Master of Business Administration
MTRH	:	Moi Teaching and Referral Hospital
RBT	:	Resource Based Theory
RFID	:	Radio-Frequency Identification
SOB	:	School of Business

ABSTRACT

The main aim of the study was to establish the effect of computerized biometric employee clocking system on operational performance of Moi Teaching and Referral Hospital (MTRH) Eldoret, Kenya. The objective of the research study was to establish the influence of computerized biometric employee clocking system on operational performance of MTRH. The study adopted a descriptive survey research design. The descriptive research design was preferred given that it ensured complete description of the situation under study and minimized bias in the collection of data. A sample of 341 employees was drawn from the target population of 2906 employees of MTRH Eldoret in Grade M 7 to M 17 who clock in and out in the workplace. The researcher developed a questionnaire as the main instrument for data collection from the respondents. Collected data from the questionnaires was coded, collated, cleaned and analyzed. Descriptive and inferential statistics were used to analyze the collected data. The study concluded that there was a statistically significant influence of computerized biometric employee clocking system on operational performance MTRH. The study recommends that future researchers should explore comparative studies to explore the extent to which computerized biometric employee clocking systems influence operational performance across organizations.

CHAPTER ONE

INTRODUCTION

1.1 Background

Computerized biometric employee clocking systems have been used for more than two decades for managing time and employee attendance in organizations. Biometrics based time management attendance systems with enhanced features have been developed (Akinduyite, Adetunmbi, Olabode, & Ibidunmoye, 2013). Organizations are increasingly operating in dynamic conditions. Human resources form a large part of the costs that organizations have to incur. Computerized employee clocking systems that use biometrics 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). The use of computerized biometric employee clocking systems is widespread and growing rapidly with many organizations adopting them due to their ability of enhancing employee productivity. 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). Employee job satisfaction can be improved when workers feel that their efforts are recognized through balanced workload.

The computerized biometric employee clocking system maintains the attendance time of workers such that those who work extra hours are compensated through overtime pay. Effective management of employee attendance ensures that employees in Moi Teaching and Referral Hospital (MTRH) attend to their duties on time to deliver services to patients, which contributes to better operational performance.

The theoretical basis for the study was the Resource Based Theory. The RBT focuses on effective and efficient utilization of resources that an organization has that can contribute to the attainment of a competitive advantage of that organization (Barney, 1991).

Employee attendance timing, employee identification and pay computation are crucial aspects in ensuring that organizations achieve their set operational performance levels. Employee attendance has a direct influence on operational performance of an organization. Employees are expected to attend to their duties as scheduled at MTRH to enhance operational performance. Employee identification is important in ensuring that the actual employee attends to duty. Where employee identification is not done effectively employees who are expected to be on duty may fail to report and their colleagues sign for them if manual attendance registers are used instead of the computerized biometric clocking system.

At MTRH the operations may be adversely affected if some employees fail to report for duty. Proper pay computation ensures that employees are paid what is due to them. When pay is computed accurately it enhances the motivation of workers. Where manual systems of calculating pay are used, errors may occur that lead to employees not being paid accurate salaries. In MTRH workers provide essential services and where pay has errors it may lead to disputes like strikes that disrupt the operation performance of MTRH.

1.1.1 Computerized Biometric Employee Clocking System

Computerized biometric employee clocking system is an automated process that verifies workers identity and captures employee traits with high speed (in one second or less) with high levels of accuracy. Computerized biometric employee clocking systems that are well managed are crucial in the overall performance of any organization. An effective computerized biometric system should address attendance timing, employee identification,

and payroll computation. An effectively implemented computerized employee clocking system should lead to more accurate employee attendance records, eliminate the practice where employee clock in and out for their colleagues 'buddy punching', more authentic identification of workers, and more accurate payroll computation for workers, which leads to happier and productive employees (Shehu & Dika, 2011).

When working time is managed well, conscientious employees perceive their work is recognized. Employees who do not attend to their duties are identified among the workers in the workplace and are encouraged to improve. Improved job satisfaction may be realized through effective computation of overtime, management of extra workload, and recognition of hard work. The employer can also be able to identify areas of high employee absenteeism in the workplace which can be used to re-organize of work.

The history of the time clock dates back to the late 1800s when the first time clock was invented. The time clocks were used to record the time workers reported to work and left work. The time check mechanically indicated the day and time on the card. This provided the factory owner the actual time worked by the employee. Employers paid for actual hours worked by employees. Through the years, the time clocks have evolved to give rise to the current computerized biometric employee clocking systems.

Software for commercialization of time clocks appeared for the first time in the 1990s. Prior to commercialization of time clocks, electrical time clocks that were in use were prone to failure expensive to maintain and repair. The use of clock software has enabled employers to minimize payroll processing costs and expenses. This by extension has made payroll processing much faster and efficient. Computers have continuously become more complex

which has also lead to evolution more versatile attendance timing systems. The range of applications for current time and attendance software include absence management, management of vacation, sick days and holidays, automatic tracking of attendance, management of over time, real time data and online payroll.

1.1.2 Operational Performance

The operational performance of a firm according to Brown, (2008) can be evaluated on prescribed indicators that may include efficiency and effectiveness. Operations transform inputs that produce services or products that translate to value for stakeholders. Business operations should be coordinated well to realize the targets that are set in workplace. In the workplace, business operations' involve storage of materials, transportation, processing and inspection of activities. Business operations according to Brown (2008) deals with human resource, location where activities are done, the equipments that are used and processes that are undertaken. These elements of operations elements should be combined well to enhance operational performance of an organization (Brown, 2008). Russel and Taylor, (2011) propose that every employee should be provided with knowledge and skills that they can utilize to attend to customers promptly for efficiency in operations.

According to Battice, (2005) the operational performance of an organization can be enhances through the streamlining of main activities and processes that an organization engages. Organizations are expected to continuously position themselves and be dynamics in the context of the ever charging market forces. Organizations should strive to attain high levels of operational performance. Organizations should continuously reduce wastages of time and resources while making optimum use of employees and utilizing appropriate

technology to manage operations. Battesse, (2005) indicates that the reduction of operational costs that accrue as a result of enhanced operational efficiency can propel organizations to realize higher profitability with higher chances of becoming more competitive as compared to their competitors. Firms are said to be effective if they formulate appropriate strategic goals, and efficient if they achieve the goals with minimal resources. Battesse, (2005) proposed consequences for increasing operational efficiency, which include reducing costs, improving customer satisfaction, and staying ahead of the competition. This helps in providing employees with secure and consistent access to information.

Effective organizations utilize operational process components to achieve their desired performance targets and success. Organizations strive to enhance superior service levels, better quality standards, meet and exceed the expectations of their customers (Brown, 2008). Organizations need to develop efficient business processes that meet the requirements of their stakeholders in order to secure, reliable network infrastructure (Russel & Taylor, 2011). Organizations need to make it easy for collaboration to take place for effective and interactive links between employees, partners, suppliers, and customers to enhance efficiency in organizations (Brown, 2008).

1.1.3 Moi Teaching and Referral Hospital

The MTRH Eldoret had a humble beginning and has developed immensely over for a period of 90 years from a Native hospital to its current status of a National Referral Hospital. The MTRH commenced operations from 1917 as a native cottage hospital that could handle 60 patients with emphasis on the health needs of Africans. The establishment of Moi University, Faculty of Health Sciences in 1984 saw MTRH elevated from a district hospital

to a teaching and referral institution. The MTRH has an 800 bed capacity and receives patients from Rift Valley, Western Kenya, parts of East Uganda, and the Southern Sudan. The AMPATH - Academic Model Providing Access to Healthcare Centre and MTRH staff work very closely together. The MTRH currently employs 3689 employees who are expected to provide comprehensive healthcare services to patients. Prior to the introduction and adoption of the computerized biometric employee clocking system at the MTRH, manual attendance book registers were in use. The manual attendance management process was slow, prone to manipulation and less accurate. Employees often times complained and disputed the records relating to their attendance.

1.2 Research Problem

In the current health care provision processes, health institutions are making efforts to provide health care to an increasing number of patients with diverse medical conditions while the resources at the disposal of the health institutions are scarce. The attendance management practices that are adopted by organizations can influence their operational performance, which can be manifested in terms of employee punctuality, productivity and customer satisfaction levels. Computerized biometric employee clocking system provides an opportunity for organizations to manage employee attendance, employee identification and payroll computation in ways that can influence operational performance.

The MTRH operates within the public health care system. The MTRH is expected to formulate and implement employee management systems to enable the organization to make optimum use of its employees and other resources to deliver superior services as a teaching and referral hospital. Due to the cost sharing strategy adopted by the Kenya Government in provision of health services, the MTRH has to compete with private medical facilities to

attract customers. The MTRH has the challenge of ensuring that employees are punctual to work, there is high productivity and customers are satisfied with the services received. These challenges can be traced to the type of attendance management system that is adopted by MTRH, hence the need for the current study.

Previous studies have attempted to establish a relationship between biometric attendance management systems and organizations performance (Akinduyite, et. al, 2013; Cupido, 2011; Shawlo (2013). Most of the empirical studies (Mulumba, 2012; Omobogo, 2015; Adewole, et. al 2014) have shown a positive relationship in the link between biometric attendance management systems and organizational performance. Literature suggests that using computerized biometric employee clocking systems enhanced operational performance, yet the variables used by the researcher have not been used in a single study known to the researcher. The researcher has used the variables to attempt to explain the influence of computerized biometric employee clocking system on operational performance. Hence the need for the current study which intended to answer the question; Does computerized biometric employee clocking system influence operation performance of MTRH?

1.3 Research Objectives

The research study objective was to find out the influence of computerized biometric employee clocking system on the operational performance of MTRH Eldoret, Kenya.

1.4 Value of the Study

Administrators and management of MTRH can benefit from the findings of the study to inform improvements in their human resource management systems. The management may take into account the findings of the study when formulating or revising existing policies on employee attendance management in MTRH.

Policy makers in the health care sector may also benefit from the insights of the proposed study. The insights from the proposed study may provide new dimensions in reassessing the policies that have been formulated and implemented in the past. The findings of the study can inform policy formulation and implementation to better manage the scarce of medical facilities and resources dedicated to healthcare.

Researchers and scholars may benefit from the gaps in research that have identified and suggested for further research. The researchers may utilize the findings of the study to explore new areas of research that have hitherto not been considered.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Chapter two provides a review of literature related to the study. Important theoretical and practical problems were analysed; aspects pertaining to computerized biometric employee clocking systems with emphasis on MTRH Eldoret, Kenya were discussed.

2.2 Theoretical Framework

Theories as well as models provide a basis that guide research and interpretation of research results (Eisenhardt, 1989).

In research, theories are formulated to assist in explaining, predicting, and understanding phenomena. Theories provide opportunities to extend frontiers of ideas and knowledge Swanson (2013). The research study was guided by the Resource Based Theory (RBT).

2.2.1 Resource Based Theory

The study was anchored in the Resource Based Theory (RBT). There is evidence from research that supports the RBT (Crook et al, 2008) that argues that organizations compete in dynamic and changing business environment. Firms can attain and achieve a sustainable competitive advantage through their employees according to Barney (1991). This can be realized when organizations have a pool of human resources that cannot be imitated or substituted by its rivals or competitors. The RBT as a foundation of competitive advantage is embedded in the utilization of a bundle of valuable resources that are at the disposal of the firm. It is important that firms have to identify the major potential resources. These resources should be valuable, rare in-imitable and non-substitutable among the competitors of the firm (Galbreath, 2005) in the field that they operate in. A firms' resources must be valuable in

order to make firms adopt value creating strategies. The firm should outperform its competitors or minimize the weaknesses that it may have (Barney 1991). The RBT as a foundation for competitive advantage of firms' is embedded mainly in the use of tangible or intangible resources that firms may have (Rumelt, 1984)

The RBT looks at the firm's internal operational environment as an important driver that can create a competitive advantage for the firm. The RBT makes an assumption that an organization is made up of unique capabilities and resources as a foundation for a firm's strategy to compete and be profitable and also have competitive advantage over its competitors. According to Hitt, Ireland and Hoskisson, (2009), firms can use the resources at their disposal and capabilities to enhance their operational performance. In order to be competitive, firms should ensure that they carry out their activities in an integrated approach. Firms should also adopt strategies that distinguish them from other firms in the areas that they operate in. As a result, organizations need to explore their frameworks if they envisage remaining relevant in the context of the competitive global environment. Organizations are striving to achieve competitive advantage, they should put into consideration that true competitive advantage requires the resources of an organization to be valuable, rare, inimitable and non-substitutable as pointed out by (Crook, Ketchen, Combs & Todd 2008).

The key aspect of the Resource Based Theory is that firms have to identify their main resources that can make the firms to achieve and sustained a competitive advantage against their competitors (Barney, 1991). A resource has to be valuable to organizations like MTRH Eldoret, Kenya are expected to make optimum use of time and the human resources that they have by ensuring that employees work fully for the scheduled time to enable MTRH enhance its operational performance in delivery of health services.

2.3 Computerized Biometric Employee Clocking System

The computerized employee clocking system is an automated biometric time clocking process that verifies workers identity like personal number and captures employee traits with high speed (one second or less) with high levels of accuracy, ease of enrollment (Ononiwu & Okorafor, 2012).

Computerized biometric employee clocking systems capture individual traits that are unique to an individual. These characteristics may include finger prints, hand geometry and an individual's voice. The biometrics data is captured by specialized devices in the workplace. (Schneider & Price, 2001).

2.4 Attendance Timing

Effective attendance timing in the workplace helps in increasing employee or workers productivity which leads to overhead cost saving that enhance an organizations operational performance. Computerized attendance timing system helps to track employee attendance (Ononiwu & Okorafor, 2012). Time management helps in guiding how time is managed in the workplace. The action that is taken to improve efficiency is guided by the principle of attendance timing (Swift, 2010).

Attendance timing is crucial for individuals to match their requirements as employees in the workplace in order to manage work-life balance (Allen, 2001). Whereas employees are expected to be in the workplace to work, they have their individual commitments which they also have to attend to. An effective attendance timing system can ensure that there is a mutual balance between individual and workplace.

The number of working hours that an employee is expected to put in any given month determines the pay due to the employee. These working hours may be determined by the pattern of work. Employees may work in the regular, shift and over time (locum) patterns. These working hours are determined based on the legal requirement, collective bargaining agreements for union workers, organizational policy, and best practices in the industry among other considerations.

The biometric clocking systems may be used in two modes, that is, identification and verification. The identity verification of a user takes place when a user logs into the system. The biometric data that is presented to the system is checked against the template that is embedded in the biometric system. The total identification of the users takes place once the computerized biometric system matches the users data with all the records embedded in the identification database (Zhang, 2001).

The process of identifying individuals in an organization is technical, costly and challenging. Generally, the accuracy level of identification reduces as the size of a database increases. To increase the level of accuracy in large data bases, the data bases have to be categorized on the basis of biometric data. This ensures that record identification is done within a specific category to minimize the number of records in which a search has to be done. This helps in increasing the level of accuracy (Coats et al, 2007). Prior to the identification, a user of the computerized biometric employee clocking system is expected to register into the system. The individual traits of the user have to be captured by the system. Data enrolment has to done in stages to create high quality of biometric templates that are eventually used for the identification of the users. Enrolment is the process that users go through to register in the biometric system (Coats et al, 2007).

2.5 Employee Identification

In order to identify a user, the user's biometric characteristics and the derived biometric template characteristics must be reconciled. This is referred to as enrolment and involves the creation of a data base of the user which is subsequently maintained in the system. The user's data base comprises employee details and biometric traits (Schneider & Price, 2001).

The person to be recognized in a biometric system has to present their biometric characteristic to be captured in a biometric database as a template. On the basis of the recognition biometric template characteristic extracted, a user specific template is created and stored in the biometric data base. As a result of the statistical nature of the biometric templates there is no exact match possible that can be possible from two different users of the system. On the basis of this, the user identification process only assigns biometric data based on a biometric template and confirms recognition where the comparison score outcome exceeds an adjustable threshold (Schneider & Price, 2001).

User authentication involves reliable verification of the user's identity (Russ, 2000). The individual users of the biometric system have to be authenticated and identified by the machine using the characteristics that are embedded in the biometric system database (Woodward et al 2001).

A computerized biometric clocking system can be an authentication system or an identification system. Identification confirms one's identity using an identifier like username. Verification is a confirmation or denial of an identity using a verifier like a password. In biometrics, verification involves authenticating users in conjunction with smart cards and usernames and this is called biometric authentication.

Whereas biometric identification compares a user's biometric templates against stored profiles and it finds the one that matches best, authentication deals with individual to template matching of the live reading against the stored profile (Ruggles, 2002). Identification responds to the question "Who is this person" while authentication asks "Is this person the person they claim to be?" Authentication is typically utilized for positive recognition, where the aim is to prevent multiple people from using the same identity (Omobogo, 2015).

2.6 Payroll Computation

Biometric system is an accurate and reliable way to determine whether an employee was actually present for payment purposes. The technical operation of computerized biometric employee clocking system can be evaluated on the ability of the system to match the individual users' traits with the templates with accuracy (Jain et al., 2000). The computerized biometric employee clocking system ensures that data is available for use at all times. The data that is obtained from the computerized biometric employee clocking system can be utilized for payroll computation in real time.

The initial biometric data that is captured by the biometric system is critical for subsequent authentications of the user. As a result of this the quality of the biometric template must be ascertained to ensure that it is suitable, if not, another biometric template should be obtained from the user (Schneider & Price, 2001).

Templates are produced after biometric data is captured by the biometric machine. The quality of biometric templates that are subsequently processed depend on the type of biometric technology utilized (Battese, 2005). The computerized biometric employee clocking system enhances the quality of data.

Biometric features neither compared nor stored in their raw format. The raw templates have some irrelevant data, which should not be kept on record. The templates are processed to ensure that only the important characteristics are extracted and retained on the records. This helps in reducing the quantity of data (Oloyede, 2014). Biometrics enables employers to keep records of their employees' time more accurately for payroll computation. The computerized biometric employee clocking system stores payroll accurate data. The computerized biometric employee clocking system enhances employee job satisfaction and retention (Lawson, 2003).

2.7 Computerized Biometric Employee Clocking System and Operational Performance

When computerized biometric employee clocking systems are being designed it is important to ensure that physiological and behavioural features are taken into consideration. (Jain et al, 2000: Zhang, 2001). The ultimate performance of the biometric system will depend on how well the physiological and behavioural features were considered in the biometric system design. The features that need to be considered include the uniqueness of individual users, permanence, acceptance, and hardness of the system and levels of fulfillment (Hitt *et al.*, 2013).

Biometrics systems helps in effective attendance management which helps in increasing employee or workers productivity and generates time and overhead cost savings to enhance the organizations performance by utilizing computerized time management system to track employee time and attendance (Ononiwu & Okorafor, 2012). Attendance timing management helps in guiding our methods of managing working hours. The actions that are taken to enhance efficiency was based on the principle of time management (Swift, 2010).

Attendance timing is important for individuals in a workplace as well as employers (Allen, 2001). The number of working hours that an employee is expected to put in any given month determines the pay due to the employee. These working hours may be determined by the pattern of work. Employees may work in the regular, shift and over time (locum) patterns. These working hours are determined based on the legal requirement, collective bargaining agreements for union workers, organizational policy, and best practices in the industry among other considerations.

According to Zhang (2001) biometric authentication system should be designed properly to enhance security. Biometrics based time and attendance devices are considered to be the most secure means of identity and authenticate users (Coats et al, 2007, Zhang, 2001). The utilizing electronic based intervention devices enhance security (Emre 2000).

According to Coats et al, (2007) biometrics assists in enhancing accuracy. When an organization utilizes the biometrics employee clocking system effectively, the biometric features that are unique to individual users imply that they cannot be replicated. This enhances the accuracy in identification of the users.

The biometrics system helps in eliminating the challenges that may be encountered when other attendance management systems like manual registers and clocking cards are used. Users in biometric attendance management system do not need to remember complicated passwords or carry employment identification cards (Jain et al., 2004).

2.8 Conceptual Framework

According to Mugenda and Mugenda (2003) a conceptual framework or model is a hypothesized model indicating the relationship between the dependent and independent variables. The conceptual framework for the research study is presented in Figure 1.

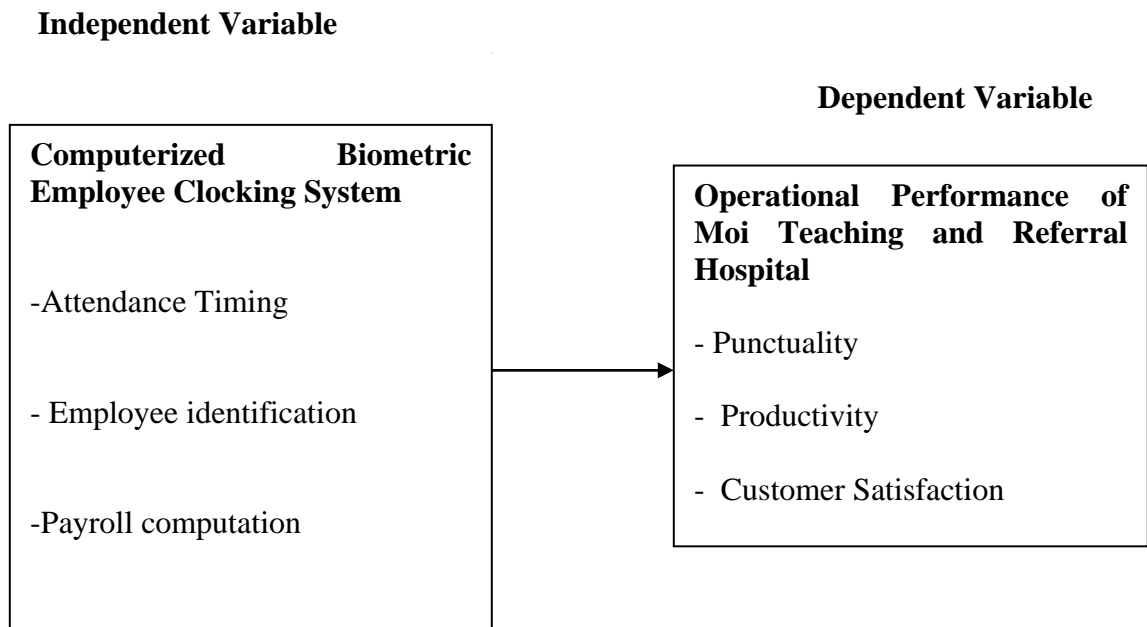


Figure 1: Conceptual Framework

The independent variable, that is, computerized biometric employee clocking system is thought to influence operational performance of the MTRH.

2.9 Knowledge Gap

The knowledge gap that has been identified in the literature review is that there seems to be no known study that has been conducted to find out the effect of computerized biometric clocking system on operational performance of MTRH Eldoret, Kenya. This is despite of the important role that the MTRH plays in the referral health system in Kenya as the second largest referral hospital in Kenya after Kenyatta National Hospital.

2.10 Summary of the Reviewed Literature

This chapter examined the various aspects relating to computerized biometric employee clocking system and operational performance. The resource based theory reveals that the resources that an organization has that include time and people can make an organization to enjoy a competitive advantage over its competitors. The time management theory emphasizes the crucial need of managing time for optimum benefit from organizational resources.

CHAPTER THREE

RESEARCH METHODOLOGY

Chapter three research design, population, sample design, data collection and data analysis procedures that were utilized in the research study.

3.1 Research Design

The descriptive survey research design was adopted in the study. The descriptive research design was preferred given that it ensured complete description of the situation that was preferred given that it could facilitate a complete description of the phenomena that was under study. (Cooper & Schindler, 2003).

3.2 Population

The target population of the study was 2906 employees of MTRH Eldoret, who are in Grades M 7 to M 17. The employees who are in these grades are the ones who use the computerized biometric employee clocking system at MTRH, to clock in and out of the workplace.

Table 3.1: Target Population

Employee Grade	Number of Employees
M 7	380
M 8	354
M 9	829
M 10	336
M 11	137
M 12	439
M 13	245
M 14	62
M 15	81
M 16	41
M 17	2
Total	2906

3.3 Sample Design

The Krejcie and Morgan (1970) table for the determination of sample size in a given population (Appendix III) was utilized to determine the sample size for the study. A sample of 341 employees was obtained out of the target population of 2906 employees of MTRH in Grade M 7 to M 17 who clock in and out in the workplace. Proportionate stratified sampling was utilized to determine the proportionate sample of the target population of each stratum (Sekaran, 2003).

Table 3.2: Sample size

Employee Grade	Target Population	Sample size
M 7	380	44
M 8	354	42
M 9	829	97
M 10	336	39
M 11	137	16
M 12	439	51
M 13	245	29
M 14	62	7
M 15	81	10
M 16	41	5
M 17	2	1
Total	2906	341

3.4 Data Collection

A questionnaire (Appendix II) was the main instrument for data collection from the respondents. The study questionnaire had both open-ended questions and closed-ended questions. The study questionnaire was self-administered to selected employees of MTRH. The questionnaires were left with respondents and collected after they were completed.

3.5 Data Analysis

The collected data was coded, collated, cleaned and analyzed. Descriptive and inferential statistics were utilized to analyze the collected data. Descriptive statistics constituted frequencies, percentages were calculated for institutional data to describe the main features of the study gender of respondents, employee grades, employee age, highest level of education of the respondent and the number of years worked at MTRH.

Measure of central tendency (means) and dispersion (standard deviations) were utilized to calculate mean scores and ranges of dispersion. Inferential statistics were used which included correlation and regression analyses. Mean scores were computed for likert type questions. The value of coefficient of determination R^2 was used to indicate the degree of variation in operational performance (dependent variable) attributed to computerized biometric employee clocking system (predictor variable). The Beta values indicated the amount of change in operational performance attributed to the amount of change computerized biometric employee clocking system. The F ratio was used to measure how well the equation line that was developed fitted with the observed data. The statistical significance of the relationship was interpreted based on R^2 , F, t, β and p values. The regression model used was $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

Chapter four presents data analysis, results and discussion. The results of the research study are presented percentages, frequency, distributions, means and standard deviations.

4.2 Response Rate

The study targeted 341 employees of MTRH Eldoret, 243 respondents completed and returned the questionnaires resulted into a 71.2% response rate. The respondent's rate was considered adequate for further analysis. This was consistent with Orodho (2009) given that a response rate above 50 per cent contributes to gathering of data that is sufficient that could be used to generalize the opinions of respondents in a study about a problem in the target population. Table 4.1 presents the response rate for each grade.

Table 4.1: Distribution of Respondents by Employment Grade

Employee Grade	Sample size	Frequency	Percent
M 7	44	36	10.6
M 8	42	31	9.1
M 9	97	68	19.9
M 10	39	24	7.0
M 11	16	11	3.2
M 12	51	40	11.7
M 13	29	17	4.9
M 14	7	5	1.5
M 15	10	7	2.1
M 16	5	3	0.9
M 17	1	1	0.3
Total	341	243	71.2

4.3 Distribution of Respondents by Gender

The respondents of the study indicated their gender. The distribution of the respondents by their gender is highlighted in Table 4.2.

Table 4.2: Distribution of Respondents by Gender

Gender	Frequency	Percent
Male	81	33
Female	162	67
Total	243	100

Results in Table 4.2 indicate that 33% of those who responded were male, while 67% were female.

4.4 Distribution of Respondents by Grade

The respondents who use the computerized biometric employee clocking at MTRH provided their current grades. . The results of the distribution of the respondents by grade are provided in Table 4.3.

Table 4.3: Distribution of Respondents by Grade

Employee Grade	Frequency	Percent
M 7	36	14.8
M 8	31	12.8
M 9	68	28.0
M 10	24	9.9
M 11	11	4.5
M 12	40	16.5
M 13	17	7.0
M 14	5	2.1
M 15	7	2.8
M 16	3	1.2
M 17	1	0.4
Total	243	100

The study results presented in Table 4.3 show that the highest number of employees who responded to the study were in Grade M 9 comprising of 28% and the lowest response was from employees in Grade M 17 with 0.4%.

4.5 Distribution of Respondents by Age Bracket

The respondents were asked to indicate their age bracket. The responses are indicated on Table 4.4.

Table 4.4: Distribution of Respondents by Age Bracket

Age Bracket	Frequency	Percent
Below 20 Years	7	2.8
21 – 30 Years	34	14.0
31 – 40 Years	68	28.0
41 – 50 Years	62	25.5
More than 50 Years	72	29.6
Total	243	100

The study results presented Table 4.4 indicate that higher number of respondents who responded to the study were above 50 years of age comprising of 29.6%. The lowest response was from employees below 20 years of age with 2.8%.

4.6 Distribution of Respondents by Years Worked at MTRH

The respondents indicated the number of years that they had worked at MTRH. The result of the findings are indicated in Table 4.5.

Table 4.5: Distribution of Respondents by Years Worked at MTRH

Years Worked at MTRH	Frequency	Percent
Below 5 Years	16	6.5
5 – 10 Years	31	12.8
10 – 15 Years	37	15.2
15 – 20 Years	92	37.9
More than 20 Years	67	27.6
Total	243	100

The study established that most of the respondents 37.9% had worked at MTRH for duration between 15 to 20 years. Respondents who had worked at MTRH for more than 20 years were 27.6%, while 6.5% indicated that they had worked at MTRH for less than five years.

4.7 Distribution of Respondents by Highest Level of Education

The respondents indicated their highest level of education. The results of findings are indicated in Table 4.6.

Table 4.6: Distribution of Respondents by Highest Level of Education

Highest Level of Education	Frequency	Percent
Primary	14	5.7
Secondary	41	16.8
Certificate	58	23.8
Diploma	70	28.7
Degree	39	16.5
Post Graduate	15	6.1
Other	6	2.4
Total	243	100

The results in Table 4.6 shows that 28.7% of the respondents had attained a diploma as their highest level of education, while 2.4% of the respondents had attained other qualification as their highest level of education.

4.8 Attendance Timing

The respondents were asked to rate the extent to which they agreed with the statements on attendance timing at MTRH using a likert type scale of 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5= Strongly Agree. The results of the mean scores, means and standard deviations of the responses are presented in Table 4.7.

Table 4.7: Distribution of Respondents Mean Scores, Means and Standard Deviations on Statements for Attendance Timing

Statement	Percent					Mean	Standard Deviation
	Strongly Disagree	Disagree	Neutral	Agree	Strong Agree		
Finger print input takes lesser time for recording employee attendance.	0	4.9	49	49	41.2	4.26	0.77
Finger prints time clocking is better than manual system.	20.2	30.5	33.3	11.1	4.9	2.56	1.09
Attendance data can easily be captured through computerized biometric employee clocking system.	2.9	0	9.9	57.2	30	4.12	0.81
Computerized biometric employee clocking system is effective in capturing employee working hours.	0	0	5.3	51	43.6	4.38	0.59
Biometrics provides a detailed audit trail of employee attendance.	0	0	49	43.6	51.4	4.47	0.59

From the findings in Table 4.7, the statement that ‘biometrics provides a detailed audit trail of employee attendance’ had the highest overall mean rating of 4.47 and standard deviation of 0.59. The statement that, ‘finger prints time clocking is better than manual system had the lowest overall mean rating of 2.56 and standard deviation of 1.09.

4.9 Employee Identification

The respondents were asked to rate the extent to which they agreed with the statements on employee identification at MTRH using a likert type scale of 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5= Strongly Agree. The results of the mean scores, means and standard deviations of the responses are presented in Table 4.8.

Table 4.8: Distribution of Respondents Mean Scores, Means and Standard Deviations on Statements for Employee Identification

Statement	Percent					Mean	Standard Deviation
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		
Biometrics-based authentication use individual physical traits	0	3.3	5.8	44	46.9	4.35	0.74
Employees don't carry separate hardware tokens when clocking	23	28.4	33.7	6.2	8.6	2.49	1.17
All employee identification aspects of the system are fully secure	3.3	0	8.2	53.5	35	4.17	0.89
Biometrics data is intrinsically connected to an individual employee	0	0	7.4	48.1	44.4	4.37	0.62
Computerized biometric system authenticate employee identity in real time	0	0	7.8	38.3	53.9	4.46	0.64

The findings on Table 4.8 indicate that the statement ‘computerized biometric system authenticate employee identity in real-time (M = 4.46. SD = 0.64) received the highest rating. The statement that ‘employees don’t carry separate hardware tokens when clocking (M = 2.49, SD = 1.17) received the lowest rating. This implies that according to most of the respondents the computerized biometric employee clocking system is identifies employees in real-time at MTRH.

4.10 Pay Computation

The respondents were asked to rate the extent to which they agreed with the statements on pay computation at MTRH using a likert type scale of 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5= Strongly Agree. The results of the mean scores, means and standard deviations of the responses are presented in Table 4.9.

Table 4.9: Distribution of Respondents Mean Scores, Means and Standard Deviations on Statements for Payroll Computation

Statement	Percent					Mean	Standard Deviation
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		
Biometric system is a reliable way to determine employee pay	23	12.3	2.9	57.6	4.1	3.07	1.34
Computerized biometric employee clocking system provides accurate data for payroll computation.	8.2	7.4	1.2	69.1	14	3.73	1.06
Computerized biometric employee clocking system stores payroll data accurately.	2.1	2.1	2.5	79	144	4.02	0.66
Computerized biometric employee clocking system enhances quick payroll processing.	7.4	9.9	3.3	71.2	8.2	3.63	1.02

The results of findings in Table 4.9 show that the statement ‘computerized biometric employee clocking system stores payroll data accurately’ the highest mean rating of 4.02 and standard deviation of 0.66. The statement that ‘biometric system is a reliable way to determine employee pay’ received the lowest mean rating of 3.07 and standard deviation of 1.34. This implies that according to most of the respondents the computerized biometric employee clocking system is not reliable for determination employee pay at MTRH.

4.11 Operational Performance

The respondents were asked to rate the extent to which they agreed with the statements on operational performance at MTRH using a likert type scale of 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5= Strongly Agree. The results of the mean scores, means and standard deviations of the responses are presented in Table 4.10.

Table 4.10: Distribution of Respondents Mean Scores, Means and Standard Deviations on Statements for Operational Performance

Statement	Percent					Mean	Standard Deviation
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		
Computerized biometrics clocking system enhances employee punctuality.	2.5	10.7	17.3	43.6	25.9	3.80	1.02
Computerized employee clocking system eliminates incidents of wage theft.	0	7.8	28	46.1	18.1	3.74	0.84
Computerized biometric clocking system result in reduction of employee attendance management costs that lead to savings that enhance productivity.	2.5	2.9	7.4	69.5	17.7	3.99	0.77
Computerized biometric system facilitates quick resolution of employee complaints in relation to working hours.	2.5	10.3	12.8	40.7	33.7	3.93	1.05
Computerized biometrics system ensures that patients are attended to on time.	0	8	8	56	42.4	4.40	0.55

From the findings in Table 4.10, the statement that ‘computerized biometrics system ensures that patients are attended to on time’ received the highest mean rating of 4.40 and standard deviation of 0.55. The statement that ‘computerized employee clocking system eliminates incidents of wage theft’ received the lowest mean rating of 3.74 and standard deviation of 0.84.

4.12 Correlation Analysis

A correlation analysis was done to estimate correlation coefficients among the variables of the study. The correlation analysis results are presented in Table 4.11.

Table 4.11: Pearson’s Correlation for Attendance Timing, Employee Identification, Payroll Computation and Operational Performance

	Attendance timing	Employee identification	Payroll computation	Operational performance
Attendance timing	1.000			
Employee identification	.852	1.000		
Payroll computation	.835	.502	1.000	
Operational performance	.041	.017	.218	1.000

The correlation analysis results in Table 4.11 indicate that all the correlation coefficients were positive. Employee identification and attendance timing had the strongest correlation coefficient of 0.852, while operational performance and employee identification had the weakest correlation coefficient of 0.017.

4.13 Regression Analysis

Regression analysis was conducted to test the influence of computerized biometric employee clocking system on operational performance in MTRH. The regression model was as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Where:

Y= Operational performance

X₁= Attendance timing

X₂=Employee identification

X₃= Payroll computation

β₀ = Constant (y intercept)

β = Coefficient

ε = Error term

The regression analysis results are provided in Table 4.12.

Table 4.12 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.213 ^a	.045	.033	.5803958

a. Predictors: (Constant), Attendance Timing, Employee Identification, Pay Computation

The regression results in Table 4.12 indicate that the computerized biometric employee clocking system (independent variables) explains 4.5% of the changes in operational performance (dependent variable) in MTRH as represented by R Square of 0.045 (Coefficient of determination). The model does not explain 95.5% of the variations in operational Performance. This implies that there are other factors that influence operational performance that were not explained in the model.

Table 4.13 ANOVA^b

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3.813	3	1.271	3.773	.011 ^a
	Residual	80.509	239	.337		
	Total	84.322	242			

a. Predictors: (Constant), Attendance Timing, Employee Identification, Pay

Computation

b. Dependent Variable: Operational Performance

The study used ANOVA to establish the significance of the regression model on the basis of which an f-significance value of p less than 0.05 was established ($p = 0.011$, $F = 3.773$, < 0.05). The results in Table 4.13 indicate that the model was statistically significant in predicting how operational performance is influenced by attendance timing, employee identification and pay computation.

Table 4.14 Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.186	.543		4.026	.000
	Attendance Timing	.181	.089	.128	2.031	.043
	Employee Identification	.188	.080	.148	2.347	.020
	Payroll Computation	.089	.079	.071	1.125	.262

a. Dependent Variable: Operational Performance

The established regression equation was

$$Y = 2.186 + .181X_1 + .188X_2$$

The findings in Table 4.14 show that when all other independent variables are held constant, one unit increase in attendance timing will lead to a 0.181 ($p = 0.043 < 0.05$) increase in the scores of operational performance. One unit increase in employee identification leads to 0.188 ($p = 0.020 < 0.05$) increase in operational performance. The findings further indicate that the effect of pay computation on operational performance was not significant 0.089 ($p = 0.262 > 0.05$). This implies that employee identification influences operational performance the most, followed by attendance timing. Based on the findings pay computation did not influence operational performance.

4.14 Discussion of the Findings

The objective of this research study was to establish the influence of computerized biometric employee clocking system on operational performance of MTRH. The first findings of the study indicated that one unit increase in attendance timing leads to 0.181 ($p = 0.043 < 0.05$) increase in the scores of operational performance. This finding supported the findings of Akinduyite, Adetunmbi, Olabode, & Ibidunmoye, (2013) who found out that biometrics based time management attendance systems with enhanced features enhance workplace efficiency and operations. In a previous study Ononiwu and Okorafor (2012) found out that effective attendance timing in the work place helped in increasing employee productivity. These findings supported the finding of swift (2010) who found out that the action that taken to enhance efficiency is guided by the principle of time management. These results imply that computerized biometric employee clocking systems that are put in place to manage

attendance of employees like finger prints input for recording employee attendance, finger prints time clocking capturing detailed audit trail of employee attendance and data integrity enhance operational performance.

The second finding of the research study indicated that a unit increase in employee identification led to 0.188 ($p = 0.020 < 0.05$) increase in the scores of operational performance. This finding was in line with a previous study by (Schneider and Price 2001) whose finding indicated that employee identification is enhanced by use of multiple biometric references to assist in employee identification which enhances organization performance. In another study Russ (2000) found out that employee authentication was a reliable process of verifying an individual identity. In a study by Omobogo (2015) the results indicated that authentication is typically used for positive recognition of an individual. These findings were consistent with those of Mulumba (2012) who found out that biometric authentication systems have a link with service delivery in healthcare sector in Kenya. This finding is in line with resource based theory according to Barney (1995). The theory puts emphasis on the need for organization to ensure that they make use of their processes like computerized employee biometric clocking systems of identification of the employees as an important resource that can make the organization competitive through superior operational performance. These findings imply that MTRH has to formulate a computerized biometric employee clocking system that authenticates employee identity with emphasis on biometric based authentication of employee physical traits and employee authentication of employee identity in real time to enhance operational performance.

The third finding of the research study was that there was no significant link between computerized biometric employee clocking system pay computation and operational performance of MTRH. The results indicated that the effect of pay computation on operational performance was not significant 0.089 ($p = 0.262 > 0.05$). This was contrary to the findings of previous studies by Adewole et al (2014) who found out that biometrics enabled employers to maintain records of their employees' time more accurately to facilitate payroll computation. The results were also contrary to a study by Ononiwu and Okorafor (2012) who found out that that biometrics provides a detailed audit trail for pay computation which leads to reduced overhead costs that enhance an organizations operational performance. The insignificant relationship between payroll computation and operational performance can be attributed to lack of effective MTRH policies and practices that sensitize employees on the application and uses of computerized biometric employee clocking system in preparation of payroll.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

Chapter five presents a summary of findings, conclusions and recommendations of the research study. The chapter was guided by the research study objective that sought to establish the influence of computerized biometric employee clocking system on operational performance of MTRH Eldoret, Kenya.

5.2 Summary

The main purpose of the research study was to establish the influence of computerized biometric employee clocking system on operational performance of MTRH. Data for the research study was obtained from 243 respondents from MTRH using a structured self administered questionnaire with multiple choice questions, open ended questions and five likert scale type questions.

The objective of the research study was to establish the influence of computerized biometric employee clocking system on operational performance. The research study set out to answer the question, Does computerized biometric employee clocking system influence on operational performance in MTRH. The results showed a positive and statistically significant influence of attendance timing and employee identification aspects of computerized biometric employee clocking systems on operational performances. The research study established no statistically significant link between pay computation and operational performance.

5.3 Conclusion

The objective of the study was to establish the influence of computerized biometric employee clocking system on operational performance of MTRH. The research question that was answered by the study was; what is the influence of computerized biometric employee clocking system on operational performance of MTRH?

On the basis of the findings of the study, it was concluded that there was a statistically significant influence of computerized biometric employee clocking system (attendance timing and employee identification) on operational performance of MTRH. It was further concluded that there was no statistically significant influence of computerized biometric employee clocking system (pay computation) on operational performance of MTRH.

5.4 Recommendations

On the basis of the conclusions made by the study, it is recommended that MTRH needs to enhance the utilization of the computerized biometric employee clocking system for improved operational performance. Attendance timing and employee identification processes should be streamlined for increased operational performance; however pay computation should be linked to operational performance.

Institutions should invest more on technologies that ensure efficiency in operational performance. Operational performance should be kept in mind as institutions upgrade their employee attendance management systems. In order to differentiate themselves from other organizations, institutions like MTRH need to go out of their way to deliberately listen to the needs of employees and customers to ensure that their operational performance is enhanced.

5.5 Limitations of the Study

The research findings were applicable to MTRH Eldoret, Kenya, which is a public teaching and referral hospital. The findings can therefore not be generalized to all organizations without considering private teaching and referral hospitals. Inadequate finances also posed challenges in conducting the study. The researcher did not have adequate funding to exhaust all factors that influence computerized biometric employee clocking system in MTRH Eldoret, Kenya.

5.6 Areas for Further Study

Further studies should be conducted using different organizations to facilitate a comparison of the findings of the influence of computerized biometric employee clocking system on operational performance of organizations.

REFERENCES

- Acuity Market Intelligence, (2008). *Biometrics: high value workforce management: The critical role of biometric time and attendance to workforce management solutions*, White Paper, February, 2018
- Adewole K., Adbulsalam S., Babatunde R., Shittu T. & Olotede M. (2014). Development of finger biometric attendance system for non-academic staff in a tertiary institution. *Computer Engineering and Intelligent Systems Review*, 5, 2.
- Akinduyite C.O, Adetunmbi A.O, Olabode O.O. & Ibidunmoye E.O, (2013) Fingerprint-based attendance management system. *Journal of Computer Sciences and Applications*, 2013, 1(5), 100-105
- Allen, D. (2001). *Getting things done: The art of stress-free productivity*, New York: Viking ISBN 978-0-670-88906-8
- Barney, J. (1991). Firms resources and sustained competitive advantage, *Journal of Management*, 17, 99-120
- Battesse, W. T. (2005). Sustainability: a new and complex challenge for crisis managers. *International Journal of Sustainable Strategic Management* 2(1), 4-16.
- Brown, J. (2008). Firm resources and sustainable competitive advantage. *Journal of Management*, 17(1)
- Coats, Taneja, S., Pryor, M. G. & Zhang L. (2007). Crisis management: a strategic and tactical leadership imperative for organizational sustainability. *International Journal of Sustainable Strategic Management*, 2(1), 60-73.
- Coopers, D.R & Scindler, P.S. (2006). *Business Research Methods*, 9th Edition, MacGraw-Hill, Publishing New Delhi, India.
- Creswell, J.W. & Miller, D.L. (2000). Determining validity in qualitative inquiry. *Theory into Practice*, 39 (3), 124-131.
- Crook, T.R, Ketchen Jr, D.J, Combs, J. G & Todd, S.Y (2008). Strategic resources and performance. *A Meta – Analysis, Strategic Management Journal*, 29, 1141-1154.
- Cupido, (2011). *The implementation of a time and attendance system at Stellenbosch Municipality – a change management perspective masters project in public administration*. University of Stellenbosch

- Eisenhardt, R. (1989). A framework linking intangible resources and capabilities to sustainable competitive advantage. *Strategic Management Journal*, 14(8), 607-618.
- Galbreath, J. (2005). Which resources matter most for firm success? An exploratory study of resource based view. *Technovation* 25, 979-987.
- Government of Kenya, (2014). *Ministry of health Kenya healthy policy 2014 – 2030* towards attaining the higher standards of health.
- Hitt O. D., Ireland V., & Hoskisson K. K. (2013). IT-Enabled Organizational Agility and Sustainable Competitive Advantage, *Working Paper Series*
- Kothari, C.R. (1990). *Research methodology: Methods and techniques*. New Delhi: New Age International publishers limited.
- Krejcie, R. V.& Morgan, D. W. (1970). *Table of determining sample size for a given population*
- Mugenda, O. M. & Mugenda, A. G. (2003). *Research methods: Quantitative and qualitative approaches*, (2nd Ed.). Nairobi: Acts Press.
- Mulumba, M. (2012). *Biometric authentication systems and service delivery in healthcare sector in Kenya*.
- Oloyede, J. (2014). Addressing sustainability: a strategy development framework. *International Journal of Sustainable Strategic Management* 1: 3, 303-319.
- Omobayo, A. (2015). *Optimization of bimodal biometrics system for access control authentication in Kenya*, School of Computing, College of Science, Engineering and technology, University of South Africa.
- Omobogo, R.M. (2015). *Contemporary Strategy Analysis*, 4th ed., Oxford: Blackwell
- Ononiwu G. C.& Okorafor, G. N (2012). Radio frequency identification based attendance system with automatic door unit. *Academic Research International*, 2(2), March, 2012.
- Oso, W. Y & Onen, D (2011). *A general guide to writing research proposal and report*, Jomo Kenyatta Foundation, Nairobi, Kenya.
- Ruggles, H.E. (2002). *Trade between Zambia and Kenya. An investigation into factors that make the Kenyan edible oil industry competitive*, Unpublished Thesis University of Nairobi.

- Rumelt, D.P. (1984). *Towards a strategic theory of the firm alternative theories of the firm*; 2002, 154(2); 286-300 Elgar Reference Collection international library of critical writings in Economics.
- Russ, K. (2000). *Exploring Corporate Strategy*, Text and Case Prentice
- Russel, M. R. & Taylor, C. E. (2011). Research challenges in sustainable strategic management: change and sustainability. *International Journal of Sustainable Strategic Management*, 1(1), 2-15.
- Schneider, G. S. & Price, R. (2001). Assessing advantage: A framework for diagnosing competitive superiority. *Journal of Marketing*, 52(2), 1-20.
- Sekaran, U. (2003). *Research method for business: A skill building approach*, New York: John Wiley & Sons, Inc.
- Shawl D. (2013). *Biometrics – implementing into the healthcare industry increases the security for the doctors, nurses, and patients.*
- Shehu V. & Dika A. (2011). *Using real time computer vision algorithms in automatic attendance management systems*. Proceedings of the ITI 2010 32nd Int. Conf. on Information Technology Interfaces, June 21-24, 2010, Cavtat, Croatia
- Swanson, R. A. (2013). *Theory building in applied disciplines*, San Francisco, CA: Berrett-Koehler Publishers 2013
- Swift, J. (2010). *Where did time fly: Practical unconventional tips to save and optimize time*, CreatSpace Independent Publishing Platform, Amazon USA ISBN 13: 978-1452855325
- Woodward, G., Combs, J. G, Galbreath, J. & Scholes, K., (2012). *Exploring Corporate Strategy*. 6th Edition, Prentice Hall of India, New Delhi.
- Zhang, M, A. (2001). The role of intangible assets in sustaining competitive advantage among the pharmaceutical manufacturers. *Operational Performance Journal* 14: 8, 607-618.

APPENDICES

APPENDIX 1: LETTER OF INTRODUCTION



UNIVERSITY OF NAIROBI SCHOOL OF BUSINESS

Telephone: 020-2059162
Telegrams: "Varsity", Nairobi
Telex: 22095 Varsity

P.O. Box 30197
Nairobi, Kenya

DATE 21/10/2016

TO WHOM IT MAY CONCERN

The bearer of this letter HILDER ALYISA KISAME

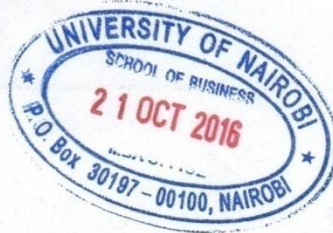
Registration No. DBI/75757/2014

is a bona fide continuing student in the Master of Business Administration (MBA) degree program in this University.

He/she is required to submit as part of his/her coursework assessment a research project report on a management problem. We would like the students to do their projects on real problems affecting firms in Kenya. We would, therefore, appreciate your assistance to enable him/her collect data in your organization.

The results of the report will be used solely for academic purposes and a copy of the same will be availed to the interviewed organizations on request.

Thank you.




PATRICK NYABUTO
SENIOR ADMINISTRATIVE ASSISTANT
SCHOOL OF BUSINESS

APPENDIX II: Questionnaire for Employees of Moi Teaching and Referral Hospital, Eldoret

Dear Respondent,

The aim of this questionnaire is to obtain data on computerized biometric employee clocking system and operational performance: case study of MTRH Eldoret, Kenya. The researcher assures the respondent that the data obtained information gathered will be handled with utmost confidentiality for academic reasons only.

Kindly tick (√) or fill as appropriate

SECTION A: DEMOGRAPHIC DATA

1. What is your gender
Male ()
Female ()
2. Your current job Grade. M _____
3. Your age bracket.
Below 20 ()
21-30 ()
31-40 ()
41-50 ()
More than 50 ()
4. Your highest level of education
Primary ()
Secondary ()
Certificate ()
Diploma ()

- Degree ()
- Post Graduate ()
- Other, Specify

5. How many years have you worked at MTRH?

- Below 5 ()
- 5-10 ()
- 10-15 ()
- 15-20 ()
- More than 20 ()

SECTION B: ATTENDANCE TIMING

6. In a 5 point scale where; 1 = Strongly Disagree 2= Disagreed 3 = Neutral 4 = Agree and 5 = Strongly Agree, tick to indicate the extent to which you agree with the statements on attendance timing in MTRH.

Statement on attendance timing	1	2	3	4	5
Finger print input takes lesser time for recording employee attendance.					
Finger prints time clocking is better than manual system.					
Attendance data can easily be captured through computerized biometric employee clocking system.					
Computerized biometric employee clocking system is effective in capturing employee working hours.					
Biometrics provide a detailed audit trail of employee attendance.					
Computerized biometric clocking system ensures data integrity.					

SECTION C: EMPLOYEE IDENTIFICATION

7. In a 5 point scale where; 1 = Strongly Disagree 2= Disagreed 3 = Neutral 4 = Agree and 5 = Strongly Agree, tick to indicate the extent to which you agree with the statements on employee identification in MTRH.

Statement	1	2	3	4	5
Biometrics-based authentication use individual physical traits.					
Employees don't carry separate hardware tokens when clocking.					
All employee identification aspects of the system are fully secure.					
Biometrics data is intrinsically connected to an individual employee.					
Computerized biometric system authenticate employee identity in real-time.					

SECTION D: PAYROLL COMPUTATION

8. In a 5 point scale where; 1 = Strongly Disagree 2= Disagreed 3 = Neutral 4 = Agree and 5 = Strongly Agree, tick to indicate the extent to which you agree with the statements on payroll computation in MTRH.

Statement	1	2	3	4	5
Biometric system is a reliable way to determine employee pay.					
Computerized biometric employee clocking system provides accurate data for payroll computation.					
Computerized biometric employee clocking system stores payroll accurate data.					
Computerized biometric employee clocking system enhances quick payroll processing.					

SECTION E: OPERATIONAL PERFORMANCE

9. In a 5 point scale where; 1 = Strongly Disagree 2= Disagreed 3 = Neutral 4 = Agree and 5 = Strongly Agree, tick to indicate the extent to which you agree with the statements on operational performance in MTRH.

Statement	1	2	3	4	5
Computerized biometrics clocking system enhances employee punctuality.					
Computerized employee clocking system eliminates incidents of wage theft.					
Computerized biometric clocking system result in reduction of employee attendance management costs that lead to savings that enhance productivity.					
Computerized biometric system facilitates quick resolution of employee complaints in relation to working hours.					
Computerized biometrics system ensures that patients are attended to timely.					

APPENDIX III: Table for Determining Sample Size for a Given Population

1		2		3		4		5	
N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	373
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	225	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Note: "N" is population size "S" is sample size

Source: Krejcie & Morgan, 1971