



**PROJECT MANAGEMENT INFORMATION SYSTEMS AND DECISION-  
MAKING IN A MULTI-PROJECT ENVIRONMENT**

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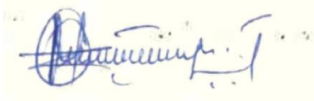
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Degree of Master of Business Administration**

**September 2022**

## DECLARATION


I, the undersigned, declare that this is original work of my investigation and has not been presented in this or any other institution of higher learning for academic credit

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This research project report has been presented for examination with my approval as the approved supervisor

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## **ABSTRACT**

Making right and informed choices is important in attaining organizational goals. Organizational supervisors are charged with the duty of formulating different strategies and plans to ensure smooth running and provision of latest and reliable data relating to organizational assets. This study sought to examine the influence of project management information system (PMIS) on the decision-making processes in an environment characterized by multiple projects within the healthcare sector of Kenya. Its purpose was to determine how the quality and quantity of PMIS information, project management, and PMIS information sharing in complex and multi-project environment influence decision-making processes. The study utilized a cross-sectional study design. The study population comprised of stakeholders who are the actual users of the Ministry of Health Project Management Information System DHIS2 (MoH PMIS DHIS2) platform and project leaders, including international development partners, division and departmental heads in the ministry of health, as well as county governments. A structured questionnaire was employed to gather data. The findings unmasked that the quality of information has a substantial and direct effect on the quality of decisions made. Quality information results in quality decisions. It was also found that the quantity of information, project management in complex environments, as well as PMIS information sharing directly and significantly affects the quality of decisions made. The study made the following recommendations: policymakers within the health sector need to encourage information exchange and sharing to help in better decision-making, project managers to secure quality project management information system while managing their projects, and the ministry of health need to ensure that the is sufficient and appropriate information in the PMIS to make better decisions within the industry.





# CHAPTER ONE: INTRODUCTION

## 1.1 Background

The present business atmosphere is increasingly turning out to be complicated, with managers being required to allocate scarce resources appropriately, make rapid and informed choices while at the same time remaining focused. According to Keegan and Den Hartog (2019), the management faces several challenges in companies that engage in multiple projects. Alotaibi and Mafimisebi (2019) observed that project managers, specifically, encounter most of these problems as they have to deal with multiple projects of different timelines, complexities, and scopes concurrently. Caniëls and Bakens (2020) noted that poor balancing of scarce resources can exert even intense pressure on the firm, leading to extended project lead time and poor quality of information. More problems are created through interdependency of and interactions between projects together with project and information overload. Organizational management may be engulfed with the huge amount of information for which better and informed choices need to be made that cause them to lose focus on appropriate data and fail to recognize inaccurate information. As noted by Caniëls and Bakens (2020) and Blichfeldt and Eskerod (2018), poor quality information leads to low quality decisions.

Leveraging PMIS is considered beneficial to the management as it thought to contribute to timely and better decisions which translate to the project success (Keegan & Den Hartog, 2019). Adopting the projected-related IS in a multi-project setting can be useful in attaining genuine projects that are of great help in project management.

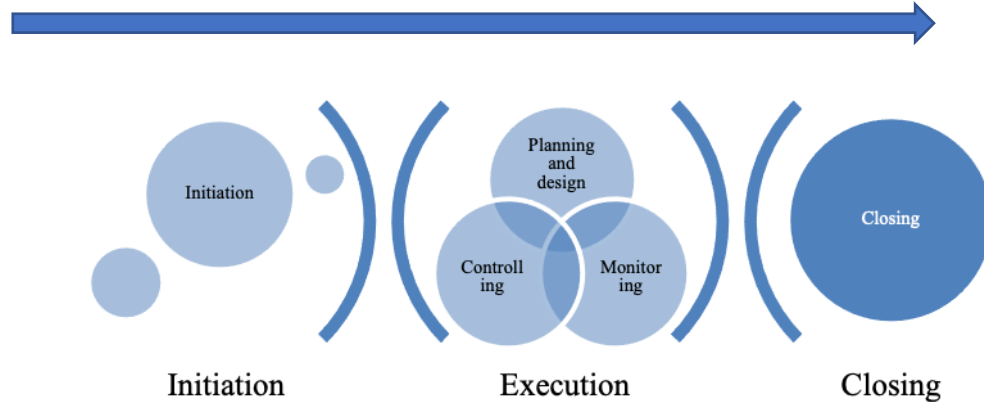
The current study examines the fundamentals of PMIS system that affect the decision-making process in companies that carry out multiple projects and how PMIS influence the process of decision-making. Moreover, the study examined the quality of managers' decisions contingent to the utilization of PMIS in managing company projects. The project was hinged on the Simon's decision-making theory, the capabilities approaches, and garbage can framework.

### **1.1.1 Project Management Information Systems (PMIS)**

PMIS is a basic pillar that allows firms to plan and eventually instigate their projects. It is considered a cornerstone that permits organizations to successfully manage their projects. In Information Technology sector, over 75% of projects that are managed through PMIS are successfully executed (Gartner, 2019). Gartner (2019) also found that more than 75% of projects that do not get PMIS support have high chances of failing. According to Abdulrahman et al (2019) PMIS is made up of diverse procedures and processes, support systems, and intelligence which help in processes of managing data.

PMIS seeks to ensure that decision-making processes are smooth via provision of the most current and reliable data relating to organizational assets. As Abdulrahman et al (2019) uncovers, PMIS is widely used in almost every aspect and areas of the organization, including human resource management, development, marketing, and finance. For managers who want to analyze data by running reports, PMIS can be used to collect, store, and avail the data for them. According to Sanchez et al (2017), PMIS offers the ultimate tools needed to examine strategy and scenarios as well as analyze business trends.

Caniels and Bakens (2020) opined that today's business environment is highly complex and very dynamic, needing managers to have a clear focus, make faster and better decisions, and adequately allocate scarce resources. Elonen and Artto (2017) found that management faces many barriers if their companies undertake several projects simultaneously. The essence of decision-making in these projects is constrained by cognitive, resources, time, and knowledge. As noted in figure 1-1 below, accurate decisions are needed in nearly all project cycles to improve organizational performance.



*Figure 1-1: Project's Life Cycle (source: Hedberg & Högländer, 2018, p. 26)*

The first stage of the whole project management life cycle is the initiation period. The purpose of the initiation stage is to define the project (scope, requirements and specifications), formulate a business case for it, and have it approved. The next phase is the planning stage in which the project managers create a project roadmap to be followed. The details and goals are outlined to meet organizational requirements and may involve creating a project and resource plan, defining goals and performance indicators, anticipating risks and creating contingency plans, and communicating roles and responsibilities to members of the team (Hedberg & Högländer, 2018). The execution phase is where the bulk of the project is done. The goals and deliverables are established to ensure the project meets its requirements. Here, most people, time, and money are allotted to the project. At the controlling and monitoring phase, the project manager ensures that all the moving parts are moving in the right directions and makes adjustments due to a change in direction or unforeseen situations. Here, the project manager may modify project plans, manage resources, perform status reports and meetings, update project schedule, and monitor project performance. The closing or completion stage signals the end of the project and offers a period of reflection, organization of materials, and wrap-up. The project manager archives files, records lessons learned, communicates project success to stakeholders, and celebrates completion and acknowledges members (Elonen & Arto, 2017). Because of this, Caniels and Bakens (2020) noted that project managers face unique challenges managing several projects with differing

deadlines, scopes, and complexities. Therefore, this study sought to describe an environment where managers undertake multiple projects concurrently within the organizations.

### **1.1.2 Multi-Project Environment**

Issa, Patterson, and Tu (2020) define multi-project management as a practice where project heads lead many projects concurrently. Here, project managers are charged with handling projects with common pool of resources but varying deadlines.

According to Dotsenko, Chumachenko and Chumachenko (2019), most project managers always complain about the theory of shared resources that leads to irregular replacement or reshuffling of trained with inexperienced staff. There is a set of golden rules at least at every organization that improve the project management process, including make sure the work is done as fast as you can, get the goal met as quickly as possible, and make sure you cut on cost as much as you can (Nyameke, Haapasalo & Aaltonen, 2020). It is important that managers make diverse decisions while acknowledging the essence of task prioritization to allow employees make these kinds of decisions.

### **1.1.3 Management decision making**

According to Hua and Herstein (2017), the responsibility to make better decisions is with the managers and leaders. Ton, English, and Travis (2019) posited that this should not be confused with the identification of certain choices and outcomes but rather means the motive that results in the process of coming up with such choices. While making decisions, project managers may encounter a lot of challenges. Sayegh, Antony, and Parrewe (2018) identified time constraints, uncertainties, conflicts, and bounded rationality as the most common decision-making challenges encountered in a multi-project environment in which many partners exist.

Today, data is important to any project or entity and good management of data is the foundation for making key strategic decisions. Al-Mamary, Shamsuddin and Aziati (2017) found that for entities to succeed, they should gather better quality data to obtain high-quality information. Relevant and accurate information should be shared on a timely basis to allow the managers make effective decisions.

Karlsson and Garcia Wernersson (2019) observed that entities must ensure timely execution of project and concentrate on flow-oriented processes that address changes in client requirement without compromising the overall performance to meet the end-user satisfactions. By utilizing project management information system, managers can ensure that these requirements are attained and eventually results in better decision-making processes.

#### **1.1.4 Kenyan health Sector**

The Kenyan healthcare system constitutes of the public sector, private sector, and private for-profit sector. The private for-profit healthcare system is made up of the distributors and manufactures of supplies together with private hospitals like Nairobi Women hospital, the Nairobi hospital, and Coptic hospital. The public healthcare system is made up of all government or public healthcare providers, including dispensaries, referral hospitals, and district and provincial hospitals. The non-commercial private sector is made up of faith-based organizations, the mission health facilities run by churches, and hospitals run by NGOs.

At the moment, there are nearly 9696 legally operated healthcare facilities in Kenya, with about 1384 (representing 14%) operated by community-based organizations or Non-governmental organizations, 4616 (48%) owned and operated by the government, and about 3696 (38%) run by the private sector (MoH, 2015). Kenya's Ministry of Health established norms in 2006 to regulate personnel concerned with the delivery of healthcare services to ensure the country has qualified and enough staff to carry out the task and their distribution countrywide is complied with (MoH, 2015). As such, distribution of healthcare workers is based on the number of medical facilities within the country.

Nurses are charged with the responsibilities of providing first care services in majority of the level 2 dispensaries across the country, specialized physicians work in the specialized clinics at level 4 district hospitals while specialist doctors provide health services in provincial hospitals. Given this, the national government invested heavily in expanding health structures and training of health workers. This move bore fruits as the number of pharmacists, dentists, and doctors increased to 3097, 898, and 7129 respectively by 2010, with most of them working in private sector where terms of work are better and the pay is high.

There are three major methods in which Kenya's health sector is financed. About 29% of the financing comes from donors, 29% public financing, 3% private funding, and 37% from

households (Government of Kenya, 2018). Kenya's Ministry of Health is the primary healthcare provider in the country and achieves this through referral hospitals, health centers, district hospitals, and provincial hospitals. As per the report released by the Government of Kenya (2018) that analyzed poverty and socio-economic status on healthcare consumption, it was unearthed that affordability of medical services is the main problem facing the poor people and this forced the government to intervene in the provision of better, quality, and adequate medical services to its citizens.

According to Caniels and Bakens (2020), adoption of the District Health Information System (DHIS-2), a type of PMIS, in multi-project environment can help firms attain a reasonable outcome, an effective strategy for project management. Raymond and Bergeron (2018) posited that the past studies on PMIS mainly focused on single but complex projects and the PMIS has been tipped advantageous in such kind of projects. The healthcare system of Kenya is deemed a multi-project environment with many projects and programs running concurrently, and tasks expected to be done all together. The focus of this project is on the application of DHIS2 in the multi-project healthcare environment

## **1.2 Problem Statement**

The digital era combined with globalization have consequently led to a reduction in the information illiteracy level thus widening the extant gap in the utility of computing platform. As a result, this has led to intense competition both internationally and domestically. This has forced business managers to adjust their tactics to attain competitive edge. Kahura (2017) found that multiple environment projects like pharmaceuticals, IT, and construction have been at the center of globalization in the recent times. In the process of prioritizing the institutions, the decision-making process in a multi-project environment is the main challenge faced. This is for the reason that given the current business conditions, better decisions should be made on how to utilize knowledge, funds, goodwill, time, and personnel. Wijnen and Kor (2020) argue that businesses and people endowed with similar resources may have different portfolios of programs as people's priorities differ. Even though the role of PMIS cannot be overlooked, its contribution to decision-making has not been adequately explored or is unclear.

The information system used in the health sector of Kenya has been strengthened by huge investments from county health departments and the Ministry of Health (MoH) across the entire spectrum of data collection, analysis, and interpretation for effective utilization. There has also been a lot of commitment to ease up the process of decision-making. As noted by Kyalo (2018), the Ministry of Health is particularly committed to digitalizing all medical records to enhance data accessibility and sharing.

Even though the studies done by Raymond & Bergeron (2018) and Caniëls and Bakens(2020) uncovered that quality of information coming from PMIS relates directly to the use of PMIS information, quality, and project manager's satisfaction with PMIS, people charged with managing projects in the Information technology sector offer a unique context because of the vast information that need to be processed within shortest time possible. In their study, Wilcox and Bourne (2002) agreed that each decision-making action is based on the future organizational establishment. They also uncovered that data should not be just be used to understand the present performance but also help predict the capability of the management to make the system function well.

For project managers in all sectors, the results of this study are valuable. But the effect of information quality in delivering exceptional analytical management abilities within the Information Technology sector should be examined. In one study to investigate the role of PMIS in completion of construction projects, Kahura (2017) unearthed that three elements of PMIS, namely, users, software, and information, improve the success of projects in this sector. In the present study, the researcher targeted the IT sector and identified specific PMIS elements that impact project success.

Even though past studies have associated project success with the information management systems, there is scarce or completely no evidence indicating how these systems influence decision-making processes in multi-project settings. In view of this, the inquiry worked towards addressing the question: how does PMIS impact the process of decision-making in multiple project environments as it relates to Kenya's health sector?

### **1.3 Research Objectives**

The overarching goal for which this examination was conducted was to establish the effect of PMIS on decision-making process in environment characterized by multiple projects, a case for Kenya healthcare system.

#### **1.3.1 Specific objectives**

The study pursued the following objectives: -

1. Examine how the quality of PMIS information influence decision-making process in Kenya's healthcare system multi-project environment
2. Determine how the quantity of PMIS information influence decision-making process in Kenya's healthcare system multi-project environment
3. Ascertain the impact of PMIS information exchange and sharing on decisions made in Kenya's healthcare system multi-project environment
4. Evaluate the impact of complex project environment on quality of decisions made in multiple environment

### **1.4 Value of the Study**

The results obtained from this inquiry will help the government to evaluate how the information systems for project management can influence the process of decision-making within the healthcare system to inform future policy making. For the Health Management Information Systems (HMIS) department in the MoH, the findings can provide valuable insights on the effect of the PMIS on making informed health choices. For scholars and academicians in the field, the study findings may help bridge the gap in the extant literature by serving as the point of reference for carrying out future studies to establish the impact of the PMIS on decision-making in multiple project setting.



## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

This part appraises the literature used in answering the research question. It discusses the relevance of theories and their context of study, including information systems capabilities approach, Simon's decision-making model, and garbage can framework, examines empirical studies on PMIS and decision-making, and finally presents conceptual frameworks.

### **2.2 Theoretical framework**

The project was centered on three main theories, including information systems capabilities approach, Simon's decision-making model, and garbage can framework

#### **2.2.1 Information systems capabilities approach**

According to the resource-based theory (RBT), firms own valuable, non-substitutable, rare, and difficult to imitate resources that help them gain competitive edge that result in long-run success. Frawley and Fahy (2019) noted that when a firm sustains competitive edge over an extended period, this can result in excessive supply of resources which eventually expands business operationalization.

For companies operating in competitive environment, project management sort of information system has various features with dynamic capabilities that contribute to company operations. It is not always true that information system will result in business prosperity in the short-term. But Wade and Hulland (2021) found that it is very crucial in the long-term because it allows the firm to integrate and generate more resources for a long time.

Resource-based theory can be applied by focusing on the basic competencies within the function of the information system. Information technology competency is crucial as they allow employees to move easily across subsectors (Peppard et al., 2017). As a matter of fact, information system helps people transect the functional limits of the organization

#### **2.2.2 Garbage Can Approach**

Also known as garbage can theory, garbage can model can be traced by in the 1975 seminal paper written by Johan Olsen, Michael Cohen, and James March (Cohen, 1972). This model proposes that people charged with decision-making responsibilities often operate in an irrational

environment characterized by uncertainty. Because of this, they formulate decisions that deviate from rational approach of collecting facts and weighing evidence carefully. Rather than looking for ideal solutions, the model mixes and matches organizational elements already incorporated in the can such as decision-makers deciding what to do, choices looking for problems, and solutions searching for issues to resolve. Since the organizational processes and preferences are not open to all members within the organization, the decision-making process is fluid and changes over time. March, Cohen, and Olsen believed that there is no one size-fit-all processes to find solutions to the problems facing the firm

According to Fioretti and Lomi (2010), different problems and solutions are thrown into different types of opportunities in the same way trash is thrown. In the end, some companies will have a more structured approach to solving problems while others will face unrelated challenges needing solutions to be provided in the meetings. This kind of situation is likely to occur within the healthcare system. This model was effectively applied in evaluating the effect of PIMS in making decisions within the healthcare sector that engage in multiple projects.

### **2.2.3 The Simon Decision-Making Model**

Hebert Simon believed that carrying out a comprehensive evaluation of how decisions are made and performed practically is one of the major processes that can help influence the decision-making capabilities in an organization. Simon argued that just like there can be missing information to decision-maker, there can also be multiple actions that can be match the situation. This means that better decisions can be made based on the availability of information concerning the situation. Moreover, he argues that, contrary to what the classical theorists have asserted, there can rarely be only one action option (Simon, 1975).

As per this model, decision-making process follows three major stages: intelligence activity, design activity, and choice activity stage. Each of these steps has its contribution and must not be missed when making decisions. At the intelligence activity phase, the experts identify organizational problem and try to identify a solution applicable to the system to provide a good environment. At the next stage, the design activity, several strategies that can resolve the issue are identified. The strategies are analyzed based on the costs and benefits. The final stage, choice activity, the management selects the most suitable strategy based on the costs and benefits outlined in the previous phase (Miller, 2011).

According to this model, effective use of scientific tools and highest level of specialization in decision-making processes can improve the rationality of decisions made. Proper application of the project management information system within the healthcare sector can be one of the best practiced implemented to enhance the rationality of medical decisions made. The current study adopted Simon's model to investigate the impact of PIMS on the process of making decision in the health sector characterized by multiple projects.

## **2.3 Empirical Studies**

Past studies focusing on PMIS has only focused on describing the project and software features that can be utilized. The studies have also examined a wide range of applications of the PMIS system in document management, risk management, planning, and in measuring and controlling costs.

### **2.3.1 PMIS Elements for Decision Making**

According to Ali and Money (2020), one of the factors that motivate project heads to make good use of PMIS is whether or not their usability depends on the information quality introduced by the information systems. Another reason as observed by Ali and Money (2020) is whether or not the knowledge emerges from any kind of ambiguity thus making it possible for the company to facilitate the process of knowledge sharing among other members of the organization while measuring how information progression should be done. More so, project manager's decision to maximize the use of PMIS depend on whether or not the information system is able to provide them with very acceptable information needed to make better choices (Raymond & Bergeron, 2018).

Lee and Yu carried out a study titled "success model of project management Information System in Building," uncovered that out of the many solutions related to IT problems, solutions generated within the firm (internal-based) are considered beneficial. However, this might not be the most appropriate solution to allow the firm to flourish on completely integrated information technological solutions.

Managers handling just one complex project may be reluctant to use information systems because the cost, in terms of time, required to upgrade the system may exceed the benefits being

derived from it (Bendoly & Swink, 2017). But this may not apply to several complex projects being dealt with concurrently which demand an effective information system to guarantee better decision-making process and eventually contribute to project success.

### **2.3.2 PIMS Information Quality and Decision Making**

Caniels and Bakens (2020) posit that information systems that relate to project management optimizes the use of available data to enrich the information quality being utilized by the firm to make decisions. In the view of Elon and Arto (2017), a common expectation in environment that seeks to improve the execution of many projects at the same time is that one manager will be assigned the leadership role to execute multiple projects concurrently. Quality information results in timely execution of better decisions thus resulting in proper project implementation (Caniels & Bakens, 2020).

Aina, Hu and Muhammed (2018) carried out a research to determine and evaluate barriers to discharging project-related IS as well as the quality of information assessed and decision-makers satisfaction level. They developed a conceptual framework which outlined important parameters essential in the analysis of the impact of information system on the whole process of decision- by project managers. Among the variables investigated included decision-making analysis, the speed and quality of the decision, users' satisfaction, impact of problem definition, access to information, and the content of information quality. The authors found that although management information system enhances the quality of decisions made, it's the project head's duty to ensure the success of the development project facilitated by information systems. As uncovered by Huff and Prybutok (2018), this success can be influenced by multiple factors, including past experiences and the managers propensity to assume risks.

### **2.3.3 PIMS Information Quantity and Decision Making**

In one study, a linkage between project performance and quantity of information has been established (O'Reilly, 1980). Caniels and Bakens (2020) opined that if information is supplied beyond optimal level, the chance of making better decisions reduces thus negatively affecting firm performance. In an environment characterized by execution of multiple projects, information emanating from the project managers is multiplied by the number of development projects done concurrently (O'Reilly 1980). In the event the information is available in

abundance for one individual project, then it becomes necessary for the project manager to select only relevant information for project candidate for adoption (Elonen & Artto, 2017).

#### **2.3.4 Sharing of PMIS Information and Decision-making**

A study conducted by Somjai and Jermstittiparser (2019) in Thailand sought to examine the association between organizational performance and information sharing. The authors utilized a structural equation framework to validate the specified measurement scale. The findings revealed that supply chain management capabilities directly influence organizational performance. Similarly, information sharing directly affects the business performance.

In another study examining information sharing in selected publicly funded institutions, Yego (2019) uncovered that most businesses have policies that guide data exchange and sharing. Many of these institutions make good use of online portals and electronic emails for information sharing. Yego found that most institutions utilized ICT services such as spreadsheets to manage data that should be shared among organizational members. As per the findings, lack of proper communication protocols and policies are the major challenges facing government funded institutions.

#### **2.3.5 PMIS Project Environment Complexity and Decision-making**

In his study to understand and manage project complexity in British universities, Azim (2019) utilized purposeful sampling technique and interviews and questionnaire to collect data to answer the research question. The findings revealed the existence of some degree of interactions and interdependence between people, products, and processes. The element of novelty is the only factors differentiating them and is related to technology which is required to attain desired product quality. Things such as product system level issue, partnerships, and novelty project organization contributed to the project complexity.

Elsewhere, San et al (2018) investigated the correlation of project management with the environmental complexity. The authors established the influence of complexity on project planning and controlling. Environmental complexity was found to adversely affect optimal project execution. In another study that examined the type of environmental complexity factors influencing decision-making ability of software project managers, Jia, Zhang and Capretz (2018) carried out a thorough systematic review of extant literature to gain more insights on the study

topic. A total of 40 research papers were carefully selected for the review. It was established that since software is an element that emanates from the outside environment, it's highly complex.

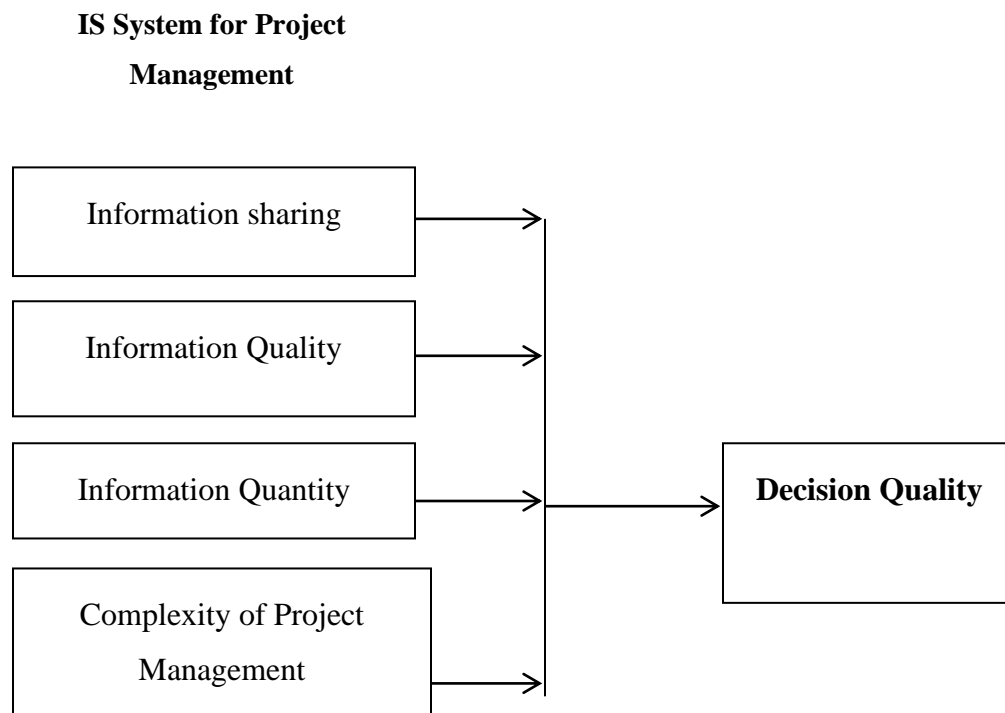
### **2.3.6 Role of PIMS in Decision-Making**

In a study to look into the influence of the PIMS on the decision-making processes within multiple project setting, Caniëls and Bakens (2019) interviewed more than 101 managers who had interacted with the information system relating project management. The findings unearthed that the process of decision-making is directly affected by the quality of information and its usage. Utilizing structural equation model to the maximum calls for the new type of information to have complex sort of relationship. It was found that the use of projected related information system confers a lot of benefits to the project managers. The authors did not note any negative effect of information overload on project implementation. Managing a series of projects concurrently can prevent the project heads from providing timely information on the types of projects to be performed.

In Kiambu County, Ngari (2017) studied the effect of information systems features on projects performance. Participants were selected using random sampling approach and structured questionnaires proved useful in the data collection process. The study findings demonstrated that the use of software results in production of quality information important for project success. The degree of software quality affects the effectiveness and efficiency of performance within the organizations. Information availability directly influences the project implementation rate by project heads. It is for this reason than majority of firms, both local and international, are adopting information systems for managing projects.

## 2.4 Conceptual Framework

Also known as conceptual model, conceptual framework is a visual image that aid researchers to represent the expected cause and effect relationship (Van der Waladt, 2020). An information system theory, Information System Success Model, was employed to offer an in-depth understanding of information system success by drawing relationships among five important dimensions of success along which IS are assessed. The dimensions include decision-making (quality), information sharing, PM in environment complexity, information quality, and information quantity.



**Figure 2.2: Conceptual framework**

## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.1 Introduction**

In this part, the author expounds on the approach utilized in the research design. Sections reported on include study design, target population, sampling technique, as well as data collection and analysis methods.

### **3.2 Study Design**

The study followed a cross-sectional survey design. A cross-sectional research is a type of study design where the researcher gathers data from many people at one point in time. In this design, the researcher observes the behavior of the participants without influencing them. The aim of a descriptive study design is to describe the situation as it happens naturally and gather information on certain variables as they are (Johnson & Schwartz, 2016).

### **3.3 Target Population**

The study population can be considered a subset of the desired population from which the researcher selects the actual sample (Zhao & Wei, 2016). It includes unique people or group of people, amenities, set of items or households, proceedings, and fundamentals being investigated to provide a broad view of the findings. The study targeted stakeholders and project leaders who are the actual users of the district hospital information system (DHIS2) platform. They include international development partners, division and departmental heads in the ministry of health, and county government. These people were selected because they are major decision-makers in the healthcare systems that utilize the DHIS2 platform.

### **3.4 Sampling Design**

Proper selection of a sampling approach helps ensure that the samples the researcher expend time and resources into gathering are able to back the conclusions he or she wants to make. Using inappropriate sampling methods can result in biased samples while assessing the objectives. As such, it becomes difficult to generalize the research findings to the population. A purposeful or rather judgmental sampling approach was utilized in this study to only select people with



qualities that a researcher expects from the population. Expert or judgmental sampling is used in situations where the target population has very intellectual people who cannot be selected by other sampling techniques or where the researcher has the confidence in his knowledge to select a study sample (Sharma, 2017). The researcher considered project leaders and actual users of PMIS to have knowledge needed to provide accurate results. A census survey design was adopted that considered all participants.

### **3.5 Data Collection**

A structured questionnaire was designed using closed-ended questions to help in data collection. The feedback forms were administered online due to the restrictions imposed following the outbreak of Coronavirus pandemic. Choic and Pak (2015) hailed the use of questionnaire in data collection as it is useful in obtaining primary data from many respondents within the shortest time, reduces bias, and encourages honesty. Each of the six parts of the questionnaire addressed different objectives. Part One gathered demographic data of the population. The four specific objectives were addressed in part 2, 3, 4, and 5 respectively. Part 6 obtained data on the dependent parameter. The behaviors, opinions, and attitudes of the participants were quantitatively assessed on a Likert scale. The participants were chosen from six departments in the six departments of country governments, Ministry of health, NASCOP, USAID, and CDC & US DoD.

### **3.6 Data Analysis**

During the analysis phase, the fully completed questionnaires were edited and compiled in the SPSS software. Once all the questionnaires have been collected, the analysis was done to make sure that the data tallied is uniformly, accurately, and consistently keyed in the system. The data obtained was quantitative in nature and both inferential and descriptive statistics were employed to analyze it. Types of descriptive statistics employed include percentages, means, frequencies, and standard deviations. After the analysis, the researcher presented the data in tabular form. The inferential analysis followed a linear regression model to determine the linkage amid experimental and predicted variables. The following multiple linear regression model was employed:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3+ \beta_4X_4 +\epsilon$$

Whereby;

$Y$  = Quality of decisions,

$X_1$ = Quantity of information

$X_2$ = Quality of information

$X_3$ = Information sharing

$X_4$ = Complexity of project environment

$\beta_1, \beta_2, \beta_3$  and  $\beta_4$  = coefficients of determination

$\varepsilon$  = error term

## CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION

### 4.1 Introduction

In this part, the researcher offers a summary of the results based on the study objective, which was to examine the effect of PMIS on decision-making process in multiple project environments. The results are also based on the 84 of the 94 (89.3%) of questionnaires that were administered both physically and online and were fully completed. This response rate was believed to be adequate for carrying out the analyses.

### 4.2 Background Information

Table 4.1 below displays the demographic information of the study participants including the number of years in service, gender, age, and educational level.

**Table 4.1: Demographic Data**

	Category	Frequency	%
	Female	37	44.0
	Male	47	56.0
	<b>Total</b>	<b>84</b>	<b>100.0</b>
Age	21 – 30 yrs.	7	8.3
	31 – 40 yrs.	32	38.1
	41 – 50 yrs.	38	45.2
	>51 yrs.	7	8.3
	<b>Total</b>	<b>84</b>	<b>100</b>
Educational level	Postgraduate	11	13.1
	Degree	52	61.9
	Diploma	21	25
	<b>Total</b>	<b>84</b>	<b>100.0</b>
	<b>Total</b>	<b>84</b>	100
Years in service/experience	<2 Yrs	8	9.5
	2 – 5 Yrs.		27.4

	6 – 8 Yrs.	23	31.0
	9 – 11Yrs	26	20.2
	> 11 Yrs.	17	11.9
	<b>Total</b>	<b>10</b>	<b>84</b>

The results presented in Table 4.1 above demonstrate that 44% and 56% of the participants were female and male respectively. In terms of age, most respondents (41.5%) were between 41-50 years, followed by 31-40 years at 38.1%, and finally 21-30 and 51+ years both at 8.3%. In terms of educational level, majority 61.9% had bachelor's degree, followed by 25% with diploma, and then postgraduate at 13.1%. This implies that all the participants were able to respond to the questions without any problem. In terms of years of experience or service, majority respondents (31%) had stayed in the organization for 6-8 years, followed by 2-5 years (27.4%), and then 9-11 years at 20.2%. 11.9% of the respondents had stayed in the company for more than 11 years and 9.5% had an experience of less than two years. This means that project leaders and users of PMIS had enough experience to provide necessary information on how PMIS influence decision-making process.

### 4.3 Quality of PMIS Information

Table 4.2 below represents the findings on the participants' degree of agreement with the statements as regards the quality of PMIS information.

**Table 4.2: Statements on Quality of PMIS Information**

Statement as regards the quality of PMIS information	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean	Std.dev
Information is timely	2%	1%	6%	63%	27%	4.12	0.26
Information is complete	1%	2%	8%	51%	37%	4.20	0.23
Information is accurate	1%	2%	4%	57%	36%	4.24	0.25

Information is readily available when required	1%	2%	8%	67%	21%	4.05	0.27
Information is consistent	1%	1%	2%	70%	25%	4.17	0.30

When asked to indicate the degree to which respondents supported different statements concerning the quality of PMIS information, majority 70% stated that that project-related IS information is consistent (Mean=4.17). 67% (Mean=4.05), 63% (Mean=4.12), 57% (Mean=4.24), and 51% (Mean=4.20) of the respondents agreed that PMIs information is available when required, timely, accurate, and complete respectively.

#### 4.4 PMIS Information Quantity

Table 4.2 below depicts the outcomes of the participants' degree of agreement with the statements on quantity of IS information.

**Table 4.3: Statements on quantity of PMIS information**

Statement as regards to the quantity of PMIS information	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean	Std.dev
Information is accessible	0%	0%	1%	73%	26%	4.25	0.31
Information is diverse	2%	8%	7%	57%	25%	3.94	0.22
Information is relevant	1%	6%	5%	52%	36%	4.15	0.23
Information is comprehensive	2%	2%	4%	67%	25%	4.10	0.28
Information is plenty	0%	2%	5%	60%	33%	4.24	0.26

Respondents were requested to point to the degree to which they concur with various statements about the quantity of the PMIS information. Majority 73% (mean=4.25) of the respondents stated that the information was accessible and 67% (Mean=4.10) said the information is comprehensive. Besides, 60% of the respondents agreed that the information was plenty, 57% that the information is diverse and 52% that the information is relevant.

#### 4.5 PMIS Information Sharing

Table 4.4 below depicts results on the degree of agreement with the statements on sharing of PMIS information

**Table 4.4: Statements on Sharing of PMIs information**

Statements about sharing of PMIS information	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean	Std.dev
The information offer valuable insights to various healthcare departments	1%	6%	10%	51%	32%	4.07	0.21
Information is shared openly among decision makers	1%	2%	4%	57%	36%	4.24	0.25
Information is shared equally among shareholders	0%	2%	10%	56%	32%	4.18	0.24
Sharing information enhances its value	4%	5%	8%	52%	31%	4.02	0.21
Information can be shared	0%	0%	1%	80%	19%	4.18	0.34

When respondents were requested to point to the degree to which they agreed with different statements relating to sharing of PMIS information, majority 80% (mean=4.18) agreed that the information is sharable, 57% (mean=4.24) said that the information was shared openly among decision-makers, and 56% (mean=4.18) agreed that the information is shared evenly among organizational shareholders. Moreover, 52% (mean =4.02) and 51% (mean= 4.07) of the

respondents agreed that information sharing information enhance data analysis and value and offer valuable insights to various healthcare departments respectively.

#### 4.6 Project Management in Environment Complexity

Table 4.5 below presents the findings on the degree to which the participants fall in with various statements relating to the complexity of the multi-project environment.

**Table 4.5: Statements on Complexity of Project management environment**

Statements about complexity of project environment	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean	Std.dev
Major project goals and objectives are clearly identified	1%	4%	4%	56%	36%	4.21	0.25
Project planning is done appropriately	1%	4%	7%	58%	30%	4.12	0.24
The choice of a good project management plan follows a certain criteria	1%	2%	2%	68%	26%	4.15	0.29
Complexity is applicable in the selection of project inputs	1%	2%	5%	55%	37%	4.24	0.24
Projects have interdependent structures and parts	4%	5%	11%	51%	30%	3.99	0.20

When requested to point to the level to which they fall in with statements as regards the effect of complexity of project environment, majority 68% (mean=4.15) agreed that the choice of a good management plan follows a certain criterion, 58% (mean =4.12) agreed that project planning is carried out effectively, and 56% (mean=4.21) agreed that major project goals and objectives are clearly defined. Additionally, 55% (mean=4.24) and 51% (mean=3.99) of the respondents agreed

that complexity is applicable during the selection of project inputs and that projects have interconnected structures and parts respectively.

#### 4.7 Decision Quality

Table 4.6 below presents the findings on the participants' degree of agreement with statements relating to the quality of project decisions.

**Table 4.6: Statements on Quality of project decisions**

“Statement relating to decision making in a multi-project environment.”	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean	Std.dev
Decisions are sustainable in the long-run	4%	6%	8%	51%	4%	4.00	0.21
Decisions are well-timed	0%	4%	6%	70%	0%	4.07	0.29
Ultimate decisions are of better quality	1%	1%	4%	73%	1%	4.12	0.31
Project decisions are economical	1%	1%	4%	62%	1%	4.23	0.27
Decisions are consultative	0%	5%	4%	60%	32%	4.19	0.26
Shareholders are welcoming to all project decisions	2%	2%	6%	55%	2%	4.17	0.24

When requested to point to the degree to which they support various statements relating to the quality of project decisions, majority 73% (mean=4.12) respondents stated that the ultimate decisions are of better quality, 70% (mean=4.07) said that projects decisions are made at the right time, 62% (mean=4.23) affirmed that decisions are economical, and 60% (mea=4.19) were in agreement that decisions are consultative. More so, 55% (mean=4.17) and 51% (men=4.00) of



the respondents agreed that projects decisions are acceptable amongst our stakeholders and projects decisions are sustainable in the long-run.

#### 4.8 Inferential statistics

##### 4.8.1 Regression analysis

The researcher employed regression analysis to examine the correlation of predictor with dependent research variables.

**Table 4.7: Model summary**

R	R <sup>2</sup>	Adj. R <sup>2</sup>	Std. Error of the Estimate
0.724	0.524	0.493	0.1153

Predictors (Constant): Project environment complexity, information quantity, Quality of information, and Information sharing.

Dependent Variable: decision quality

Table 4.7 above depicts data for R, R-square, Adjusted R-Square, and standard error of the estimate. This data is used to evaluate the fitness of the regression model. From the findings, the adjusted R-squared is 0.493 which means PMIS (quality, quantity, environment complexity, and information sharing) could explain 49.3% of the decision-making process.

**Table 4.8: Analysis of Variance (ANOVA)**

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	83.971	4	20.993	111.671	.000
Residual	14.851	79	0.188		
Total	98.822	83			

Predictors (Constant): Project environment complexity, Information quantity, Quality of information, and Information sharing.

Dependent Variable: decision quality

Table 4.8 displays the outcomes of the ANOVA analysis and to ascertain goodness of fit exists among the data. The results show that the model represents data expected to be found in the actual population because the F-calculated (111.671) exceeds the PV=0.000 and F-critical 2.487.

The findings illustrate that PMIS (information quality and quantity, information sharing, and environment complexity) is a major predictor of the quality of project decisions.

**Table 4.9: Coefficients of Regression**

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.404	0.249		5.639	0.000
Quantity of information	0.491	0.132	0.463	3.720	0.002
Quality of information	0.557	0.132	0.526	4.220	0.000
Complexity of multi-project environment	0.132	0.0416	0.102	3.173	0.000
Sharing information	0.571	0.128	0.552	4.461	0.001

$$Y = 1.404 + 0.491X_1 + 0.557X_2 + 0.571X_3 + 0.132X_4 + \varepsilon$$

The results of the regression coefficients show that quantity of information had P-value  $0.002 < 0.05$  and beta coefficient of 0.491 implying that quantity of information directly and significantly affect the quality of decisions made. Increasing quantity of PMIS would increase the quality of decisions by 49%.

Also, the findings shows that the quality of PMIS information has p-value  $0.000 < 0.05$  and beta coefficient of 0.557 implying that the quality of information positively and significantly affect the quality of project decisions made; increasing the quality of information would result in a 55% increase in the quality of decision.

More so, the findings uncovers that information sharing has a p-value  $0.001 < 0.05$  and a beta coefficient of 0.571 implying that information sharing significantly and positively correlates with the quality of decisions; improving information sharing would result in a 57% increase in decision quality.

Furthermore, the results show that complexity of project environment has p-value  $0.000 < 0.05$  and a beta coefficient of 0.132 implying that complexity of project environment directly and

significantly impact the quality of decisions; increased complexity of project environment would result in a 13% increase in the quality of decisions made.

## **4.9 Discussion of Findingsa**

### **4.9.1 Influence of quality of information on decision-making in healthcare sector**

Objective one sought to examine the influence of quality of project-related IS information on the process of decision-making in environment where multiple projects are undertaken. It was uncovered that quality of information directly and significantly impact the quality of decisions made. The quality of decisions made can be improved by increased information quality. This fact is supported by Aina, Hu and Muhammed (2018) who unearthed that information system designed specifically for managers improves the quality of decisions made by the management. The findings further revealed that PMIS information is complete, accurate, consistent, and readily available when required. These findings are consistent with Caniels and Bakens (2020) who found that information quality positively correlates with well-timed execution of decisions formulated resulting in project success.

### **4.9.2 Impact of quantity of PMIS information on decision-making process in multiple project setting**

The second objective for this study was to examine the effect of quantity of information system in decision-making in environment where multiple projects are undertaken concurrently. From the findings, it was established that quantity of information is positively and significantly related to the quality of decisions made. It was found that the quality of the decisions can be improved by increasing the quantity of information. These results resonate with what Caniels & Bakens with (2020) and O'Reilly (1980) found that providing enough and relevant information enhances the quality of decisions made which could affect the overall organizational performance. More so, it was uncovered that information is relevant, accessible, diverse, comprehensive, and plenty. In corroboration with the results, Ngari (2017) revealed that availability of information directly affect the rate of project execution. It is for this reason that most firms are implementing information systems.

#### **4.9.3 Impact of Sharing information for decision-making in multiple project setting**

The third goal for which the study was conducted was to examine the influence of information exchange and sharing on the decision-making process in environment where several projects are done at the same time. The findings showed that sharing of PMIS information significantly and positively affect the quality of decisions made: the quality of the decisions made can be improved by increasing information sharing. Consistent with the study findings, Somjai and Jemsittiparser (2019) uncovered the existing relationships between decision-making and information sharing. Moreover, the study findings established that information is sharable, decision-makers shares information openly, information is shared evenly amongst various stakeholders, sharing of information enhances analysis and its values, and information offers valuable insights to various healthcare departments. The outcomes of this inquiry are in line with those found by Yego (2019). He hailed the effect of information sharing in decision-making processes and that firms make good use of online portals and electronic emails to share information amongst organizational staff.

#### **4.9.4 Impact of Complexity of project environment on decision-making in multiple project setting.**

The fourth and last study objective was to uncover the influence of complexity of project environment on decision-making process in settings where several projects are worked on simultaneously. It was discovered that complexity of project environment directly and significantly influences the quality of decisions; quality of decisions is improved by increasing the project environment complexity. On the contrary, San et al (2018) found that complexity adversely affects project execution to the maximum. Besides, the findings confirmed that project goals and objectives are clearly defined, project planning is done well, good project management plan follows a specific criterion, projects have interconnected structures and parts, as well as complexity is applied in the selections of project inputs. These findings are confirmed by Jia, Zhang and Capretz (2018) who unearthed that certain types of complexity factors influence the ability of software project managers.

## **CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

### **5.1 Introduction**

This part summarizes the main outcomes, makes conclusions, and formulates recommendations as per the study objectives and findings. The following sections provide detailed discussion of each part.

### **5.2 Summary**

The research project worked towards establishing the impact of information system used in project management on the decision-making process in Kenya's health sector where multiple projects are handled concurrently. An emphasis was on how information quality, quantity, sharing, and complexity of project complexity could affect the process of decision-making in settings where multiple projects are undertaken concurrently, specifically in Kenya's healthcare system.

In response to the first objective, the results showed that PMIS information is timely, consistent, complete, accurate, and readily available when needed. The quality of information has a positive influence on the quality of decisions undertaken. The quality of decisions can be enhanced by increasing the quality of information.

Data obtained and analyzed to address the second objective on quantity of information uncovered that PMIS information offer valuable insights for various healthcare departments can be shared, sharing information improves its value, information is shared evenly amongst stakeholders with the firm, and decision-makers openly share information. The quantity of PMIS information was shown to affect the quality of decisions made to a great extent. Decision quality can be enhanced by increasing the quantity of information.

On the objective of project environment complexity, the results showed that complexity is applicable in the selection of project inputs; an effective project management plan follows certain criteria, projects have interdependent systems and parts, proper project planning is made, and project goals and objectives are clearly identified. The complexity of project environment directly influences the quality of project decisions; quality decisions are made when project environment complexity is increased.

Data analyzed to examine the fourth objective on the project decisions uncovered that these decisions are of better quality, consultative, acceptable to and by key stakeholders, are sustainable in the long-run, well-timed, and economical in nature.

### **5.3 Conclusions**

Hanging on the above study findings, the researcher makes the following conclusions. One is that the quality information as exemplified by completeness, availability, accuracy, and consistency would help improve the quality of decision made within organizations.

Secondly, it was concluded that quantity of information (as characterized by relevance, diversity, comprehensiveness, and accessibility) directly and significantly affect the decision quality.

Besides, information sharing would positively affect the quality of decisions made. Management should ensure the information offer important insights for various departments, share the information among departments and divisions, and disseminate information evenly among stakeholders.

Lastly, the study concludes that complexity of project environment would result in high-quality decisions. The use of complexity in project input selections, proper project planning, and having well-defined goals and objectives would enhance the quality of decisions made.

### **5.4 Recommendations**

The study did examine the effect of project related information system in the Kenya's health sector. Project managers are advised to adopt quality information systems for project management as this would improve the quality of decisions they make and organizational efficiency.

The study also recommends the need for the ministry of health to have adequate, high quality, and accurate information in the PMIS to assist in making informed choices. Besides, the project managers should help the Ministry of Health to facilitate and encourage sharing of information amongst all healthcare stakeholders to enhance the quality of decisions made. Lastly, complexity of project environment needs to be operationalized as regards to differentiation and interdependency to formulate better decisions in environment where multiple projects are undertaken.

### **5.5 Limitations of the Study**

A number of limitations were faced in the course of carrying out the investigation. To begin with, there was limited evidence and studies on project related information system in multiple project settings. Secondly, some questionnaires were not returned despite several follow-ups. Besides, a lot of time was consumed in distributing questionnaires and seeking responses from the supervisors and participants. Most of the respondents, project managers, expend much of their time in meetings. In rare situations where the questionnaires could not be traced, the researcher had to resend or reprint it thus increasing the time and cost of data collection. Some participants were reluctant to respond to the questions and felt disturbed. The researcher addressed this by assuring them that the questionnaires were solely for academic reasons.

### **5.6 Suggestions for further Study**

The study examined the influence of information system on the decision-making process in multiple projects settings, a case for Kenya's healthcare system. Another study should be done focusing on other sectors, and to examine how information system affects project performance in the healthcare system.



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## APPENDICES

### Appendix I: Questionnaire

#### Section A: Background Information

1. Respondent’s Gender

Male  Female

2. Educational level

Postgraduate  Degree  Diploma

Secondary  Primary

Others .....

3. Respondent’s Age

<20 Yrs  21 – 30 Yrs.

31 – 40 Yrs.  41 – 50 Yrs.  Above 50 Yrs.

4. Years of service

<2 Yrs  2 – 5 Yrs.

6 – 8 Yrs.  9 – 11Yrs  >11 Yrs.

#### Section B: Quality of PMIS Information

5. Kindly show the degree to which you agree with the following statements relating to information quality, where 5-strongly agree, 4-agree, 3-neutral, 2-disagree, and 1-stongy disagree

Statement about quality of PMIS information	Strongly agree (5)	Agree (4)	Neutral (3)	Agree (2)	Strongly disagree (1)
Information is well-timed					
Information is consistent					
Information is complete					
Information is accurate					
Information is readily available when					

required					
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**Section C: Quantity of PMIS Information**

6. Kindly show the degree to which you agree with the following statements concerning the quality of information, where 5-strongly agree, 4-agree, 3-neutral, 2-disagree, and 1-stongy disagree

Statements concerning quantity of PMIS information	Strongly agree (5)	Agree (4)	Neutral (3)	Agree (2)	Strongly disagree (1)
Information is diverse					
Information is relevant					
Information is plenty					
Information is readily accessible					
Information is comprehensive					

**Section D: PMIS Information Sharing**

7. Kindly show the degree to which you agree with the following statements as regards to the sharing of PMIS information, where 5-strongly agree, 4-agree, 3-neutral, 2-disagree, and 1-stongy disagree

Statements about sharing PMIS information	Strongly agree (5)	Agree (4)	Neutral (3)	Agree (2)	Strongly disagree (1)
Information can be shared					
Sharing information increases the value and analysis					
Information offers valuable insights to various healthcare departments					

Information is shared evenly amongst stakeholders					
Decision-makers openly share information					

**Section E: Project Management in Environment Complexity**

8. Kindly show the degree to which you agree with the following statements as regards to the complexity of project environment, where 5-strongly agree, 4-agree, 3-neutral, 2-disagree, and 1-stongy disagree

Statements about complexity of project environment	Strongly agree (5)	Agree (4)	Neutral (3)	Agree (2)	Strongly disagree (1)
A specific criterion is followed when selecting suitable projects management arrangement					
Project planning is carried out appropriately					
Projects have interdependent structures and parts					
Project objectives and goals are clearly defined					
Complexity is applied in the selection of project inputs					

**Section F: Decision Quality**

9. Kindly show the degree to which you agree with the following statements as relates to decision-making in environment where multiple projects are done, where 5-strongly agree, 4-agree, 3-neutral, 2-disagree, and 1-stongy disagree

Statements as regards decision-making in a multiple project environment.	Strongly agree	Agree (4)	Neutral (3)	Agree (2)	Strongly disagree

	(5)				(1)
Decisions are sustainable in the long-run					
Project decisions are accepted amongst stakeholders					
Decisions are consultative					
Decisions are economical					
Decisions are well-timed.					

Thank you