INFORMATION MANAGEMENT AND THE DURATION OF CONSTRUCTION PROJECTS IN KENYA: A CASE OF PHENOM PARK, PHASE 3, LANGATA, NAIROBI COUNTY, KENYA

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A Research Project Report Submitted in Partial Fulfilment of the Requirements for the Award of the Degree of Masters in Arts in Project Planning and Management of the University of Nairobi

DECLARATION

This research project report is my original work and has not been submitted for any academic award in any university

Signature ……  …… Date ……29/11/2022…..…….

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This research project report has been submitted for examination with my approval as the University supervisor.

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DEDICATION

I dedicate this research project report to my wife, Faith Mitey and kids, Jemimah Mitey, Rinnah Mitey and Norah Mitey.

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LIST OF ABBREVIATIONS AND ACRONYMNS

BOT	Built Operate Transfer
EDM	Electronic Document Management
ERP	Enterprise Resource Planning
GNP	Gross National Product
IS	Information Systems
ISSM	Information System Success Model
IT	Information Technology
KENHA	Kenya National Highway Authority
KNBS	Kenya National Bureau of Statistics
NCC	Nairobi City Council
PERT	Program Evaluation and Review Technique
PMIS	Project Management Information System
PPMS	Project Performance Monitoring System
TAM	Technology Acceptance Model

ABSTRACT

One of the key sectors in the growth and development of any country is construction which helps a nation in meeting one of the basic needs, which is shelter as well as contributing about ten percent to the nation's GNP. However, there is a high number of projects that have remained uncompleted as some were approved but the occupation certificates were minimal. This can be attributed to information management among other factors. Thus, this is the reason as to why this study sought to investigate the construction information management effect (systems, quality, use and user) on the duration of construction projects in Phenom Park, Phase 3, Langata, Nairobi County. A descriptive research design was employed for this study. The study targeted all the 32 architects, project managers, engineers in structure, mechanical and electrical, quantity surveyors and contractors (Lead Contractor, mechanical, electrical, landscape) involved in the construction project at Phenom Park, Langata, Nairobi County, Kenya. Since the target population was small, the study employed a census survey and data was collected using a questionnaire. Analysis of data was done with the help of SPSS (Version 25.0). The information collected was coded and entered using SPSS (V.25) and analyzed using both statistics that are descriptive (means, standard deviations, frequencies and percentages) and inferential (correlation and regression analysis) so as to get the goals of the research. Data was presented using mainly tables. The study concluded that construction information management system, construction information management quality, construction information management use and construction information management user are statistically significant and thus they influence the overall projects' duration in Phenom Park, Langata Constituency, Nairobi, Kenya. Thus, the study recommended that there is need for project participants to be encouraged to embrace short turnaround time in responding to requested information. Forward planning should be encouraged in projects; tracking of information and mitigation against delays should be done regularly; and single point responsibility must be encouraged with regards to information management. There is also a necessity to research on the challenges facing implementation of information management in construction as well as knowledge management in construction. It is also crucial to investigate how projects in construction duration are affected by poor planning and management

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

It was highlighted by Sweis, Sweis, Hammad and Shboul (2018) that a sector like the construction sector has constituted of variety of activities that are in relation to engineering and building construction that involves all sorts, including management, planning and maintenance. The authors further noted that the industry is related to economic sectors, thus making it a key indicator for the national economy. In addition, it was contended by Olawale and Sun (2012) and Majid (2016) that it is upon completion within a budget, time planned and to its specifications and standards that a construction project is considered successful. There is limitation of the time taken to complete a project by engineers, construction firms and contractors so as to exaggerate their gains and market share and give the economy some progression and growth.

According to Assaf and Al-Hejji (2016), construction projects consist of civil works, water and building and commence with project identification, planning of the project, designing of the project, implementation of the project, closure of the project and project handover as the final stage. Project design stage is done by the consultants who are engineers, architects, environmental and social experts as well as quantity surveyors. The designing of the projects involves critical things like bylaws that are in existence, site challenges, materials availability, labor availability, timelines in construction and cost of materials. Project implementation takes various forms including projects involving leasing may be put in consideration. Stalling of projects in construction are very costly, risky and complicated issues that are existing in construction (Siati, Nzulwa & Kwena, 2019).

According to Gajewska and Ropel (2011), due to time spent in a construction project, they may vary in terms of conditions and possibilities. This long duration of projects may lead to numerous conditions, possibilities, uncertainties and risks probabilities if extended for a long time or further financial implications that badly affect the economies of construction and project operations. Therefore, due to the differences in construction projects, there is a necessity for good project information management and planning in order to avoid risks in planning and construction these goals and targets attainment (Falqi, 2014).

According to Zou *et al*., (2017) and Keung and Shen (2012), construction projects differ in terms of the length of time, environment, size, complications, goals, structures of the company, deadlines, intensity of finances, uncertainty among other dimensions. Planning of time, management of information, and finances are important for any project in construction (Duran, 2016). In addition, Mahamid *et al.,* (2012) corroborated that delays in projects of construction means that there will be non-completion of projects and thus a standout because the projects non-completion and achievement. Furthermore, Duran (2016) and Bratic (2019) further stated that there is failure in many projects during the planning of the due dates in the timetable. A good example is in Indonesia where forty seven percent of ventures in construction were completed within the stipulated time, and only fifteen percent were completed before the time stipulated and thirty eight percent were completed after the stipulated time.

According to Preece, Moodley and Hyde (2012), management of information is vital in the construction sector as it helps them gain competitive advantage. Accordingly, when well implemented, the information management will aid the workers with the needed information in an efficient and effective way that will lead to improvement in performance of the business in terms of time and finances (Egbu, Hari & Kumar, 2014). The competitive advantage of the construction firms is linked directly to the information management systems effectiveness because an information management system that is effective will lead to encouragement of people in the same company leading to creation, sharing and protection of information (Elfar, Elsaid & Elsaid, 2017).

In 2012, Ahmed *et al.,* found that delays in projects involving construction are certainly globally potent and they go hand-in-hand with overruns in cost and time, as well as a distressing effect on all workers, contractors, consultants and owners in Florida. This means that all factors affecting the completion of a construction project are of interest to the stakeholders and project delays is a key issue. In Malaysia, Chai and Yusuf (2013) “time is of essence” as well as “time is revenue” looking at the correlation between delays in projects and losses incurred. The authors state that delay sources should be dealt with through proper analysis and classification. In Saudi Arabia, Sambasivan and Soon (2017) found that thirty percent of projects in construction are done within the dates for completion that have been scheduled and that there are between ten and thirty

percent overruns. This is corroborated by Chan and Kumaraswamy (2017) in Hong Kong who found that timely and scheduled projects delivery to the quality standards given, including cost efficient and timely delivery of projects that are successful (Lam *et al*., 2018). In many studies that have been done, this appears to be a common conclusion.

In Africa, numerous researches have been done in Tanzania, Mozambique, South Africa, Nigeria and Uganda on delays, processes, causes, risks effects and disruptions in projects in construction, leadership and influence of environment affecting the costs and delays in time on completion of projects. Contractor payment delays, changes in design, problems in funding, management of projects that is poor, delays in information, issues in compensation and work valuation differences are some of the major causes of disruptions as noted by Al-Tabtabai (2012) and Kikwasi (2012). In Nigeria, Hassan and Omran (2011) noted that implementation is one of the causes why more than half of projects are delayed causing overruns in costing and thus the project's cost higher that the initial budget and this destabilizes the client's flow of cash. Another reason projects in construction suffer delays in Nigeria is through political instability and this leads to slow completion of projects and minimized capacity of absorption in the nation (Ogunsemi & Jagboro, 2016).

In 2017, a report done by Kenya National Bureau of Statistics (KNBS) highlighted that this sector grew by nine percent in 2016, rising from 13.9 percent in 2015 which led to an upsurge in employment in the construction sector from about 148 thousand jobs in 2015 to about 163 thousand jobs in 2016. In Nairobi, in addition, the value of new buildings completed in 2016 rose by 7.6 percent to Ksh 76.2 billion while the approved building plans worth upgraded greatly by 43.3percent from Ksh 215.2 billion in 2015 to Ksh 308.4 billion in 2016. Majority of companies in the country are located in Nairobi County, thus making it a major regional hub. Furthermore, the increasing population has led to a need for housing and office blocks in the County.

It was stated by Kihoro and Waiganjo (2015) that the building construction projects performance may be successful if the numbers of units the developers are selling at remarkable short durations. Langata Constituency is among the seventeen constituencies in the County of Nairobi and has a number of ongoing residential construction projects, one of them being Phenom Park.

Phenom Park is a project that includes town homes that are grouped into about 20-24 units in each court. They also have architecture that is modern coupled up with perfect finishing and robust solid structures. Phase 3 of Phenom Park construction project is ongoing at the moment, thus the case study of this study.

1.2 Statement of the Problem

One of the key sectors in the growth and development of any country is construction which helps a nation in meeting one of the basic needs, which is shelter as well as contributing about ten percent to the nation's GNP. According to Auma (2014), many less developed nations deal with adverse widespread problems in construction that has led to concerns both globally and nationally. It was highlighted by Sawhney *et al.*, (2012) that however, there is a rising number of projects in construction in Kenya that seems to overshadow the efforts leading to numerous queries on the failure in provision of this basic need and one wonders whether this failure is due to failure in architecture, practices or attitudes or the individuals or it has been pegged on socio-economic societal platform.

In 2014, according to Sitati, Nzulwa and Kwena (2019), there were 2093 plans that were submitted to Nairobi City Council but only 297 occupation certificates were issued while in 2015, 2235 plans were submitted and approved but only 500 certificates were given out. Furthermore, in 2015, 1903 plans were approved and only 652 occupation certificates were issued while in 2017, plans that were submitted were 1947 and only 600 occupation certificates were issued citing a major project completion issue in Nairobi County. This can be attributed to information management among other factors. Thus, this is the reason as to why this study seeks to investigate the construction information management effect on the duration of construction projects in Phenom Park, Phase 3, Langata.

Research has been conducted on the information management in the construction sector and the duration of construction projects. A study by Sitati, Nzulwa and Kwena (2019) examined the determinants of completing construction projects across Nairobi. Another research done by Sweiet *et al.,* (2018) researched on the delays in projects in construction in Jordan while Kiprotich and Kimutai (2017) studied the IPMIS and their influence on projects in performance

in construction companies in the North Rift, Kenya. In addition, Ngwai, Simba and Oyoo (2019) looked at the practices in management of projects and their influence on cost control of projects in construction in Mombasa County. While these studies among others achieved their goals, they did not specifically look at how the information management in the construction sector affects the duration of these projects and more specifically in Kenyan context. Thus, the current research delved into this and look at Phenom Park Phase 3 in Langata.

1.3 Purpose of the Study

Investigating information management in construction and how it affects duration of projects in construction at Phenom Park, Phase 3, Langata.

1.4 Objectives of the Study

The general goal of the current research was investigating information management in construction and how it affects duration of projects in construction at Phenom Park, Phase 3, Langata

In addition, the research looked at:

i. Analyzing the effect of construction information management systems on the duration of construction projects in Phenom Park 3, Langata
ii. Assessing the effect of construction information management quality on the duration of construction projects in Phenom Park 3, Langata
iii. Determining the effect of construction information management use on the duration of construction projects in Phenom Park 3, Langata
iv. Examining the effect of construction information management user on the duration of construction projects in Phenom Park 3, Langata

1.5 Research Questions

i. How does construction information management systems affect duration of construction projects in Phenom Park 3, Langata, Nairobi County
ii. How does construction information management quality affect duration of construction projects in Phenom Park 3, Langata, Nairobi County

iii. How does construction information management use affect duration of construction projects in Phenom Park 3, Langata, Nairobi County

iv. How does construction information management user affect duration of construction projects in Phenom Park 3, Langata, Nairobi County

1.6 Hypothesis

HO_1: There is no significant effect of construction information management systems on the duration of construction projects on Phenom Park, Phase 3, Lang'ata, Nairobi County

HO_2: There is no significant effect of construction information management quality on the duration of construction projects on Phenom Park, Phase 3, Lang'ata, Nairobi County

HO_3: There is no significant effect of construction information management use on the duration of construction projects on Phenom Park, Phase 3, Lang'ata, Nairobi County

HO_4: There is no significant effect of construction information management user on the duration of construction projects on Phenom Park, Phase 3, Lang'ata, Nairobi County

1.7 Significance of the Study

The current research may be relevant to researchers and academicians in adding to their pool of knowledge regarding construction information management and duration of construction projects. The study may be used as a point of reference in regard to the topic at hand. The current research may also provide knowledge through the study findings and recommendations given to authorities such as Ministry of Public Works, Kenya National Highway Authority (KENHA), and Nairobi City Council (NCC). They can be used as a reference point for the actions that are needed to be taken so as to improve the rate of performance for projects in construction.

1.8 Assumptions of the Study

The assumption of this research was that the interviewees were accessible and willing to answer the research instrument truthfully and that they will return the questionnaires on time. The study further had an assumption that the finances needed for this study were available on time. In addition, there is an assumption that access to study data that was relevant would be timely.

1.9 Limitations of the Study

Time of getting access to the respondents and also filling of the questionnaires since the respondents may be too busy at the office. Thus, the researcher overcame this challenge by booking an appointment in advance and having an agreement on the best time to receive the filled questionnaires back. Questionnaire distribution may also be a challenge and thus, the researcher overcame this challenge by using the services of a research assistant to aid in questionnaire distribution.

1.10 Delimitations of the Study

Delimitations were on the geographical context in Langata area in the County of Nairobi as well as to the interviewees who will be architects, architects, project managers, engineers in structure, mechanics and electrics, quantity surveyors and contractors (Lead Contractor, mechanical, electrical, landscape) working on Phenom Park, Phase 3, Langata, Nairobi County. The study was further delimited to four independent variables namely: systems, quality, use and users of construction information management.

1.11 Definition of Significant Terms

Duration of projects in construction	Time taken to complete a construction project
Construction projects	Businesses involving the putting up, repairing and demolishing of buildings and structures of civil engineering such as dams and roads
Information management user	Refers to people who work on system manipulate so that they can get the required results, who in the current research are managers of projects
Information management use	Level of operation in some systems as well as the methods and approaches used by managers of projects
Information management quality	Quality of outputs that the information systems yield, and it can be as a report of screens that are online
Information management systems	These are the methods and tools that are utilized in gathering, integrating and disseminating the outputs of project management processes. It is used to support all

aspects of the project from initiating through closing, and can include both manual and automated systems.

1.12 Organization of the Study

The research was categorized into five chapters. Chapter one looked at the research background, problem statement, purpose, objectives, questions, significance, assumptions, hypothesis, limitations and delimitations of the research as well as the significant terms' definitions. Preceding chapter looked at the empirical and theoretical review of literature and also the conceptual framework. Chapter three presented the approaches utilized in this study while chapter four looked at analyzing, presenting and interpreting of the information gathered. The final chapter five looed at summarizing, concluding and offering recommendations in practice and further research.

This current research proposal consists of three chapters. This chapter one presents the introduction of the study consisting of background, statement of the problem, study purpose, study objectives and questions, study significance, assumptions, limitations and delimitations of the study, and defining the terms used. Preceding chapter looks at both empirical and theoretical review of literature as well as the conceptual framework. Chapter three gives the approaches used in the current research.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature related to information management in construction and the projects in construction duration. The first section looks at the duration of these projects, followed by information management systems and construction duration, information management quality in construction and projects in construction duration, information management use in construction and projects in construction duration, and information management user in construction and projects in construction duration. Other sections include the theories of the study, conceptual framework and gaps in research summary.

2.2 Concept of Duration of Construction Projects in Kenya

According to Ireland (2013), time is one of the principal goals of any project in construction for any client of construction. The agreement for construction has been clear in noting the duration of any construction contract, as well as the project scope that needs to be delivered not forgetting the cost of the project (Ahmed *et al.,* 2012). The duration of the construction contract is important in knowing and understanding if a project will be delivered successfully or not because the duration determines the quality of a project in construction (McMiniminee *et al.,* 2012). The service or product quality determines the level of satisfaction of any client.

Furthermore, Ayudhya (2011) contended that if there is a delay in the project, then the expectations of a customer are not met and this affects the cost of construction while Jagboro and Ogunsemi (2016) noted that project success is limited to factors such as quality, scope, time, cost, resources, satisfaction of a customer, risks, schedule, and support from the stakeholders. Furthermore, Nyamwange and Nyang'au (2018) and Kikwasi (2012) opined that the three key factors determining the achievement of any project are cost, time and performance.

The time taken in any given project within construction is directly related to the capabilities of the management leading the construction (Aje, Odusami & Ogunsemi, 2019). In 2017, Bowen et al., concluded that there are two parameters that affect a project in construction are time and finances because numerous control systems in management of projects overlook the importance

of quality and focus on finances and schedule (Hughes, Hillebrandt & Murdock, 2012; Herbsman & Ellis, 2011). Therefore, Marion (2016) notes that the three parameters of projects should be recognized in order for a project to be successful.

A research by Ibiroke and Elmah (2011) studied the factors affecting time, cost and quality management in building construction projects in Nigeria and revealed that deficiencies in plans and schedules, fraud and kickback as well as standards of evaluation that are not clear influence quality pricing and project quality In 2017, Henry, Jackson and Bengt found that insufficient materials, drawings that are incomplete, supervisors who are incompetent, communication that is poor, delays in inspection, insufficient tools and equipment, and absenteeism are the common issues affecting time of project completion. In addition, weather, conditions of the physical site, rework, interface, safety, repetition in work, changes in the people involved in the project, turnover in labor as well as unsuitable work plans affect the management of time in Nigeria and Iran (Olomolaiye, Jayawardane & Harns, 2018; Henry *et al.*, 2017; Elinwa & Joshua, 2011).

2.3 Construction Information Management Systems and Projects in Construction Duration

The systems used in management of projects in construction include: off-the-shelf commercial softwares and they are spreading in many businesses that are private and therefore, numerous commercial software packages have come up to cater for the methods mentioned including Microsoft Project, SAP, and Primavera Project (Keizner, 2015). The second category of techniques for project management and is developed especially when the traditional one has not met the firms' specifications and examples are the Betchel (Parsons, 2014; Schmitz, 2011; Hagasaki *et al.*, 2017).

In addition, Tam et al., (2019) stated that amongst numerous solutions in IT are the internet-based Project Management Information Systems (PMIS) which is beneficial with cost that is low in comparison with other traditional communication techniques; the access is location free, reliability in transferring and storing information as well as fast data shared. Utilization of this PMIS ensures that there is competitive advantage among firms as well as efficiency and effectiveness of project in construction. PMIS assumes that the benefits of the projects will offset the costs because firms can be able to manage both individual and overall project portfolios

(Kaiser & Ahlemann, 2016). The PMIS is used in a project lifecycle stages, starting from generation of ideas, management of risks, management of stakeholders and knowledge management once the project has been finalized. Furthermore, Zambare and Dhawale (2017) found that PMIS is vital in sharing of data across projects and may determine if it succeeds or fails because managing of costs and time in projects is paramount. Moreover, Ogero (2014) researched on PMIS and its effect on Nairobi's projects performance in construction sector and used descriptive survey design to interview the project managers. The research found that the utilization of PMIS has aided in enhancing the project performance whilst respecting the challenges of the projects including cost, time and quality as well as meeting the project goals. of the projects.

2.4 Construction Information Management Quality and Projects in Construction Duration

According to Elamah (2016), the quality of a project is the perceived outcome of the projects based on the information given and it can affect the project results. Thus, if the wrong information is given, then the decisions made will be wrong and thus will affect the overall project outcome negatively. Project Information Management (PIM) must be able to give the teams involved in the projects adequate and correct details may be utilized in through storage, management as well as processing of sources of the information (Lee *et al.,* 2011). This means that the information quality is a determinant for the system quality (Swanson *et al.,* cited in Ogero, 2014).

In 2016, Yoon et al., stated that data quality has been affected by numerous things, limited to how available they are, currency, how consistent they are, accuracy, understanding ability, conciseness, fidelity and interpretation. Being overwhelmed by quantity of information can lead to poor decision making and thus the use of PIM ensures relevant and accurate information is given on the daily running of the projects. Information gives the intellect for project management and it must be processed so that the decisions may be made and execution done to the highest degree of assurance It is during this phase that information given provides a foundation for the generation of project action plans, diagrams, schedules, projections as well as other areas of project planning. The project information aids in promoting understanding, establishing the goals, strategies and objective; developing control mechanisms, status of communication,

forecasting performance and resources for the future; recognizing changes; and reinforcing strategies for the projects (Matthews, 2014).

2.5 Construction Information Management Use and Projects in Construction Duration

In 2012, Caruan contended that the utilization of PIM is measured through the determination of which controlling, monitoring, planning, evaluation and reporting function methods can be used by managers of the projects. PIM has been used in the smooth sharing of information amongst the stakeholders of the projects and thus when PIM is used well and effectively, it improves the performance of the projects. The positive effects of PIM quality should be leading to intention to use, satisfaction with the usage thus expansion in usage, sharing of information that is smooth and information management that is systematic.

Consultants, project managers, clients, contracts, quantity surveyors, engineers and subcontractors use the information provided in the projects in construction. This is mostly done digitally and thus the information storage is easier as opposed to having them done manually and physically in books, papers, letters, documents, invoices among others. Moreover, Raymond and Bergeron (2017) sought to find out managers and the success of projects and the impact they have on PMIS and found that the utilization of PMIS is of benefit to managers of the projects since they help in making decisions on time and thus improving the success of the projects.

2.6 Construction Information Management User and Projects in Construction Duration

Numerous researches revealed that accuracy, relevance, reliability, availability, timeliness and consistency affect the quality of information and thus it may have the hugest overall effect on the utilization of PMI software (Ali, Anbari & Money, 2018). This brings a suggestion that the managers of projects are eager in accepting PIM on the base of the information quality and that they have a probability of utilizing the software that provides them with relevant details that fit into the needs of their work, is easy to use and understand as well as communicating with the team involved in the project.

Satisfaction of the user is a crucial element in the use of machines and how they fulfill their duties and thus the effectiveness of PIM must be able to bring about the usage intention thus increasing how the machine is used enabling easy sharing of statistics and in overall improving

the management of production (DeLone and McLean, 2013). In addition, Lehtonen (2011) found a size for performance model that helps corporations' leaders to provide feedback on the activities of the firms. Thomas (2012) noted that reporting and keeping records in firms is important for referencing in the future since it also helps in dispute settlements, repairing and maintaining of the projects. In 2014, Cheung, Suen and Cheung found that Project Performance Monitoring System (PPMS) helps leaders in companies in creating workouts, doing signs of performance in whole, doing management by the top management, challenging them and evaluation and monitoring of performances.

In South Rift construction companies, Kiprotich and Kimutai (2018) investigated IPMS and how they affect the projects performance and found that IPMS user knowledge has an association that is of a positive manner with projects in construction. In 2014, Seddon and Kiev revealed that one of the key determinants of satisfaction is the quality of information and Raymond and Bergenon (2017) concluded that the data quality affects management of projects positively. This means that at work, the manager of the project will feel more professional when they have access to information regarding the projects that is of high quality and the system usage is more intense and extensive. The satisfaction of the user is under no restriction to personal satisfaction only but it has effects that are positive.

2.7 Theoretical Framework

2.7.1 Technology Acceptance Theory

The theory by Tsai (2014) and Chung *et al.*, (2019) helps to analyze if the Enterprise Resource Planning (ERP) systems fails or succeed since they are used in firms dealing with construction as they help to assess, plan and conduct a project. The ERP is categorized into two, namely the user-related element that looks at how relevant the job is, the end product and its image, how compatible, and reliable it is while the second category is the project-related elements that deal with supporting, functioning and supporting consultants.

In addition, Hjelt and Bjork (2007) looked at drawing factors affecting the systems in EDM acceptance in projects in construction. Davis, Bagozzis and Warshaw (1989) highlighted the TAM schematics as presented in the figure 2.1:

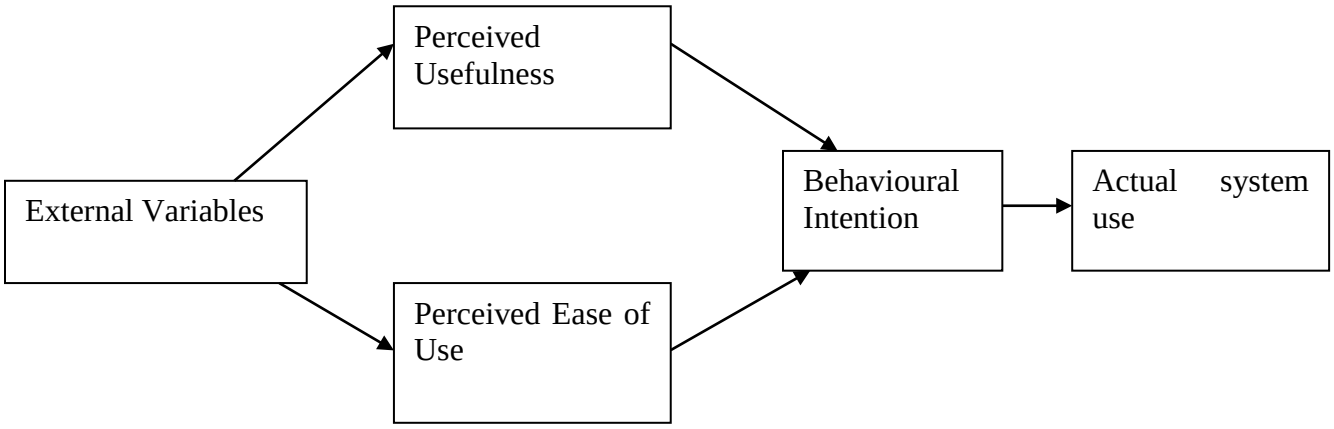

Figure 2.1 Technology Acceptance Model

Source: Davis et al., (1989)

TAM was upgraded in 2003 from the ISSM theory (Raymond & Bergeron, 2017). TAM looks at the seeming ease of utilization and seeming usefulness. In 2008, Peterson concluded that information technology success reforms are dependent on the firm's capacity to change, managing of the change and firm survival. The change resistance can be from numerous stakeholders in the firms who have common interests and may have benefitted from the firms before the change was effected. This theory was used in this study since it reveals how the numerous reforms in IT and their success are dependent on the company to accept change, manage it and survive.

2.7.2 Diffusion of Innovation Theory

The Roger's theory of diffusion of innovations points out how, why and at what support the technology spreads through a given structure institution. This theory was supported by French sociologist, Gabriel Tarde in 1930s whereby the diffusion study focused on factors that promote adoption and acceptance of novel ideas, practices or products in a given institution or in a given structured social system (Sahin, 2016).

In 2003, Rogers reviewed the theory and thus it was renamed Roger's theory of diffusion of innovation whereby he explains what factors have an influence on a given society to tend to accept a new method of conveying information such as the internet use and application of ICT (Rogers, 2003). The theory considers changes as being acceptable slowly by the evolution

happening in live and environment which people are operating in thus, they adopt the will of the society as they change with the changing life behaviours (Greenhalgh *et al.*, 2019).

Thus, this theory was suited for this study in investigating how information management influences the duration of projects in construction due to the rising need of ICT in the recent decades.

2.8 Conceptual Framework

This highlights association amongst the different research variables and was illustrated below:

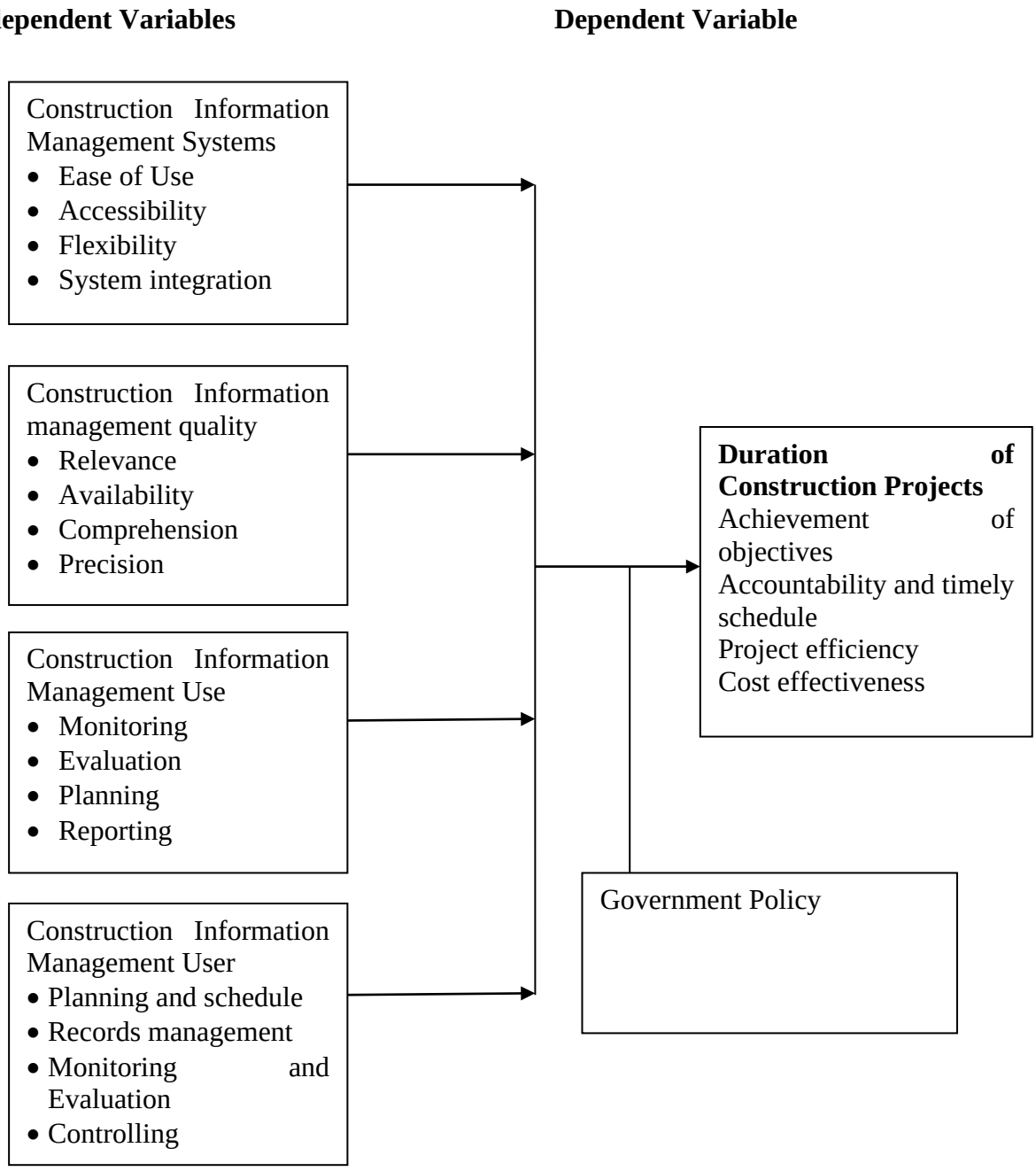

Figure 2.2: Conceptual Framework

2.9 Summary of Research Gaps

The chapter reviewed both empirical and theoretical literature related to the study objectives. Project information management is very vital in the industries dealing with construction. The

goal of management of projects in the construction sector is unquestionably in the success and delivery of the projects as agreed in the projects' missions and visions. Previous studies have focused on construction information management (Sitati, Nzulwa and Kwena, 2019; Swei *et al.*, 2018; Kiprotich and Kimutai 2017; Ngwai, Simba and Oyoo, 2019; Obero, 2014) among others. There is little evidence regarding information management in construction and the time taken in projects of construction in the country and more particularly in Langata Constituency and thus this research looked at investigating the duration taken and how management of information in construction affects them in Phenom Park, Phase 3 in Langata Constituency, Kenya.

Table 2.1 Summary of Research Gaps

Researcher	Research Focus	Method used	Study findings	Gaps in the study	Current research focus
Zambare and Dhawale, (2017)	Project management information system in construction industry	Empirical study design, secondary data	While PMIS can be used to determine quality costs, the lack of information made available by organizations during the testing phase meant that the research focused on rework (often considered as a quality failure).	The findings could not be generalized to the Kenyan construction industry	Effect of construction information management on the duration of construction projects in Phenom Park, Phase 3, Langata
Kiprotich and Kimutai (2018)	Influence of integrated PMIS on performance of construction projects in South Rift construction companies, Kenya	Descriptive survey design, questionnaire, multiple regression analysis,	Integrated PMIS makes significant contribution to project performance	The study differed from the current study in terms of context and target population	Effect of construction information management on the duration of construction projects in Phenom Park, Phase 3, Langata
Ogero (2014)	How performance of projects is affected by the construction industry PMIS in Kenya	Descriptive survey, purposive sampling, questionnaire, Pearson coefficient of correlation	The utilization of PMIS helped in the improving performance of project	Different results have different findings depending on the stakeholders	Effect of construction information management on the duration of construction projects in

					Phenom Park, Phase 3, Langata
Wilcox and Bourne, (2012)	Performance Measurement and Prediction.	Cross-sectional survey, questionnaire, interview guide, Pearson's correlation coefficient	A model needs to be built to help in decision making and provide support that is predictive	Examining how capabilities in management of information are affected by information quality creates a need for future studies	Effect of construction information management on the duration of construction projects in Phenom Park, Phase 3, Langata
Raymond and Bergeron, (2017).	Research on how success of projects and managers of projects are affected by PMIS	Descriptive research design, 133 respondents, interview guide, closed structured questionnaires, spearman's correlation	It is beneficial to utilize PMIS as it helps in making decisions faster and efficiently as well as aiding in success of the projects	The findings could not be generalized to the Kenyan construction industry	Effect of construction information management on the duration of construction projects in Phenom Park, Phase 3, Langata
Cheung, Suen and Cheung (2014)	Project overall performance related to assignment managers	Descriptive survey, 15 larges scale projects, questionnaires, observations and document analysis, regression analysis, Pearson's correlation coefficient	Success model for construction ERP systems through extensive data collection and empirical	They focused on large-scale projects in construction	Effect of construction information management on the duration of construction projects in Phenom Park, Phase 3, Langata
Kiprono and Kibet (2018)	Influence of integrated project management	Survey design using 15 interviewees,	Project Management Information System	Focus was on projects in South	Effect of construction

	information systems user knowledge on performance of projects in construction	questionnaire, correlation, regression analysis	user Knowledge makes significant contribution to project performance	Rift Construction projects	information management on the duration of construction projects in Phenom Park, Phase 3, Langata

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

The highlighted sections in this section include the design of the study, the population being targeted, sample size and methods of sampling, instruments for collection of information, testing of pilots, how reliable and valid the instruments of research are, procedures utilized in collection of information, approaches used in analysis of the information collected, and thoughts in ethics.

3.2 Research Design

A design that was descriptive was used to investigate the construction information management influence on the project in construction duration at Phenom Park, Phase 3 in Lang'ata Constituency, Nairobi County. This study looked at collecting and analyzing the data and thereafter coming up with conclusions and recommendations and is utilized in many researches since it saves on time and cost (Kothari, 2014).

3.3 Target Population

Data was gathered from every individual involved in the construction project at Phenom Park, Langata, Nairobi County, Kenya. They included architects, project managers, engineers in structure, mechanics and electrics, quantity surveyors and contractors (Lead Contractor, mechanical, electrical, landscape) as tabulated.

Table 3.1 Target Population

	Frequency
Architects	6
Managers of Porjects	4
Structural engineers	4
Quantity surveyors	4
Mechanical and electrical engineers	6
Contractors (Lead Contractor, mechanical, electrical, landscape)	8
Total	**32**

3.4 Sample Size and sampling Procedures

Since targeted population is small, current research employed a census survey, meaning that all the 32 respondents were interviewed. This is in line with Israel (1996) who noted that a census survey is ideal when the sample is less than 200.

3.5 Data Collection Instruments

A survey questionnaire was utilized by this research since it helps the investigator to get information from the respondents as well as reacting to many oral or composed questions.

3.5.1 Pilot Testing of the Instrument

This measured how valid and reliable the questionnaire is and this was done at Siliboi Court which was finished in 2020. This Court was not included in the main research but the population targeted for this pilot testing was the same as that to be used.

3.5.2 Validity of the Instrument

This research used supervisors' examination and opinions as well as reviews by peers so as to aid in checking if the questionnaire is valid or not. It also checked the relevancy and appropriateness of the study as noted by Kothari (2014).

3.5.3 Reliability of the Instrument

This research used the internal consistency in measuring whether the survey instrument was unfailing or whether it was not and it was done using the Cronbach's Alpha coefficient that checks association among the various study items. A validity of 0.7 and above was used as noted by Sekaran (2016) and Sreevidya and Sunitha (2013) since anything below that is thought to be poor. The questionnaires were accepted at 0.7 and above reliability.

3.6 Data Collection Procedures

A University of Nairobi's letter was sought by the researcher as well as a permit to collect data from NACOSTI. The researcher was then able to visit Phenom Park 3 so as to collect data from the interviewees. A research assistant was employed to assist in collection of questionnaires from the respondents. The instrument also had the limitations of use of the data as well as the ethical

considerations such as privacy and confidentiality on the first page so as to help the respondent understand the intent of the study and also if they are able to be in participation or not.

3.7 Data Analysis Techniques

Information was entered into SPSS (V.25) and analyzed using both statistics that are descriptive and inferential.

3.7.1 Qualitative Analysis

Data that is qualitative was analyzed thematically and then narrated in a continuous prose.

3.7.2 Quantitative Analysis

This used means, standard deviations, frequencies and percentages for descriptive statistics. Correlation analysis and regression analysis were done for inferential statistics so as to check the association among the variables of the current research. Presentation was in form of tables.

Regression model was:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where:

Y = Projects in Construction Duration

β_0 = Constant term

β_1, β_2, β_3, β_4 = Independent Variables coefficients

X_1 = Construction information management systems

X_2 = Construction information management quality

X_3 = Construction information management use

X_4 = Construction information management user

ε = Standard error

3.8 Operationalization of Variables

Table 3.2: Operationalization of Variables

Research Objective	Variables	Indicator	Measurement	Analysis Tools	Analysis Levels
Analyzing systems in information management and their effect on the duration of projects in construction at Phenom Park, Phase 3, Langata	Independent Variable: Information management systems	Ease of Use Accessibility Flexibility System integration	Interval	Quantitative Qualitative	Descriptive statistics (mean, frequencies, standard deviation, percentages), analysis using regression and correlation
	Dependent Variable: Duration of construction projects	Achievement of objectives Accountability and timely schedule Project efficiency Cost effectiveness			
Assessing quality in information management and their effect on the duration of projects in construction at Phenom Park, Phase 3, Langata	Independent Variable: Construction information management quality	Relevance Availability Comprehension Precision	Interval	Quantitative Qualitative	Descriptive statistics (mean, frequencies, standard deviation, percentages), analysis using regression and correlation
	Dependent Variable: Duration of	Achievement of objectives Accountability			

Research Objective	Variables	Indicator	Measurement	Analysis Tools	Analysis Levels
	construction projects	and timely schedule Project efficiency Cost effectiveness			
Determining use in information management and their effect on the duration of projects in construction at Phenom Park, Phase 3, Langata	Independent Variable: Construction information management use	Monitoring Evaluation Planning Reporting	Interval	Quantitative Qualitative	Descriptive statistics (mean, frequencies, standard deviation, percentages), analysis using regression and correlation
	Dependent Variable: Duration of construction projects	Achievement of objectives Accountability and timely schedule Project efficiency Cost effectiveness			
Examining users in information management and their effect on the duration of projects in construction at Phenom Park,	Independent Variable: Construction information management user	Planning and schedule Records management Monitoring and Evaluation Controlling	Interval	Quantitative Qualitative	Descriptive statistics (mean, frequencies, standard deviation, percentages), analysis using regression and

Research Objective	Variables	Indicator	Measurement	Analysis Tools	Analysis Levels
Phase 3, Langata					correlation
	Dependent Variable: Duration of construction projects	Achievement of objectives Accountability and timely schedule Project efficiency Cost effectiveness			

3.9 Ethical Consideration

The investigator got a letter to introduce them from the campus and another from NACOSTI as this helped them get access to gather the information required in the study. The interviewees were informed that the study is voluntary and thus no coercion, and that there was no personal information that was collected from them. In addition, the interviewees were informed that the study is for study purposes only.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

The chapter gives a presentation of the results of the main research in terms of analysis, presentation and interpretation and focused on the demographics of the respondents, and the four main objectives of this research on information management in construction and how it affects duration of projects in construction at Phenom Park, Phase 3, Langata.

4.2 Response Rate on the Questionnaires

The research gave out 32 questionnaires to the study population and 28 of them were returned for analysis of data, meaning that there was a very high rate of response as presented in Table 4.1.

Table 4.1: Response Rate on the Questionnaires

	Frequency	Percentage
Returned	28	87.5
Not returned	4	12.5
Distributed	**32**	**100.0**

4.3 Respondent's Demographic Characteristics

This section presents the gender, age, level of education, designation in the project and duration worked in the current organization. The gender of the respondent is presented in Table 4.2.

Table 4.2: Respondent's Gender

	Frequency	Percentage
Male	23	82.1
Female	5	17.9
Total	**28**	**100.0**

The table reveals that majority of the respondents were male (82.1%) while 17.9% were female. These findings imply that majority of construction project management teams comprise of male. The age of the respondents is presented in Table 4.3.

Table 4.3: Respondent's Age

	Frequency	Percentage
20-30 years	1	3.6
31-40 years	17	60.7
41-50 years	7	25.0
51 years and above	3	10.7
Total	**28**	**100.0**

The results reveal that majority of the respondents are aged 31-40 years (60.7%) followed by 41-50 years (25.0%), 51 years and above (10.7%) and 20-30 years (3.6%). The findings imply that majority of the construction project team members are middle aged. The respondent's level of studies is tabulated below.

Table 4.4: Respondent's Education Level

	Frequency	Percentage
Undergraduate	17	60.7
Postgraduate	9	32.1
PhD	2	7.1
Total	**28**	**100.0**

The table reveals that majority of the respondents have attained undergraduate level of education (60.7%), postgraduate level of education (32.1%) and PhD (2.0%). This is an implication that the project team members have attained tertiary education. The project designation is presented in Table 4.5.

Table 4.5: Respondent's Project Designation

	Frequency	Percentage
Architect	5	17.9
Project manager	5	17.9
Structural engineer	4	14.3
Quantity surveyor	3	10.7
Mechanical engineer	6	21.4
Electrical engineer	5	17.9
Total	**28**	**100.0**

The study findings above reveal that most of the team involved in management of projects are mechanical engineers (21.4%), Architects (17.9%), Project managers (17.9%), Electrical engineers (17.9%) and Quantity surveyors (10.7%). The length of years worked in the organization is presented in Table 4.6.

Table 4.6: Duration at Current Employment

	Frequency	Percentage
Less than 1 year	2	7.1
1-3 years	3	10.7
4-7 years	3	10.7
8-11 years	8	28.6
More than 11 years	12	42.9
Total	**28**	**100.0**

The results in Table 4.4 show that most of the respondents have worked with the firm for more than 12 years (42.9%), 8-11 years (28.6%), 4-7 years (10.7%), 1-3 years (10.7%) and less than 1 year (7.1%). This implies that the respondents have worked with the firm for a long time and thus are conversant with information management in construction and how it affects duration of projects in construction.

4.4 Construction Information Management Systems and Projects in Construction Duration

Table 4.7: Construction Information Management Systems and Projects in Construction Duration

	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Mean	SD
System of information management is easy to use	0.0	0.0	0.0	64.3	35.7	4.36	.488
Ease of access of data	0.0	0.0	0.0	46.4	53.6	4.54	.508

It is flexible and data is available on time	0.0	0.0	0.0	28.6	71.4	4.71	.460
The industry components are improved by the integration of the systems	0.0	0.0	0.0	28.6	71.4	4.71	.460
The use of systems has brought about competitive advantage against the competitors as well as increasing the construction projects efficiency	0.0	0.0	25.0	67.9	7.1	3.82	.548
The system supports majority of life cycle phases in a project such as generation of ideas, management of risks, management of stakeholders and knowledge management that is created after the project has been finalized.	0.0	0.0	0.0	17.9	82.1	4.82	.390

The table reveals that the project management team who were the majority agreed strongly to: system supports majority of life cycle phases in a project such as generation of ideas, management of risks, management of stakeholders and knowledge management that is created after the project has been finalized (82.1%); The industry components are improved by the integration of the systems (71.4%); The industry components are improved by the integration of

the systems (71.4%); Ease of access of data (53.6%); and System of information management is easy to use (35.7%) as statements regarding construction information management systems influence on projects in construction duration. The system supports majority of life cycle phases in a project such as generation of ideas, management of risks, management of stakeholders and knowledge management that is created after the project has been finalized had the highest mean of 4.82 while the use of systems has brought about competitive advantage against the competitors as well as increasing the construction projects efficiency had the lowest mean of 3.82.

The findings are in line with Zambare and Dhawale (2017) who found that PMIS is vital in sharing of data across projects and may determine if it succeeds or fails because managing of costs and time in projects is paramount. Furthermore, Ogero (2014) researched on PMIS and its effect on Nairobi's projects performance in construction sector and used descriptive survey design to interview the project managers. The research found that the utilization of PMIS has aided in enhancing the project performance whilst respecting the challenges of the projects including cost, time and quality as well as meeting the project goals. of the projects.

4.5 Construction Information Management Quality and Projects in Construction Duration

Table 4.8: Construction Information Management Quality and Projects in Construction Duration

	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Mean	SD
The results from projects are affected by the information quality used in decision making	0.0	0.0	0.0	28.6	71.4	4.71	.460
The information is easily available,	0.0	0.0	0.0	64.3	35.7	4.36	.488

timely and accurate							
Information is relevant	0.0	0.0	0.0	64.3	35.7	3.36	.488
There is easy comprehension of the information gathered and shared	0.0	0.0	50.0	32.1	17.9	3.68	.772
The information shared is precise and straight to the point	0.0	17.9	28.6	35.7	17.9	3.54	.999

The table reveals that the project management team who were the majority agreed strongly to: results from projects are affected by the information quality used in decision making (71.4%) as statements regarding construction information management quality effect on projects in construction duration. The findings further show that a large proportion of the respondents are in agreement with the information is easily available, timely and accurate (64.3%); The information is easily available, timely and accurate (64.3%); the information shared is precise and straight to the point (35.7%) and there is easy comprehension of the information gathered and shared (32.1%) as statements regarding construction information management quality and how it affects projects in construction duration. Findings also reveal that the results from projects are affected by the information quality used in decision making had a mean of 4.71 while Information is relevant had the lowest mean of 3.36.

These research findings concur with a study done in 2016 by Elamah whereby the researcher noted that a project's quality is the perceived outcome of the projects based on the information given and it can affect the project results. Thus, if the wrong information is given, then the decisions made will be wrong and thus will affect the overall project outcome negatively. Project Information Management (PIM) must be able to give the teams involved in the projects adequate and correct details may be utilized in through storage, management as well as processing of sources of the information (Lee *et al.*, 2011). This means that the information quality is a

determinant for the system quality (Ogero, 2014). The project information aids in promoting understanding, establishing the goals, strategies and objective; developing control mechanisms, status of communication, forecasting performance and resources for the future; recognizing changes; and reinforcing strategies for the projects (Matthews, 2014).

4.6 Construction Information Management Use and Projects in Construction Duration

Table 4.9: Construction Information Management Use and Projects in Construction Duration

	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Mean	SD
Information management helps in monitoring of the ongoing projects	0.0	0.0	0.0	28.6	71.4	4.71	.460
Information management helps in evaluation of the ongoing and completed projects and resources	0.0	0.0	0.0	42.9	57.1	4.57	.504
Improved planning of activities	0.0	0.0	0.0	64.3	35.7	4.36	.488
Enhanced reporting of the construction project activities	0.0	0.0	0.0	32.1	67.9	4.68	.476
The success of the project is accomplished through decision making that is timely	0.0	0.0	0.0	17.9	82.1	4.82	.390
Information	0.0	0.0	0.0	28.6	71.4	4.71	.460

management aids management of resources							

The table reveals that the project management team who were the majority agreed strongly to: The success of the project is accomplished through decision making that is timely (82.1%); Information management aids management of resources (71.4%); Information management helps in monitoring of the ongoing projects (71.4%); Enhanced reporting of the construction project activities (67.9%); Information management helps in evaluation of the ongoing and completed projects and resources (57.%) and Improved planning of activities (35.7%) as statements regarding construction information management use and how it affects projects in construction duration. The success of the project is accomplished through decision making that is timely had the highest mean of 4.82 while Improved planning of activities had the lowest mean of 4.36.

These findings support Caruan (2012) who contended that the utilization of PIM is measured through the determination of which controlling, monitoring, planning, evaluation and reporting function methods can be used by managers of the projects. PIM has been used in the smooth sharing of information amongst the stakeholders of the projects and thus when PIM is used well and effectively, it improves the performance of the projects. Furthermore, Raymond and Bergeron (2017) sought to find out managers and the success of projects and the impact they have on PMIS and found that the utilization of PMIS is of benefit to managers of the projects since they help in making decisions on time and thus improving the success of the projects.

4.7 Construction Information Management User and Projects in Construction Duration

Table 4.10: Construction Information Management User and Projects in Construction Duration

	Strongly Disagree (%)	**Disagree (%)**	**Neutral (%)**	**Agree (%)**	**Strongly Agree (%)**	**Mean**	**SD**

Information management supports planning of projects before implementation	0.0	0.0	28.6	35.7	35.7	4.07	.813
It is easy to monitor and evaluate the projects that are still continuing	0.0	0.0	0.0	64.3	35.7	4.36	.488
Sufficient knowledge by the users enables projects to be completed within stipulated schedules and provisions	0.0	0.0	0.0	64.3	35.7	4.36	.488
Sufficient knowledge by the users enables timely preparation of the reports as per what is going on in each phase	0.0	0.0	0.0	46.4	53.6	4.54	.508
Information management helps in keeping and managing the projects' records	0.0	0.0	0.0	39.3	60.7	4.61	.497
It helps on controlling and managing the projects	0.0	0.0	0.0	39.3	60.7	4.50	.577
Tracking of usage of resources is made easy by project managers	0.0	0.0	3.6	42.9	53.6	4.71	.460

The table reveals that most of the respondents are in agreement that It is easy to monitor and evaluate the projects that are still continuing (64.3%); Sufficient knowledge by the users enables projects to be completed within stipulated schedules and provisions (64.3%); Sufficient knowledge by the users enables timely preparation of the reports as per what is going on in each

phase (46.4%); and Tracking of usage of resources is made easy by project managers (42.9%) as statements regarding construction information management user and how it affects projects in construction duration.. Tracking of usage of resources is made easy by project managers had the highest mean of 4.71 while Information management supports planning of projects before implementation had the lowest mean of 4.07.

These findings agree with Ali, Anbari & Money (2018) who posited that accuracy, relevance, reliability, availability, timeliness and consistency affect the quality of information and thus it may have the hugest overall effect on the utilization of PMI software. This brings a suggestion that the managers of projects are eager in accepting PIM on the base of the information quality and that they have a probability of utilizing the software that provides them with relevant details that fit into the needs of their work, is easy to use and understand as well as communicating with the team involved in the project. Satisfaction of the user is a crucial element in the use of machines and how they fulfill their duties and thus the effectiveness of PIM must be able to bring about the usage intention thus increasing how the machine is used enabling easy sharing of statistics and in overall improving the management of production (DeLone and McLean, 2013). In South Rift construction companies, Kiprotich and Kimutai (2018) investigated IPMS and how they affect the projects performance and found that IPMS user knowledge has an association that is of a positive manner with projects in construction. In 2014, Seddon and Kiev revealed that one of the key determinants of satisfaction is the quality of information and Raymond and Bergenon (2017) concluded that the data quality affects management of projects positively. This means that at work, the manager of the project will feel more professional when they have access to information regarding the projects that is of high quality and the system usage is more intense and extensive. The satisfaction of the user is under no restriction to personal satisfaction only but it has effects that are positive.

4.8 Duration of Construction Projects

Table 4.11: Duration of Construction Projects

	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Mean	SD
Completion of projects on time helps the company to achieve its objectives and goals	0.0	0.0	0.0	28.6	71.4	4.93	.262
Accountability is very critical in ensuring the construction project is completed in the stipulated time	0.0	0.0	0.0	64.3	35.7	4.36	.488
Completion of the projects on time aids in enhancing project efficiency	0.0	0.0	28.6	35.7	35.7	4.07	.813
The companies and stakeholders are able to be cost effective and manage the budgets better	0.0	0.0	0.0	64.3	35.7	4.36	.488
More efficient resource allocation	0.0	0.0	0.0	39.3	60.7	4.61	.497
There is improvement in information quality	0.0	0.0	0.0	32.1	67.9	4.68	.476
There is reduction in time taken to make	0.0	0.0	0.0	28.6	71.4	4.71	.460

decisions

The table reveals that the project management team who were the majority agreed strongly that there is timely project completion that aids the firm in achievement of its goals and objectives (71.4%); there is reduction in time taken to make decisions (71.4%); there is improvement in information quality (67.9%); and more efficient resource allocation (60.7%) as statements regarding projects in construction duration. Completion of projects on time helps the company to achieve its objectives and goals had the highest mean of 4.93 while Completion of the projects on time aids in enhancing project efficiency had the lowest mean of 4.07.

These findings concur with Jagboro and Ogunsemi (2016) who noted that project success is limited to factors such as quality, scope, time, cost, resources, satisfaction of a customer, risks, schedule, and support from the stakeholders. Furthermore, Nyamwange and Nyang'au (2018) and Kikwasi (2012) opined that the three key factors determining the achievement of any project are cost, time and performance. In 2017, Bowen et al., concluded that there are two parameters that affect a project in construction are time and finances because numerous control systems in management of projects overlook the importance of quality and focus on finances and schedule (Hughes, Hillebrandt & Murdock, 2012; Herbsman & Ellis, 2011). Therefore, Marion (2016) notes that the three parameters of projects should be recognized.

4.9 Correlation Analysis

This was done using Peason's correlation coefficient tabulated here below

Table 4.12: Correlation Analysis

Correlations

		Duration	System	Quality	Use	User
Duration	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	28				
System	Pearson Correlation	.863*	1			

	Sig. (2-tailed)	.000				
	N	28	28			
Quality	Pearson Correlation	.500*	.548*	1		
	Sig. (2-tailed)	.007	.003			
	N	28	28	28		
Use	Pearson Correlation	.943*	.923*	.637*	1	
	Sig. (2-tailed)	.000	.000	.000		
	N	28	28	28	28	
User	Pearson Correlation	.945*	.857*	.446*	.916*	1
	Sig. (2-tailed)	.000	.000	.017	.000	
	N	28	28	28	28	28

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

The Peason's correlation coefficient of duration of construction projects to construction information management systems is 0.863 ($p=0.000<0.05$), construction information management quality is 0.500 ($p=0.007<0.05$), construction information management use is 0.943 ($p=0.000<0.05$) and construction information management user is 0.945 ($p=0.000<0.05$). This implies an existence of an association that is significant and positive amongst projects in construction duration to construction information management systems (86.3%), construction information management quality (50.0%), construction information management use (94.3%) and construction information management user (94.5%). Thus, the results indicate that when construction information management systems, construction information management quality, construction information management use and construction information management user increase, so does the duration of construction projects.

4.10 Regression Analysis

Table 4.13: Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.967[a]	.934	.923	.78195

a. Predictors: (Constant), Construction Information Management User, Construction Information Management Quality, Construction Information Management System, Construction Information Management Use

The table reveals that the correlation coefficient (R) is equal to 0.967 showing that there is an existence of an association that is strong between the independent and dependent study variables. In addition, the adjusted R-squared reveals there is a 92.3% explanation of independent variables in the dependent variables meaning that 7.7% of the changes in projects duration are explained by other factors that influence duration of projects. This implies that construction information management systems, construction information management quality, construction information management use and construction information management user are highly important and should be put into consideration in projects duration. The ANOVA summary is presented in Table 4.14.

Table 4.14: ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	199.651	4	49.913	81.631	.000[b]
	Residual	14.063	23	.611		
	Total	213.714	27			

a. Dependent Variable: Duration of projects

b. Predictors: (Constant), Construction Information Management User, Construction Information Management Quality, Construction Information Management System, Construction Information Management Use

The table shows that the F-values were statistically significant, F (4.23) = 81.631, p = 0.000<0.05 implying that information management in construction affects duration of projects in construction at Phenom Park, Phase 3, Langata, Nairobi County. The coefficients of regression are presented in Table 4.14.

Table 4.15: Regression Coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.770	2.059		.374	.712
	Construction Information Management System	.629	.575	.103	1.736	.019
	Construction Information Management Quality	.700	.507	.073	1.938	.028
	Construction Information Management Use	.865	.280	.673	3.092	.005
	Construction Information Management User	.595	.131	.450	3.019	.006

a. Dependent Variable: Duration of projects

The table reveals that the constant of the model of regression is 1.770. Construction information management User was the most significant (0.865), followed by construction information management quality (0.700), construction information management systems (0.6290 and user (0.595). The table further reveals that the p-value for construction information management system (0.019), construction information management quality (0.028), construction information management use (0.005) and construction information management user (0.06) are less than 0.05. This means that construction information management system, construction information management quality, construction information management use and construction information management user are statistically significant and thus they influence the overall projects' duration in Phenom Park, Langata Constituency, Nairobi, Kenya.

This, the regression model is as follows

$Y = 1.770 + 0.629X_1 + 0.700X_2 + 0.595X_3 + 0.865X_4$

Where:

Y = Duration of Construction Projects

β_0 = Constant term

$\beta_1, \beta_2, \beta_3, \beta_4$ = Independent Variables coefficients

X_1 = Construction information management systems

X_2 = Construction information management quality

X_3 = Construction information management use

X_4 = Construction information management user

Thus, the study rejected the null hypothesis stating that there is no association that is statistical between construction management systems, construction information management quality, construction information management use and construction information management user and the overall projects' duration in Phenom Park, Langata Constituency, Nairobi, Kenya.

Table 4.16: Hypothesis Testing Results

Hypothesis	Regression Results	Verdict
There is no significant effect of construction information management systems on the duration of construction projects on Phenom Park, Phase 3, Lang'ata	p=0.019<0.05	Reject the null hypothesis
There is no significant effect of construction information management quality on the duration of construction projects on Phenom Park, Phase 3, Lang'ata	p=0.028<0.05	Reject the null hypothesis
There is no significant effect of construction information management use on the duration of construction projects on Phenom Park, Phase 3, Lang'ata	p=0.005<0.05	Reject the null hypothesis
There is no significant effect of construction information management user on the duration of construction projects on Phenom Park, Phase 3, Lang'ata	p=0.006<0.05	Reject the null hypothesis

CHAPTER FIVE
SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents this study's summarization, conclusion remarks and recommendations on the basis of the findings of the study that were in presentation in the chapter preceding.

5.2 Summary of Research Findings

The research investigated information management in construction and how it affects duration of projects in construction at Phenom Park, Phase 3, Langata, Nairobi County. Tasks included analyzing construction information management system, construction information management quality, construction information management use and construction information management user and their influence on the overall projects' duration in Phenom Park, Langata Constituency, Nairobi, Kenya. Previous studies were reviewed in an attempt to fill the gaps in knowledge and academics.

The research findings revealed that a large proportion of the project management team are male aged 31-40 years, having graduated with undergraduate level of education. Most of the project management team have been in the organization for more than 11 years as well as being mechanical engineers.

5.2.1 Construction Information Management Systems and Duration of Construction Projects

The study reveals that the project management team who were the majority agreed strongly to: the system supports majority of life cycle phases in a project such as generation of ideas, management of risks, management of stakeholders and knowledge management that is created after the project has been finalized; the industry components are improved by the integration of the systems; the industry components are improved by the integration of the systems; ease of access of data; and system of information management is easy to use as statements regarding construction information management systems and how it affects projects in construction duration. The system supports majority of life cycle phases in a project such as generation of ideas, management of risks, management of stakeholders and knowledge management that is

created after the project has been finalized had the highest mean of 4.82 while the use of systems has brought about competitive advantage against the competitors as well as increasing the construction projects efficiency had the lowest mean of 3.82.

5.2.2 Construction Information Management Quality and Duration of Construction Projects

Research findings reveals that the project management team who were the majority agreed strongly to: the results from projects are affected by the information quality used in decision making as statements regarding construction information management quality influence on projects in construction duration in Nairobi County, Kenya. The findings further show that a large proportion of the respondents are in agreement with the information is easily available, timely and accurate; The information is easily available, timely and accurate; the information shared is precise and straight to the point and there is easy comprehension of the information gathered and shared as statements regarding construction information management quality and how it affects projects in construction duration. The table findings reveal that the results from projects are affected by the information quality used in decision making had a mean of 4.71 while Information is relevant had the lowest mean of 3.36.

5.2.3 Construction Information Management Use and Duration of Construction Projects

The findings reveals showed that the project management team who were the majority agreed strongly to: The success of the project is accomplished through decision making that is timely; Information management aids management of resources; Information management helps in monitoring of the ongoing projects; Enhanced reporting of the construction project activities; Information management helps in evaluation of the ongoing and completed projects and resources and Improved planning of activities as statements regarding construction information management use and how it affects projects in construction duration. The success of the project is accomplished through decision making that is timely had the highest mean of 4.82 while Improved planning of activities had the lowest mean of 4.36.

5.2.4 Construction Information Management User and Duration of Construction Projects

The study reveals that the project management team who were the majority agreed to: that It is easy to monitor and evaluate the projects that are still continuing; Sufficient knowledge by the users enables projects to be completed within stipulated schedules and provisions; Sufficient knowledge by the users enables timely preparation of the reports as per what is going on in each phase; and Tracking of usage of resources is made easy by project managers as statements regarding construction information management user and how it affects projects in construction duration.. Tracking of usage of resources is made easy by project managers had the highest mean of 4.71 while Information management supports planning of projects before implementation had the lowest mean of 4.07.

The research findings reveals that the project management team who were the majority agreed strongly that there is timely completion of projects that aids the firm in achieving its objectives and goals; there is reduction in time taken to make decisions; there is improvement in information quality; and more efficient resource allocation as statements regarding projects in construction duration. Completion of projects on time helps the company to achieve its objectives and goals had the highest mean of 4.93 while Completion of the projects on time aids in enhancing project efficiency had the lowest mean of 4.07.

The study further reveals that when construction information management systems, construction information management quality, construction information management use and construction information management user increase, so does the projects in construction duration.

5.3 Conclusion

The study findings reveal that when construction information management systems, construction information management quality, construction information management use and construction information management user are statistically significant and thus they have an influence on the projects in construction duration. Thus, the study rejected the null hypothesis stating that there is no association that is statistical between construction management systems, construction information management quality, construction information management use and construction information management user and the overall projects in construction duration in Phenom Park,

Langata Constituency, Nairobi, Kenya and concludes that rejected the null hypothesis that construction information management system, construction information management quality, construction information management use and construction information management user have an influence on the projects' duration in Phenom Park, Langata Constituency, Nairobi, Kenya..

5.4 Recommendations

5.4.1 Recommendations for Policy and Practice

There is need for project participants to be encouraged to embrace short turnaround time in responding to requested information. Forward planning should be encouraged in projects; tracking of information and mitigation against delays should be done regularly; and single point responsibility must be encouraged with regards to information management. The study recommends that all firms require a generation of quality information that is needed for the efficient and effective management of projects.

In addition, the study showed that the information management in construction is important to the users and thus, it is crucial to hire managers who are skilled as it aids in information transmission during construction project implementation; there should be continues training of the project participants on the use of IMS; and improvement of the technologies used in construction projects. Improvements in better planning of projects, scheduling, evaluation, monitoring and control should be encouraged to ease managerial tasks. Improvements in productivity and time delivery can be done in terms of timelier decision making.

5.4.2 Recommendations for Further Research

In an attempt to bridge the knowledge gap that existed, the researcher investigated the information management in construction and how it affects duration of projects in construction at Phenom Park, Phase 3, Langata, Nairobi County. Even though the study achieved its goals, the focus of the study was on one construction site, Phenom Park Phase 3 in Langata Constituency, Nairobi County, Kenya. There is a necessity to replicate the research in other construction sites so as to compare the results of the study and make inferences. There is also a necessity to research on the challenges facing implementation of information management in construction as

well as knowledge management in construction. It is also crucial to investigate how projects in construction duration are affected by poor planning and management

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APPENDICES

APPENDIX I: LETTER OF TRANSMITTAL

Sammy Kiplangat Mitey,

P.O. Box 003-20108,

Rongai, Kenya.

5th August, 2021.

Dear Respondent,

RE: DATA COLLECTION

I am a Masters in Project Planning and Management student at the University of Nairobi conducting a study on the projects in construction duration and how it is affected by the information management in the construction sector at Phenom Park, Phase 3, in Langata. You have been chosen to participate in this research and I will be thankful for assistance in filling the research instrument provided in honesty and completion. Participation is also optional. Kindly spare some time to fill in the research instrument that is attached.

Thank you.

Yours Faithfully,

Sammy Mitey,

Researcher.

APPENDIX II: QUESTIONNAIRE

Kindly fill in the research instrument as honestly as possible. Do not include your name or any other personal information. Tick appropriately.

Part A: Demographic Characteristics

1. What is your gender? ( ) Male ( ) Female
2. What is your age bracket?

( ) 20-30 years ( ) 31-40 years ( ) 41-50 years ( ) 51 years and above

3. What is your highest education level?

( ) Certificate ( ) Diploma ( ) Undergraduate

( ) Post graduate ( ) PhD ( ) Other _____

4. What is your designation in the project?

( ) Architect

( ) Project manager

( ) Structural engineer

( ) Quantity surveyor

( ) Mechanical Engineer

( ) Electrical Engineers

( ) Contractors

5. How long have you worked for the current organization?

( ) Less than 1 year ( ) 1-3 years ( ) 4-7 years

( ) 8-11 years ( ) More than 11 years

Part B: Effect of construction information management systems on the duration of construction projects

6. Kindly tick appropriately

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
System of information management is easy to use					
Ease of access of data					

It is flexible and data is available on time					
The industry components are improved by the integration of the systems					
The use of systems has brought about competitive advantage against the competitors as well as increasing the construction projects efficiency					
The system supports majority of life cycle phases in a project such as generation of ideas, management of risks, management of stakeholders and knowledge management that is created after the project has been finalized.					

7. What else do you think can be done to improve the information management systems in construction on duration of projects in construction?

   _____

   _____

Part C: Effect of construction information management quality on the duration of construction projects

8. Kindly tick appropriately

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
The results from projects are affected by the information					

quality used in decision making					
The information is easily available, timely and accurate					
Information is relevant					
There is easy comprehension of the information gathered and shared					
The information shared is precise and straight to the point					

9. What else do you think can be done to improve the information management quality in construction on duration of projects in construction?

_____

_____

Part D: Effect of construction information management use on the duration of construction projects

10. Kindly tick appropriately

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Information management helps in monitoring of the ongoing projects					
Information management helps in evaluation of the ongoing and completed projects and resources					
Improved planning of activities					
Enhanced reporting of the construction project activities					

The success of the project is accomplished through decision making that is timely					
Information management aids management of resources					

11. What else do you think can be done to improve the information management use in construction on duration of projects in construction?
    _____
    _____

Part E: Effect of construction information management user on the duration of construction projects

12. Kindly tick appropriately

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Information management supports planning of projects before implementation					
It is easy to monitor and evaluate the projects that are still continuing					
Sufficient knowledge by the users enables projects to be completed within stipulated schedules and provisions					
Sufficient knowledge by the users enables timely preparation of the reports as per what is					

going on in each phase					
Information management helps in keeping and managing the projects' records					
It helps on controlling and managing the projects					
Tracking of usage of resources is made easy by project managers					

13. What else do you think can be done to improve the information management user in construction on duration of projects in construction?

_____

_____

Part F: Duration of construction projects

14. Kindly tick appropriately

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Completion of projects on time helps the company to achieve its objectives and goals					
Accountability is very critical in ensuring the construction project is completed in the stipulated time					
Completion of the projects on time aids in enhancing project efficiency					
The companies and stakeholders are able to be cost effective and					

manage the budgets better					
More efficient resource allocation					
There is improvement in information quality					
There is reduction in time taken to make decisions					

15. Kindly give suggestions/recommendations regarding management of information and how it affects the duration of projects in the construction sector

_____

_____

THANK YOU FOR YOUR TIME AND COOPERATION

APPENDIX III: INTRODUCTORY LETTER

UNIVERSITY OF NAIROBI

FACULTY OF BUSINESS AND MANAGEMENT SCIENCES

OFFICE OF THE DEAN

Telegrams: "Varsity",
Telephone: 020 491 0000
VOIP: 9007/9008
Mobile: 254-724-200311

P.O. Box 30197-00100, G.P.O.
Nairobi, Kenya
Email: *fob-graduatestudents@uonbi.ac.ke*
Website: ***business.uonbi.ac.ke***

Our Ref: **L50/35436/2019** November 04, 2022

National Commission for Science, Technology and Innovation
NACOSTI Headquarters
Upper Kabete, Off Waiyaki Way
P. O. Box 30623- 00100
NAIROBI

RE: INTRODUCTION LETTER: SAMMY KIPLANGAT MITEY

The above named is a registered Masters of Arts in Project Planning Management candidate at the University of Nairobi, Faculty of Business and Management Sciences. He is conducting research on ***"Effect of Construction Information Management on the Duration of Construction Projects in Kenya: A Case of Phenom Park, Phase 3 Langata".***

The purpose of this letter is to kindly request you to assist and facilitate the student with necessary data which forms an integral part of the Project.

The information and data required is needed for academic purposes only and will be treated in **Strict-Confidence**.

Your co-operation will be highly appreciated.

Dean's Office
University of Nairobi
Faculty of Business
and Management Science
P.O Box 30197-00100, Nairobi

PROF. JAMES NJIHIA
DEAN, FACULTY OF BUSINESS AND MANAGEMENT SCIENCES

JN/pgr

APPENDIX IV: NACOSTI PERMIT

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **160758**

Date of Issue: **14/November/2022**

RESEARCH LICENSE

This is to Certify that Mr.. Sammy Kiplangat Mitey of University of Nairobi, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: EFFECT OF CONSTRUCTION INFORMATION MANAGEMENT ON THE DURATION OF CONSTRUCTION PROJECTS IN KENYA_ A CASE OF PHENOM PARK, PHASE 3, LANGATA for the period ending : 14/November/2023.

License No: **NACOSTI/P/22/22005**

160758

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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See overleaf for conditions