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**ASSESSING THE ROLE OF PROJECT MANAGEMENT INFORMATION
SYSTEM (PMIS) ON CONSTRUCTION PROJECTS SUCCESS IN GHANA**

**BY
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**A dissertation submitted to the Department of Construction Technology and
Management in partial fulfillment of the requirement for the Degree of**

MASTER OF SCIENCE

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DECLARATION

I hereby declare that this submission is my own work toward the award of MSc. Project Management and that to the best of my knowledge, it contains no material previously published by another person or any material which has been accepted for the forward of any other degree of the university, except where due acknowledgement has been made in the text.

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ABSTRACT

This study sought to ascertain the impact of PMIS on Construction Projects Success in Ghana. The objectives of the study were to measure the quality of PMIS deployed in managing construction project, the quality of information output generated by PMIS in construction project, the challenges associated with PMIS adoption and the effect of PMIS on project success in construction projects in Ghana. The study deployed logistic regression analysis to analyze primary data obtained through questionnaires. The study found out that the quality of information churned out by PMIS is excellently available at any material time, relevant, accurate and reliable. The study also indicated that the elements militating against PMIS adoption in Ghana included high cost of PMIS equipment, absence of training to staff who are ready to adopt the System, poor internet connectivity, absence of management support and then system failure are hampering the adoption of the PMIS usage within the Construction Project in Ghana. The study also confirms an existence of a significant and positive relationship between PMIS and project success as well as quality decision making. This significant relationship between PMIS ensures overall project success as it is able to successfully integrate all time, budget and scope into an improved project development from cost to timeliness in a healthy outcome for the adoption and development of the Construction Industry in Ghana. The researcher recommends that Construction Firms must invest resources into PMIS to support project managers and project team in managing and executing projects effectively.

Keywords: Project Success, Assessment of PMIS, construction projects, PMS adoption in Ghana.

TABLE OF CONTENTS

DECLARATION	ii
ABSTRACT	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vii
LIST OF FIGURES	viii
ACKNOWLEDGEMENT	ix
DEDICATION	x
CHAPTER ONE.....	1
GENERAL INTRODUCTION	1
1.1 BACKGROUND.....	1
1.2 PROBLEM STATEMENT	5
1.3 AIM AND OBJECTIVES	6
1.3.1 Research Aim	6
1.3.2 Research Objectives	7
1.4 RESEARCH QUESTIONS.....	7
1.5 SCOPE OF STUDY	7
1.6 METHODOLOGY	8
1.7 SIGNIFICANCE OF STUDY	9
1.8 ORGANIZATION OF STUDY	10
CHAPTER TWO.....	12
LITERATURE REVIEW	12
2.1 INTRODUCTION.....	12
2.2 OVERVIEW OF PROJECTS AND PROJECT MANAGEMENT	12
2.3 PROJECT MANAGEMENT AND PMIS	15
2.4 OVERVIEW OF PMIS	18
2.5 PMIS QUALITY	20
2.6 QUALITY OF PMIS INFORMATION OUTPUT	24
2.7 CHALLENGES ASSOCIATED WITH PMIS ADOPTION.....	28
2.8 EFFECT OF PMIS ON PROJECT SUCCESS	31
2.9 CONSTRUCTION PROJECTS AND INDUSTRY IN GHANA	36

2.10 CONCEPTUAL MODEL	38
CHAPTER THREE	40
RESEARCH METHODOLOGY.....	40
3.1 INTRODUCTION.....	40
3.2 RESEARCH METHODOLOGY	40
3.3 RESEARCH PHILOSOPHY	40
3.4 RESEARCH APPROACH.....	43
3.5 RESEARCH STRATEGY	44
3.6 RESEARCH DESIGN	46
3.7 STUDY POPULATION	46
3.8 SAMPLING AND SAMPLING TECHNIQUE	48
3.9 RESEARCH INSTRUMENT	49
3.10 DATA ANALYSIS	51
3.10.1 The Reliability Testing.....	51
3.10.2 The Validity Testing.....	54
3.10.3 Ethics.....	55
CHAPTER FOUR.....	57
PRESENTATION, ANALYSIS AND DISCUSSION.....	57
4.1 INTRODUCTION.....	57
4.2 DEMOGRAPHIC ANALYSIS OF THE SAMPLE	57
4.3 PMIS QUALITY AREAS.....	61
4.4 THE QUALITY OF PMIS INFORMATION	63
4.5 THE CHALLENGES OF PMIS ADOPTION IN THE CONSTRUCTION INDUSTRY IN GHANA	65
4.6 PROJECT SUCCESS AREAS.....	68
4.7 CORRELATION MATRIX.....	69
4.8 REGRESSION ANALYSIS	70
4.8.1 The Effect of PMIS on Project Success	70
4.9 DISCUSSION	72
4.9.1 PMIS Quality Areas	73
4.9.2 The Quality of PMIS Information.....	74
4.9.3 The Challenges of PMIS Adoption in the Construction Industry in Ghana..	75

4.9.4 The Effect of PMIS on Project Success	76
CHAPTER FIVE	79
SUMMARY, CONCLUSION AND RECOMMENDATION	79
5.1 INTRODUCTION	79
5.2 SUMMARY OF THE FINDINGS	79
5.2.1 PMIS quality areas	79
5.2.2 The Quality of PMIS Information Output	80
5.2.3 The challenges of PMIS adoption in the Construction Industry in Ghana....	80
5.2.4 The effect of PMIS adoption on Project Success	81
5.3 CONCLUSION	82
5.4 RECOMMENDATION	83
5.5 SUGGESTION AREA	84
REFERENCES	85
APPENDIX	95

LIST OF TABLES

Table 3.1: Construction firms and Population	47
Table 3.2: Confirmatory Factor Analysis (CFA) Results	53
Table 3.3: The Goodness of fit indices (GoFIs).....	55
Table 4.1: Background of the respondents.....	60
Table 4.2: PMIS quality areas	62
Table 4.3: Quality of Information output Areas.....	64
Table 4.4: the Challenges of PMIS Adoption	66
Table 4.5: The Project Success areas	68
Table 4.6: Correlation analysis.....	70
Table 4.7: Regression on the Effect of PMIS on Project Success.....	71

LIST OF FIGURES

Figure 2.1: Conceptual Framework.....	39
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DEDICATION

I hereby dedicate this work to my wife, Linda Gyimah and my parents for their immense support and encouragement since I enrolled on this programme.

CHAPTER ONE

GENERAL INTRODUCTION

1.1 BACKGROUND

The current business environment is complex. Managers need to make fast decisions, allocate scarce resources efficiently, and have a clear focus. In organizations that are engaged in many projects simultaneously, management is faced with multiple challenges (Elonen and Arto, 2003). Not solely are projects necessary, however, also a collection of such projects at any one time, provided that present institutions are constantly been engaged in numerous projects as a competitive strategy to guarantee that they are still significant in their corresponding disciplines (Kahura, 2013). Ramos and Mota (2014) postulate that the target is to be quicker than competitors by keeping the plan of the organization in an effective direction by making long-term focused and better decisions. According to Kahura (2013), the key success factor for making better decisions is making investments in Information Technology (I.T) as an essential aspect to compete in this 21st century.

Raymond and Bergeron (2008) indicate that one of the utmost important factor in a managers' process of decision making is information. Possessing correct, reliable and timely information will quicken the decision-making process and also avoid in making several erroneous decisions. The volume of information in an organization is significantly growing and it has assumed a crucial need to manage it in an efficient manner and share this information within the organization. Kamardeen (2009) posits that organizations have to be quick in implementing current technologies so as to continue to be competitive in growing in their business setting. This is where information systems surface to make contributions.

De Wet and Visser (2013) speak out that project management is often very challenging than usual managerial matters in an organization and needs more attention from various views. Managers are required to make decisions quicker, need to make allocation of sources effectively, and require to have well defined focus; therefore, using information systems in managing projects has been a matter of huge concern so as to gain competitive edge over other organizations and also to improve the efficiency of projects during their life cycle and around various business tasks. According to Pellerina (2013), modern management system is needed to manage projects and the organization as a whole. For project managers to undertake their main task of making decisions in such a better way, they need correct, quick and reliable information to have the ability to make their own choices on the basis of dependable support or assistance. In this situation, the necessity of Project Management Information System (PMIS) is of highest importance.

Developments in the I.T sector have provided possibly the best dependable solution to present project managers. This clarifies why, as per White and Fortune (2002), software development and I.T have been employed in "modern project management", in an era where streamlining business procedures, expanding research and innovation and applying extraordinary levels of development is the actual sustenance of business. This truth is the actual background on which the PMIS has become a prominent project management tool, and an important tool to ensure effectiveness, efficiency and execution of present-day projects. PMIS is one accessible alternative or choice of I.T-focused application solutions mostly seen as an essential element in managing projects (Kahura, 2013).

The PMBOK Guide (2010) define PMIS as a "system tool and technique espouse in project management to provide information. Project Management Knowledge further posit that PMIS guarantees that projects are initiated, controlled and sustained to closure in a way that meets every project goal and objective whereas respecting predetermined project constraints such as time, budget, scope and quality as well as improving the allocation and incorporation of inputs required to achieve predetermined objectives while alleviating every risks. Karim (2011) puts forward that when espoused by project managers, PMIS has been connected by empirical studies to better project planning, scheduling, monitoring and controlling, which results to more effective and efficient project management in making decisions in every stage of the project lifecycle. The demands of contemporary business require organizations to obtain a PMIS as a way of providing project managers with the needed resources that will support the process of decision making in terms of the selecting, planning, organizing and controlling projects (Karim, 2011). Kahura (2013) indicates that PMIS has been associated with many advantages as an instrument for managing projects, including rate of success, cost-benefit analysis, timeliness and relevance.

According to Caniëls and Bakens (2011), the role of PMIS is to collect, process and refine raw data of the project and create a simple analyzed database needed by the project team at every stage. Cleland (2004) suggests that utilizing PMIS for a long period and by accomplishing many projects will create institutional knowledge and along this line, supporting the activities of the project is seen as another function of the PMIS. A study by Li et al. (2015) shows that designing, scheduling and cost controlling are the most used tasks currently. Literature available also indicate that construction firms have also espoused PMIS in the segments of sales, control of cost, management of material and

contracting. Studies also provide evidence that PMIS has assisted project managers to plan resources, prioritize and monitor projects (Karim, 2011; Kamardeen, 2009).

According to Ahlemann (2009), the use of PMIS requires modifications in the skills of project managers and their team, advances in I.T literacy of institutions and also to reform processes and structures inside the organization. Arshad et al. (2011) assert that it is usual that the projects due to their varied and irregular nature to have a form dissimilar to day-to-day tasks of the organization. The truth is that organizations frequently fail to obtain better business value after investing in PMIS. The whole idea is that to introduce an information system is normally just an expensive effort and the real benefits are marginal. Bonner and Gundlach (2013) are of the view that regardless of this, organizations still invest in information systems expecting to reap benefits in future. Thus, there is pressure on the information technology sector to build up increasingly user-friendly and expedient systems; however, pressure is also put on organizations to implement these systems successfully. It is crucially significant for PMIS to be well introduced in the organization and accepted by the users.

Gargallo-Castel and Galve-Górriz (2007) indicates that PMIS contributes importantly in economies and project success is seen to be crucial for organizations. Nonetheless, the contention on whether PMIS has positively or negatively affected organizations is far from over because debates are increasing each single day. The PMBOK Guide (2010) indicates that publications and renowned management journals continuously show how organizations have enhanced their operations, created fresh business avenues and outclassed their competitors by using properly selected and deployed PMIS.

On the other hand, Borstnar and Pucihar (2014) indicate that opposite to the idea provided by certain consultants and PMIS developers, the mere fact of utilizing PMIS does not in itself in automatic manner result to the success of the project. Moreover, Kahura (2013) keeps on recounting the publications of failed I.T investments like PMIS not giving quality information to project managers and not meeting project success in many literatures. It is against this background that this study seeks to assess the role of PMIS on the success of construction projects in Ghana.

1.2 PROBLEM STATEMENT

The adoption of automation in businesses to streamline operations has also led project managers to turn their attention to this paradigm to aid structural changes and quality service delivery in terms of completing projects on time through the adoption of computerized database systems. Kahura (2013) suggests that all over the world, developing countries especially in Sub-Saharan Africa remain in a state of predicament as to how best to participate in the global age of technological progress. According to Ramdani (2012), information technology projects have the capability to support in this regard through the automation of processes, thus reducing the inefficiencies of manually driven processes and lowering transaction costs.

Raymond and Bergeron (2008) in a similar study observed that contemporary project management without tools like PMIS is seen as awkward because many are not finished on time and in many instances, went beyond their original budgets and scope. What is missing from the studies, nevertheless is the correlation, relevant or otherwise, of PMIS and general project success, where success incorporates every outcome in managing projects from timeliness to cost. According to Choudhury (2014), in India for example, the nation's only producer of electric power is the National Thermal Power Corporation,

when faced with an increase in power demand, PMIS became a crucial tool which assisted in managing the timeline and project success rate.

Currently, project management is faced with many challenges linked to making decisions and meeting goals which seems to arise from complexity (Remington and Zolin, 2009), and PMIS is a vital tool for such high-cost projects like construction projects in Ghana. From an empirical review of literature, two gaps have been identified: first, according to Duggal (2010), majority of the studies had their main aim on the independent variable which is PMIS and did not delve deeper to measure the project success. Secondly, many of the previous studies accessible in the literature have been conducted in more advanced economies, either from a generalist view or in assorted industrials. Only presently have scholars began to investigate the impact of PMIS in countries like Singapore (Kamardeen, 2009), India (Choudhury, 2014), Kenya (Kahura, 2013), Japan (Siang and Yih, 2012), Pakistan (Arshad et al., 2011), China (Li et al., 2015; Lu and Wang, 2004) and akin countries, as globalization has become a comprehensive business need. To the best of my knowledge, no work has been done in Ghana. The absence of Ghana in this documentation of country-focused study on PMIS not only requires remedy, however also a context-particular concentration of an important sector in the nation. Hence, it is against this issue that this study seeks to assess the role of PMIS on construction projects success in Ghana.

1.3 AIM AND OBJECTIVES

1.3.1 Research Aim

The aim of this study is to assess the role of PMIS on the success of construction projects in Ghana.

1.3.2 Research Objectives

The study also seeks to achieve the following specific objectives:

1. To assess the quality of PMIS deployed in managing construction projects in Ghana
2. To measure the quality of information output generated by PMIS in construction projects in Ghana
3. To investigate the challenges associated with PMIS adoption in Ghana
4. To determine the effect of PMIS on project success in construction projects in Ghana

1.4 RESEARCH QUESTIONS

The study also seeks to answer the following questions:

1. What is the quality of PMIS deployed in managing construction projects in Ghana?
2. What is the quality of information output generated by PMIS in construction projects in Ghana?
3. Are there any challenges associated with PMIS adoption in Ghana?
4. What is the effect of PMIS on project success in construction projects in Ghana?

1.5 SCOPE OF STUDY

In geographical terms, the study will be restricted to the domestic construction sector and firms in the Accra metropolis where majority of the construction companies are situated since this will assist the researcher to achieve a realistic evaluation for the study in terms of proximity. In addition, they possess a lot of construction professionals working on projects and will offer the chance of getting high response rate and accurate data. The

study will also focus on project managers using the PMIS in their daily line of work. Respondents selected for the study will be project managers and supervisors. Data collected will focus on only PMIS project implementation issues without delving deeper into the technical aspect of the system adopted by the various construction firms.

1.6 METHODOLOGY

This study will adopt the positivist approach, appropriate ontology, epistemology and axiology to guide the collection of data, analyze and interpret the results that will assist in achieving the aim and objectives of the study.

Quantitative research approach will be employed for the study since the study seeks to test already established research questions and present generalized results (Bryman, 2006). In addition, this approach will assist the researcher to gain a more accurate examination of impacts. Adopting a quantitative approach will also help the researcher to examine the relationships between variables, which are measured numerically and analyzed using a series of statistical techniques (Cresswell, 2009).

Deductive research design will be employed to delve into and test the research questions established. Deductive approach will assist the researcher to subject the research questions to rigorous test through a series of proposition and will also allow the phenomena to be anticipated and controlled.

Since the study seeks to deal with construction projects, the researcher envisages challenges in deciding the actual population due to the absence of a robust database of current category of Ghanaian contractors. In addition, the population size may be small, linked to the need to select only few respondents who are informative on the phenomenon; hence, purposive sampling which involves using subjective judgement of

the researcher to select respondents will be employed. The target population for the study includes construction firms, construction projects and consultancy companies.

Questionnaires will be employed in the collection of primary data from respondents. The formulation of the questionnaires will be premise on the variables acquired from literature and the objectives of the study. Majority of the questions in the questionnaire to be administered to the respondents will be in the form of close-ended. The questionnaire will comprise of two sections; the first part for collecting demographic information and the second section to assess each specific objective.

The data collected will be analyzed utilizing descriptive statistics using such as mean, skewness, standard deviation (SD) and percentages. Inferential analysis such as regression analysis will be employed to analyze the effect of PMIS on project success. The analysis will be done with the aid of Statistical Package for Social Sciences version 23. This will assist the researcher to provide meanings to the data collected and also interpret data with the support of secondary data collected.

1.7 SIGNIFICANCE OF STUDY

This study will be useful to the project management industry because knowledge gained from this research will be utilized to devise appropriate strategies to enhance project completions within the scheduled period in Ghana. The findings generated by the study will be both relevant and significant in informing project managers currently involved in construction projects within and outside Ghana, on the efficiency, reliability, and effectiveness of PMIS. Attaining optimal performance in construction projects saves costs, improves safety standards, enhances the quality of projects, reduces time expenditure, and galvanizes the profitability of companies. The study provides empirical

evidence on how PMIS as a software tool, positively influences project managers, offers reliable information output, and improves current practices in the construction industry. The findings are critical for a developing nation such as Ghana, in terms of displaying a profitable opportunity for private businesses, and informing an active phase of Ghana's infrastructural development.

The study will be valuable to information system administrators whose duties include monitoring and evaluating the performance of the system periodically. Finally, this study seeks to generate useful information regarding experiences and understanding of how project managers in their respective fields use information systems, thus, increasing knowledge and adding to literature in this academic field.

1.8 ORGANIZATION OF STUDY

This study will comprise of five (5) chapters as described in the subsequent paragraphs: *Chapter One: Introduction* will give a brief overview of the study which will include the background to study, problem statement, aims and objectives of study, research question, methodology, significance of study and scope of study.

Chapter Two: Literature Review / Conceptual Framework will provide a review of the diverse conceptual, theoretical and empirical literature related to the subject matter, as well as a conceptual framework to provide a basis for assessing PMIS.

Chapter Three: Methodology will describe the research methodology of adopted for the study.

Chapter Four: Results and discussion of findings will present the analysis of the data collected and will also discuss the results of the analysis.

Chapter five: Summary of findings, Conclusion and Recommendation will provide a summary of the research findings, conclude the study and provide recommendations for the various stakeholders of PMIS.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This section of the study attempts to review previous studies conducted on PMIS across the globe in an anticipation to find gaps and guide the researcher as to how to go about the methodology in the next chapter. The conceptual model for the study is also discussed in this section as well as empirically reviewing other works which have been carried out already. The chapter also provides the theories which are being adopted to carry this study.

2.2 OVERVIEW OF PROJECTS AND PROJECT MANAGEMENT

According to Remington and Zolin (2009), a project in relation to science and business is generally defined as a joint venture, often engaging research or design that is thoroughly strategized to accomplish a specific purpose. White and Fortune (2002) provides a different perspective by stating that a project is usually a series of momentary efforts to satisfy a commitment or to develop a definite product or service. To be precise, Siang and Yih (2012) identified a project as a set of tasks that are required to be realized so as to reach a particular result. In another view, Pellerina (2013) defined projects as a series of inputs and outputs needed to accomplish a specific purpose. Cleland (2004) opines that projects can vacillate from simple to complex and is managed by an individual or a team.

Borstnar and Pucihar (2014) suggest that a project is a peculiar, temporary effort, carried out to accomplished planned or scheduled goals, which could be characterized with regards to outputs, results or benefits. They further stated that a project is generally considered as successful if it accomplishes the purposes as per their acceptance criteria

or standard, within a concurred period, scope and budget. Bonner and Gundlach (2013) assert that projects are distinct from business and require people to come together transiently to concentrate on specific project goals. Due to this fact, effective and efficient teamwork is core to project success.

According to Arshad et al. (2011), project management relates to the management of distinct packages of tasks to accomplish specific goals. The manner these tasks are managed depend upon a broad combination of factors. Project Management Institute (PMI) (2010) defined project management as the use of skills, tools, techniques and knowledge to a wide range of tasks so as to attain the requirements of a specific project. Ahlemann (2009) indicates that a key variable that differentiates project management from 'management' is that it has an eventual deliverable and predetermined time span, scope and cost unlike management which is a continuous process. As a result of this, project professionals need a broad variety of skills, which frequently include technical skills, and definitely, people management skills and proper business knowledge.

According to Karim (2011), project management is defined as the use of knowledge, experience, methods and processes to accomplish the project objectives. Kahura (2013) stipulate that project management in its present state, began to grow only a few years ago. In the early 1960s, organizations and businesses started to recognize the benefit of organizing work around projects and to comprehend the crucial need to communicate and integrate work along various units and professions. This has also led to several standards in project management. Notable ones among them are the Project Management Institute (PMI, 2004) and the Association for Project Management (APM, 2005). Those provided by the PMI are extensively adopted and are recognized as competency standard.

According to Kamardeen (2009), these bodies of knowledge are just an "obviously correct" set of processes and techniques, which extensively stress on the action of planning. Ofori (2013) further posits that the basic theory of project management standards such as PMI guide suggests that the project is cut off or separated from its environment. This shows that, once the project is planned, changes should occur just occasionally. It could be seen that regardless of well-established best practice project management processes, present project managers still seem to be unsuccessful in averting project failure and regardless of well-established and conventional project management methods such as Prince2 or PRAM, project managers still see these methods as not effective in dealing with project uncertainties (Ofori, 2013).

Project management according to Attarzadeh and Ow (2008) is a field of activity which involves planning, organizing, acquiring, and managing resources to accomplish specific objectives. The foremost challenge is to achieve every project goals in terms of predetermined or defined limitations. These limitations involve budget, scope and time that the project management seeks to optimize via the application, allocation and integration of inputs. Machado and Prá Martens (2015) indicate that the process in which a project is directed and controlled from scratch to completion is segregated into five (5) main stages, which includes: project conception and initiation; project definition and planning; project launch or execution; project performance and control; and project close. The PMBOK Guide (2010) indicates that projects and project management procedures differ from sector to sector; nonetheless, there are more conventional elements of a project. The main objective is usually to offer a product, modify a procedure or to tackle a challenge so as to provide benefits to the organization. The objective of these "conventional" project management approach or practice is to deal with elements such as tasks, requirements and objectives beforehand.

2.3 PROJECT MANAGEMENT AND PMIS

Over the years, managers identified information as a costly idea; nonetheless, currently suitable information systems offer well-timed and consistent information in suitable formats and periodic reports to help managers in decision making activity (Remington and Pollack, 2007). Thus, Raymond and Bergeron (2008) indicate that these systems ought not to be seen as a costly idea but as part of capital for the organization. Based on management view, these systems provide solutions to project management challenges employing the support of technical information. According Bonner and Gundlach (2013), national benefits are seen in nations that managers do not just seek to maximize efficiency; however, their organizational drive is consistent with general strategy. Certainly, the role of information technologies and the constant growing use of them in business and projects with the goal of meeting the needs of the evolving environment and the need for accurate and well-timed decisions appear to be more crucial, it is envisaged that this might change several business situations.

According to Kuen et al. (2009), project management, which has over the years been seen as a significant feature of successful organizations, is more than ever imperative to effectively and efficiently manage projects and to help project managers in their decision-making process. Kerzner (2003) posit that a sophisticated project management software has been developed and deployed in all kinds of institutions, be it small and large, public or private, they are meant to play an important role in project management. Ahlemann and Riempp (2008) indicate that the history of PMIS in supporting managers with correct and dependable information system that has the ability to help them make decisions, plan and manage the project has historical background. The process began in the 1960s with the idea of "double-entry bookkeeping system" introduced by Luca Pacioli. Following the use of technology by the American military and traditionally, with the rise of

computers in businesses, the initial adoption of PMIS was the punch-card in offices, which made managers able to manage workers' working hours. Later, in the 20th century, PMIS uncertainly maintained their movement that this uncertainty was possibly as a result of human incapability in keeping, safeguarding and restoring data.

Institutions across the world are growingly depending on software applications to automate the process of project management. Caldwell (2004) asserts that so much emphasis is being put on enhancing the correctness of data based on which key performance indicators and reports are produced. Key responsibilities of project management such as keeping various registers and recording the lessons learned, becomes simple to be accomplished through the deployment of an appropriate application. Lee and Yu (2011) opine that dependability of estimations in terms of effort and time is critical in managing projects successfully. Studies undertaken on risks associated with project management indicate that organizations extensively employ I.T tools to analyze, monitor and control project risks. Caldwell (2004) further suggests various tools that possesses an enormous ability to contribute to the success of managing projects and these tools, such as risks impact evaluation and risk categorization and ranking, generally exist in PMIS application packages such as Microsoft Project and Primavera, and are anticipated to help and improve decision making.

Lee et al. (2010) opine that PMIS is an automated system which is adopted to rapidly create, manage and simplify the process of project management. The PMIS can be utilized to assist the project management team in creating the schedule, estimates and risk assessments, and to collect responses or feedbacks from stakeholders. Caniëls and Bakens (2011) indicate that PMIS assist in planning, executing and closing project management objectives or goals and that throughout the planning procedure, project

managers utilize PMIS for budget such as cost estimations. In addition, the PMIS is also utilized in creating a particular schedule and specify the baseline of the scope. Fageha and Aibinu (2013) stipulate that when it comes to execution in terms of the goals of project management, the project management team gathers data into a single database. The PMIS is utilized to measure up the baseline with the real attainment of every task, manage materials, gather financial data and maintain a record for reporting intention. Zakaria et al. (2015) also postulate that at the completion of the project, the PMIS is utilized to assess the goals to verify if the activities were achieved and then it is utilized in creating a final report of the close of the project. Fageha and Aibinu (2013) conclude that the PMIS is utilized to plan schedules, budget and carry out tasks to be done in project management.

Ali et al. (2008) suggest that because information in itself is a factor of power to deal with, so an effective and efficient manager is an individual who has correct and real-time information of environmental trends and obtain the benefits of such systems so as to attain the optimum organizational objectives. Bearing in mind this, Fageha and Aibinu (2013) put forward that PMIS is the formal system of creating correct and well-timed information to support manager's decision-making process amid planning, control and effectively and efficiently taking decision for the project. Ali and Money (2005) posit that akin to other information systems, a successful PMIS ought to have impact on the manager regarding user satisfaction and effective utilization. Also, a successful PMIS ought to have impacts on the organization, such as effect on project success with regards to paying attention to budget, schedule and specifications.

2.4 OVERVIEW OF PMIS

Project Management Information Systems (PMIS) generally implemented by organizations as software packages are intended to give managers the decision-making assistance necessary to plan, organize and control projects. The PMBOK Guide (2010) define a PMIS as an information system that consist of the tools and techniques espoused in gathering, integrating and disseminating the outputs of project management activities. It is utilize in supporting every aspect of the project from initiation through to completion, and can be both computerized and manual systems.

According to Bakens (2010), PMIS are system tools and procedures espoused in project management to provide information. They further emphasize that project managers utilize the methods and tools in gathering, combining and distributing information via manual and electronic forms, and that PMIS is employed by upper and lower management to interact with each other. Syuki and Ombui (2018) indicate that the benefits of computerized PMIS's over manual systems are accuracy, capacity, economy, speed, efficiency and capability to deal with complexity. Bakens (2010) posits that the main advantage of PMIS is speed. Syuki and Ombui (2018) assert that once data have been gathered and captured into the system, virtually, it can be manipulated rapidly by the computer system and to generate or review printed plans, schedules and budgets, it takes a few days and weeks to be done manually, but this can be done in just seconds and minutes with the use of a computer system. This is particularly evident with internet and intranet PMIS, as computerized PMISs can store enormous volumes of information that is easily accessible, prioritized and preserved.

According to Helgesen and Jakobsen (2015), manual systems which are used for big projects are tedious to take care of, complex to access and irritate people to work around them or prevent them. They need the efforts of various support staff to keep and utilize their outputs for analysis. In disparity, computerized PMISs can carry out most of this analysis, minimize the need for clerical staff and unburden managers and assist project team from having to undertake computations. This relieves them to utilize analysis outcomes to take decisions. Helgesen and Jakobsen (2015) indicate that in many instances, computerized PMISs provide a major cost benefit over manual systems for the storage and processing of information. With the assumption that data entered are accurate, computerized PMIS produce less computational mistakes and minimize the cost of rectifying errors.

With regards to the objective of PMIS, Borstnar and Pucihar (2014) indicate that the PMIS is used in project management to present information for the following reason:

- to create an integrated information system for projects
- to provide vital information for managers to take decision
- to make project information easily accessible to users
- to speed up the flow of information among project team
- to increase the level of security for project information
- to provide a series of valuable reports
- to create a supportive project documentation system
- to improve effectiveness and efficiency of the project
- serve as information backup for other projects in the organization
- to facilitate communication between various sites when the organization is managing multiple projects

According to Kaiser and Ahlemann (2010), some of the elements found in a typical PMIS application system include Work Breakdown Structure (WBS) creation tools, calendar features, scheduling capabilities, work authorization tools, Earned Value Management (EVM) controls, quality control charts, Gantt charts, PERT charts and other chart features. Other elements in the PMIS indicated by Lee et al. (2010) include reporting functionality, resource tracking and leveling, computations for the critical path, EVM, target dates premised on the project schedule, and so on. Kaiser and Ahlemann (2010) opine that the Microsoft Project (MS Project) is the most widely used project management application. Park, H.G. (2005) argues that the PMIS software market is characterized by intense competition between Microsoft, Meridian, Oracle, Autodesk, Welcom, RIB software, Aconex, Huddle, Trakker and Primavera Project Planner. Lee et al. (2010) identified Project Scheduler which works with an SQL database and is also compatible with MS Office. Kaiser and Ahlemann (2010) posit that whereas certain organizations constantly depend on spreadsheet applications and basic electronic calendars, majority of organizations have made investments in more sophisticated applications in streamlining their project management activities.

2.5 PMIS QUALITY

PMIS according to Kaiser and Ahlemann (2010) is a significant element of effectiveness and efficiency in project management. PMIS has evolved significantly over the past years, it started as ordinary scheduling applications and currently serves as complex systems which covers a broad range of project activities and addresses various stakeholders. Various studies have been conducted in several countries on the quality of PMIS being deployed by organizations. Majority of the studies employed certain constructs to measure the quality of PMIS (Jung et al., 2011). Kahura (2013) posits that

the first construct employed by several researchers to measure PMIS quality is the interface. They suggest that the interface of software is very important as a well-designed interface will influence users to utilize the system for its intended purpose or task. A poorly designed interface will cause users to resist its usage. Raymond and Bergeron (2008) indicate that the interface of a PMIS should be simple so that users will not suffer to locate tools on the interface.

Obeidat and Aldulaimi (2016) stipulate that larger PMISs permit data from various projects to be merged so that multi project analysis can be done. Certain systems are compatible with and can be integrated into other current databases like inventory, purchasing, payroll, and even other PMISs. Kahura (2013) contends that the ability of a PMIS to interface with certain applications from existing data files is a significant selection standard. Majority of organizations have spent extensive time and money to develop interfaces to connect a commercial project management package with current data and other PMIS. Raymond and Bergeron (2008) indicate that many small and low-priced PMIS are distinct or stand-alone and possess limited or inadequate interface capability.

Another construct identified in many studies to measure the quality of PMIS is the systems' flexibility (Pellerina, 2013; Kahura, 2013; Obeidat and Aldulaimi, 2016). Pellerina, 2013 posits that flexibility systems also differ broadly in flexibility. Flexibility means the PMIS must be adaptable to changes and also configuration management. Kahura (2013) argues that a lot of PMIS systems are restricted and run a limited set of functions which cannot be adjusted or modified. Others permit the user to create fresh applications or modify current ones relying on the requirements of the organization. Syuki and Ombui (2018) indicate that among the possible extra applications and reports

which are available sometimes include expenditure reports, management of configuration, change control, responsibility matrix, cost, technical performance summaries and technical performance reports. Karim (2011) opine that numerous application systems use internet technology and protocols that support effortless access via a browser to a broad collection of management applications and databases. Due to this assertion, the PMIS that the organization intends to deploy ought to be capable to become accustomed to changes in the organization since with time the organization might want to change the staff managing various tasks in the system or may need the system to generate different reports.

Borstnar and Pucihar (2014) suggest that it is necessary to guarantee that the system is capable to deal with these little but frequent adjustments at ease without consulting the developer or vendor. Choudhury (2014) argues that if the need arises to consult the developer in the event of major changes, the organization must communicate this early enough before the decision to buy the system is made. On the other hand, most small adjustments must be done in-house. Borstnar and Pucihar (2014) identify the ease of use of a system as a construct to measure its quality. Caniëls and Bakens (2011) indicate that how easy it is to learn and run the system is very important. Systems differ considerably in style with regards to ease of information input and clarity of on-screen presentation. Choudhury (2014) contends that they also vary in terms of system documentation, report format, usefulness of error messages, and clarity of tutorials, training and operating assistance provided by the developer. Thus, Borstnar and Pucihar (2014) posit that organizations when choosing PMIS to manage projects must also evaluate and consider the ease of use and ease of learning of the application.

Some scholars have also identified the quality of information output by the system as a construct to measure PMIS quality. Kahura (2013) stipulates that the quality of information produced by the PMIS measures the quality of the system itself. They further indicate that PMIS adopted by organizations must give project team members useful information that can be utilized to make decisions by storing, maintaining, handling and managing the information resources. Borstnar and Pucihar (2014) also found response time as a construct to measure PMIS quality. They posit that the time it takes the PMIS to respond to a given command must be considered in the implementation of the system. If the system takes a longer time to respond to a command, it may delay decision making and also delay some tasks which needs to be performed.

Kahura (2013) also identified accessibility and security features of PMIS as a construct to measure its quality. The PMIS must be able to secure or protect the information resources in the system. Most PMIS have user access levels and also provide password sections where users of the system needs to be authenticated before they can use the system tools provided by the PMIS in managing tasks. Pourkeyvan and Mousiavan (2015) collected data from Iranian cooper project by sampling experts and top managers and employed partial least square method to analyze data. Findings revealed that the PMIS quality had positive impact on its usefulness and project management success. The researchers recommended to managers to adopt PMIS applications.

Cleland (2004) argues that whereas every implementation of PMIS vary from others with regards to design, features and scope, PMIS software applications are seen as necessary component of every implementation. The optimal use of a PMIS relies hugely on the way in which useful information is made accessible to every stakeholder and the level of activities which have been automated. Numerous project managers are worried about the

efficiency and effectiveness of their PMIS, which is largely due to wrong configuration and Return of Investment (ROI) issues (Helgesen and Jakobsen, 2015). Most of these constructs discussed in this section to measure the quality of PMIS has been used in several studies which the researcher will also adopt to measure PMISs currently deployed by project managers and construction firms.

2.6 QUALITY OF PMIS INFORMATION OUTPUT

Ogero (2014) indicate that the quality of decisions made appears to be influenced by the PMIS information quality produced and the actual application of this information. Park (2005) noted that the systems must give correct and reliable information that help the project team members to undertake their assignments effectively and efficiently. Raymond and Bergeron (2008) argues that the complexity of the PMIS is not necessary but the quality of the information produced by the system and the capability of the user to utilize the information in managing the project is important. This information assists project managers to carry out their assignments in a considerably professional way.

Developers of PMIS continuously argue that PMISs produce a number of benefits on the individual, workgroup and organizational level. Currently, yet, there is no empirical support for this contention in Ghana. Obeidat and Aldulaimi (2016) posit that there exists still substantial doubt as to the variables which influence the success of projects. Kaiser and Ahlemann (2010) used the survey strategy and qualitative interviews, a Q-sorting/item ranking method and in a quantitative manner assessed pre-test with 45 respondents. The study advised that the practice of concentrating on the functions of the system ought to be revised and attention ought to be put on the information been managed in the system.

Syuki and Ombui (2018) assert that the use of PMIS is beneficial since it gives accurate and relevant information that may be needed in the daily managing of the project. Intelligence is obtained from information to manage a project. Processing of information is very vital since decisions need to be made and implemented with a high level of guarantee so that the outcomes will have a role to play on the success of the project. During the function of planning a project, information gives the foundation for producing project action plans, estimations, network diagrams, schedules, and certain planning elements. Kahura (2013) agrees with this assertion and posit that information is vital to advance understanding; predict future potential performance and resources; convey status; set up project objectives, goals and strategies; create procedures for controls; bolster project strategies; and identify changes.

Kaiser and Ahlemann (2010) indicate that most of the kill versus go decisions of managers are made in the nonexistence of reliable information and as a result are uncertain. Possessing suitable information i.e. accurate, relevant, reliable and making information rapidly available, permits project managers to make purposeful decisions. Saeed and Abdinnour-Helm (2008) in their study on information systems opine that accessibility of high quality information produced by an information system is necessary, since it helps users to make good decisions and in this manner enhances a project manager's task execution. On the other hand, information systems that give users inaccurate and unreliable information have a negative influence on its usefulness.

Many studies have used various constructs to measure the quality of information generated by the PMIS. Majority of scholars indicate the significance of high quality information is a facilitator or driving force towards the success of project management (Nitithamyong and Skibniewski, 2006; Kahura, 2013; Obeidat and Aldulaimi, 2016).

According to Kahura (2013), PMIS information quality is measured by evaluating the extent to which information from the PMIS is:

- Available-This has to do with whether the PMIS information is readily at individual's hand
- Reliable-i.e. whether the PMIS information is sound and dependable
- Relevant-i.e. whether the PMIS information is closely linked or suitable to the issue in hand
- Accurate-i.e. whether the PMIS information is correct in every detail
- Comprehensible-i.e. whether the PMIS information can be understood

Aritua et al. (2009) indicate that information overload i.e. too much information beyond some optimum level can result to a decrease in the quality of PMIS information generated. Bakens (2010) stipulates that when faced with project overload, the project manager may see PMIS information as being more useful than they would under normal project setting, and therefore perceive the quality of information to be superior. Evidence suggests that project managers constantly utilize a PMIS to manage an overload situation in order to enhance information quality. Yeganegi and Safaeian (2012) opine that whiles project managers often require high quality information from a PMIS; this requirement is more so greater in a multi project setting. Intensive time demands do not give multi project managers the time to examine whether PMIS information is reliable and accurate. Caniëls and Bakens (2011) found that in a multi project setting, the accessibility of superior quality information in the PMIS is linked to the project manager being more satisfied with the PMIS information output. Caniëls and Bakens (2011) in a survey study in Netherlands selected 101 project managers to present their views on the quality of PMIS information and usage, and their influence on decision making in a multi project setting. The study employed structural equation modeling and findings indicate that the

quality of PMIS information relates in a positive manner to the quality of decisions. Thus, project managers were satisfied with the quality of PMIS information generated and frequently used information from the PMIS.

Syuki and Ombui (2017) in a study to find out the factors which accounted for successful implementation of road construction projects in Nairobi County using PMIS indicate that the PMIS software (independent variable) had a positive relationship with project success or performance (dependent variable). Findings indicate that the use of PMIS to produce quality information required by the project manager to perform their tasks. The study further found challenges with the use of the PMIS being system failures and poor internet connections with the use of web-based PMIS. The study concluded that managers of the system must put in more efforts to resolve these challenges to make the system run smoothly.

A study by Dietrich and Lehtonen (2005) revealed that there exists a significant relationship between PMIS and project success as well as quality decision making. Respondents also indicated that they utilized spread sheet or MS Access as PMIS; however, since these applications are not basically designed for managing project tasks, their use resulted to poor information quality. Kombe (2015) investigated the impact of PMIS on project success on World Vision projects nationwide in Tanzania. The study purposively selected 62 project managers and Design Monitoring and Evaluation Officers (DMEO) and was self-administered with questionnaires and interviews. The responses of the respondents were analyzed using SPSS and findings revealed that PMIS was been used to manage projects and the quality of the PMIS was good as rated by the respondents. The study further indicated that the information generated by the PMIS was of good quality and that users had been trained properly to use the PMIS. The study

recommended that organizations should implement PMIS in managing their projects since it assures better management of project by generating quality information required for project management.

Studies show that the extent of information quality produced by an information system is a significant factor of user satisfaction with the system (Kombe, 2015). As project managers see the PMIS information to be advantageous to them, it is possible that they will intensify their utilization the information from the PMIS (Riaz et al., 2013). Elonen and Artto (2003) postulate that in a multi project environment, this impact is improved, since project managers will conclude on the information quality for a single project and broaden this conclusion to other concurrently running projects. On the other hand, Geraldi (2008) indicates that when the PMIS produces low quality information for one project is likely that project managers will conclude negatively about the quality of information for every concurrently running project, without verifying whether PMIS used for these projects may really produce high quality information. Thus, Kahura (2013) emphasizes that accuracy and timeliness of PMIS information are crucial variables of information quality.

2.7 CHALLENGES ASSOCIATED WITH PMIS ADOPTION

Despite the countless benefits of PMIS, there are several challenges that organizations face. Karim (2011) stipulate that there is no system that is perfect. Syuki and Ombui (2018) identified resistance to use the system as a major problem related to PMIS adoption. They posit that initiating a change in an organization, especially changing the way things have been done for years is very difficult. Deng et al. (2001) elaborate that resistance is witnessed when the normally the most experienced team members perceive that to update the information in the PMIS as clerical work and not as part of the project.

This could lead to the project team to treat the PMIS as an addendum and may result to loss of valuable information.

The expensive nature of I.T equipment and other devices which are required to run PMIS is seen as a barrier as expressed by Ogero (2014), Kombe (2015) and Obeidat and Aldulaimi (2016). Syuki and Ombui (2018) reveal that a major challenge to PMIS adoption is rising cost of implementation and indicate that a number of authors also agree to the fact that high capital investment is required to adopt PMIS and this is a major challenge for domestic construction firms in Africa. Nitithamyong and Skibniewski (2004) suggest that for an organization to implement PMIS successfully, there is the necessity to buy devices that the project team members and the project manager will be utilizing to communicate with the PMIS application; these devices such as laptops and desktop computers, servers, etc. Moreover, the organization is required to make investments into good network that will link these devices so as for the PMIS to function effectively. The cost of these devices and constantly maintaining of the system becomes a challenge for most organizations. Jung et al. (2004) concluded that the cost of upgrading software for smooth operations in order to attain the objectives may also hinder many organizations to deploy PMIS in their set ups.

Love and Irani (2003) also indicate that based on the peculiar requirements of every organization, PMIS has to be tailored to meet specific needs of the project manager and the organization. This implies that there has to be sessions between the vendor/developer and top executives to discuss and understand the needs prior to the development of the system. Due to this situation, the cost of implementing the system increases, therefore making it unavailable to be adopted by some organizations. Jung et al. (2004) assert that a number of organizations turn out to purchase PMIS that lack the features or tools they

require most. As indicated earlier, every organization has its own peculiar requirements with regards to PMIS. So when an organization buys a PMIS that is not meant for its needs, it will have access to information that will not help enhance their task execution. This will lead to the situation of the organization not able to obtain the optimum return on investment.

Obeidat and Aldulaimi (2016) indicate that training of the personnel can also become an issue when adopting PMIS in an organization. If there is no proper understanding of how the PMIS works, it can be difficult to acquire the entire benefits of utilizing it. This thus makes it essential for the organization to guarantee that the project team members and their project managers are properly trained on how to use the PMIS. Ogero (2014) suggests that this exercise can be expensive and consumes time. Kombe (2015) agrees with this assertion and shares a view that there is also the necessity to train personnel to maintain the PMIS in good working condition constantly. He further postulates that similar to any other system, PMIS require proper maintenance so as to generate the optimum outcomes. According to Ogero (2014), this implies that the organization will need to attach experts to the PMIS maintenance and without these experts, utilizing the PMIS will be a problem for users since errors will go unresolved and this will lead to inefficiencies in managing tasks in project management.

Ogero (2014) also conducted a study to establish the impact of PMIS on project performance in the construction industry in Nairobi County, Kenya. The study employed descriptive survey and targeted a population of 98, of which 80 were selected as respondents. Questionnaires were espoused for the study and a response rate of 76% was achieved after self-administration of the questionnaires. Descriptive statistics and Correlation (espousing Pearson's coefficient of correlation) employed to analyzed data

established a significant positive relationship between PMIS and project success. The findings further revealed some challenges associated with the system and these included inadequate training of personnel on the use of certain tools, initial cost of setting up the system, high cost of maintaining the system and security issues.

Other challenges have been raised by scholars in various studies. Karim (2011) posits that PMIS is heavily affected by lack of management support. When there is not commitment on the part of Management to get the system running in terms of providing funds and incorporate it fully into the operations of the organization, it becomes a challenge for the survival of the PMIS. Lee et al. (2010) further identified that PMIS will lead to job loss for majority of project team members. People such as traditional registry clerks and messengers might be reduced or eliminated after the incorporation of the PMIS to perform certain tasks automatically. Karim (2011) in a study identified poor internet connections in using web-based PMIS and system failures as a challenge on the adoption of PMIS.

2.8 EFFECT OF PMIS ON PROJECT SUCCESS

The PMBOK Guide (2018) stipulate that traditionally, the project management metrics of time, cost, scope and quality have been the most important factors in defining the success of a project. Turner et al. (2012) argue that a project is said to be successful if it is able to achieve time, cost and quality objectives. Dvir et al. (2003) recognize on time, to specification and within budget as the benchmark for measuring the success of a project. Mirzaa and Pourzolfagharb (2013) indicate that the definition of project success is vague or unclear and that the overall success of a project handles the broader and extended term of the project impact, implying both project product success and project management success. They refer to project success as to meet business requirements,

delivered and maintained on schedule, delivered and maintained within budget, and provide the anticipated business worth and investment return.

Abdulkadir et al. (2017) assert that project management can be ascertained at the completion of the project, implying that in several instances, success benchmarks will be decided months or years after completing the project, particularly public projects. Therefore, to determine if a project is successful is complex if perceived from the above success standards. Pourkeyvan and Mousiavan (2015) espouse the idea project success in a dissimilar manner, perceiving it as product success, meaning the quality and impact of the end product to the end user (with regards to satisfying the needs of user(s), meeting the strategic objectives or the organization, satisfying the needs of stakeholders) when an execution of a project is completed. Lee and Yu (2011) posit that project success outcomes involve two distinct features, specifically, project success outcomes and moreover project success product outcomes.

PMIS generally adopted by organizations as application packages are supposed to provide project managers with the decision-making support required to plan, organize and control projects. However, Yeganegi and Safaeian (2012) indicate that the real impact of PMIS on project success remain unknown. A study undertaken by Yeganegi and Safaeian (2012) employed questionnaire to obtain data from 101 project managers in Iran. Based on structural equation modeling to gain insight into complex relationships, the results indicate that the use of PMIS was beneficial and there was no negative impact on project. Findings also show that there were enhancements on decision-making through the use of quality information generated by the PMIS in terms of enhanced quality of decisions, minimized time in decision-making, improved allocation of resources and

process monitoring. The study found a strong relationship between PMIS and project success.

Duggal (2010) warned project managers not to view project success as the accomplishment of certain pre-established project goals such as cost, time, performance, safety and quality, but also take into account the users goals or expectations in terms of the project. They further express that the expectancy on the outcome of the project and the view of project success or failure will be dissimilar for every stakeholder. Duggal (2010) concludes that success needs to be reviewed theoretically and empirically from the view of active project team stakeholders and from their benefit recipients or client on the key success criteria on any project.

Duggal (2010) stipulates that many studies conducted on the effect of PMIS on project success employed constraints of time, cost and quality to measure project success. To be precise, how well the project managers were able to achieve the time schedule and the project budget whereas achieving quality (overall features) was measured. Nitithamyong and Skibniewski (2006) put forward that studies indicated that the utilization of PMIS supported project managers to attain higher project success regarding time, budget and quality with every measurement been ranked either good or excellent. According to Obeidat and Aldulaimi (2016), as a result of the quality of information produced by the PMIS project managers, tasks undertaken became more productive because the PMIS tools improved their ability to undertake a variety of tasks. Kombe (2015) argues that project success is achieved when project managers stay within the project timeline, budget and specifications of quality and this is accomplished through the use of the PMIS by the project manager to carry out tasks.

A study conducted by Raymond and Bergeron (2008) in Canada on the quality of PMIS presently utilized by organizations indicate that benefits acquired from PMIS utilization are not tied to only individual performance but also involve project performance. The study employed questionnaire as a data collection instrument and sought to assess the impact of PMIS on project managers as well as project performance, employing the PMIS success model. The model for Raymond and Bergeron's (2008) study included five constructs, namely: PMIS quality, the quality of the PMIS information output, PMIS usage, individual impact of the PMIS and impact of PMIS on project success. Analysis of data collected from 39 project managers confirmed the significant role played by PMIS on the success of project management. Effectiveness and efficiency in administrative tasks improved, where project managers were able to better plan, schedule, monitor and control projects. Decision-making also improved in terms of been timely. The study also found that PMIS had direct impact on project success as they contributed in enhancing budget control, met project deadlines and fulfilled technical specifications (Raymond and Bergeron, 2008).

Kahura (2013) conducted a study on the role of PMIS towards project success using construction projects in Nairobi, Kenya. The study indicates that to guarantee project success, organizations have invested in PMIS to support project managers and the project team in managing and performing project tasks. The study espoused purposive sampling and questions in the questionnaire were designed using a likert scale format. The quality of PMIS, the quality of information output and the impact of the PMIS on project success was tested. The findings indicate that the use of the PMIS to produce quality information required by project managers to carry out tasks assisted them to perform their task in a more relieve way, therefore maximizing the rate of success of the project. The three independent variables (PMIS quality, quality of information output and impact on the

user) used were converted into one variable been PMIS which had a significant positive relationship with the dependent variable (project success). Thus, the study concludes that the use of PMIS supported the attainment of project success by meeting the project constraints and achieving the project goals.

Obeidat and Aldulaimi (2016) suggest that the UAE currently is known for advanced construction projects in the world and construction projects are presently characterized by a multifaceted pattern of profitability, cost-time balance and performance. By employing questionnaire and using purposive sampling technique to select a sample size of 20 project managers, the survey indicated a positive relationship between the use of PMIS and project success. The results also confirmed that there exists a strong positive correlation between PMIS quality, quality of information output and project success in implementing construction projects in UAE.

After purposively selecting 62 project managers and Design Monitoring and Evaluation Officers (DMEO) and using self-administered questionnaires and interviews, results from Kombe (2015) show that PMIS has been a huge determinant of project success and has been a tool which has improved project success positively. Kahura (2013) suggests that as one of the main I.T applications, the PMIS has contributed significantly in the management processes of construction projects. In a study conducted by Lee and Yu (2011) on PMIS adoption in construction indicated that among the diverse I.T applications, the web-based or internet-based PMIS has been emphasized due to its immense benefits. While not adequate to assure the success of a project, espousing PMIS to manage projects is now seen as a necessity. Syuki and Ombui (2018) stipulate that to ensure the project success, organizations are investing resources into PMIS to support project managers and project team in managing and executing of tasks.

2.9 CONSTRUCTION PROJECTS AND INDUSTRY IN GHANA

The economy of Ghana has grown speedily in the past two decades, and the construction industry has played a role and has also reaped benefits from this. The construction industry has recorded remarkable growth, intensifying its contribution to Gross Domestic Product (GDP) and has employed 320,000 people. The construction industry provides employment for 2% of young Ghanaians and offers more training and apprenticeship avenues to young Ghanaians than any other industry (Offei-Nyako et al., 2014). Urban Ghanaians live in poor quality houses and often overcrowded and, whereas many seek to own their own homes, just 8% of Ghanaians are capable to pay for (Awuvafofe, 2013). UN projections indicate that four (4) new houses would be required to be built every minute of the working day over the next 10 years so as for this case to be resolved (Awuvafofe, 2013). If the necessity for enhanced housing could be turned into useful demand, this industry could provide employment for a huge number of skilled and semi-skilled young Ghanaians.

In Ghana, municipal building construction also forms an essential wellspring of business for small and medium-sized construction companies in Ghana (Ofori, 2012). Financing construction projects such as schools, hospitals and religious institutions emanates from a series of public, non-profit and private (involving private persons) sources and creates a substantial volume of work in the industry (Osei, 2013). In rural settings to be specific, there is frequently clear concentration on employing local labor, so municipal construction projects can provide an essential area of employment creation. In a similar way, Offei-Nyako et al. (2014) reveals that as the economy of Ghana persists to grow into the bracket of middle income, there is rising demand for enhanced transport infrastructure. Nonetheless, once more, majority of contracts for these kinds of construction projects go to larger, frequently international companies.

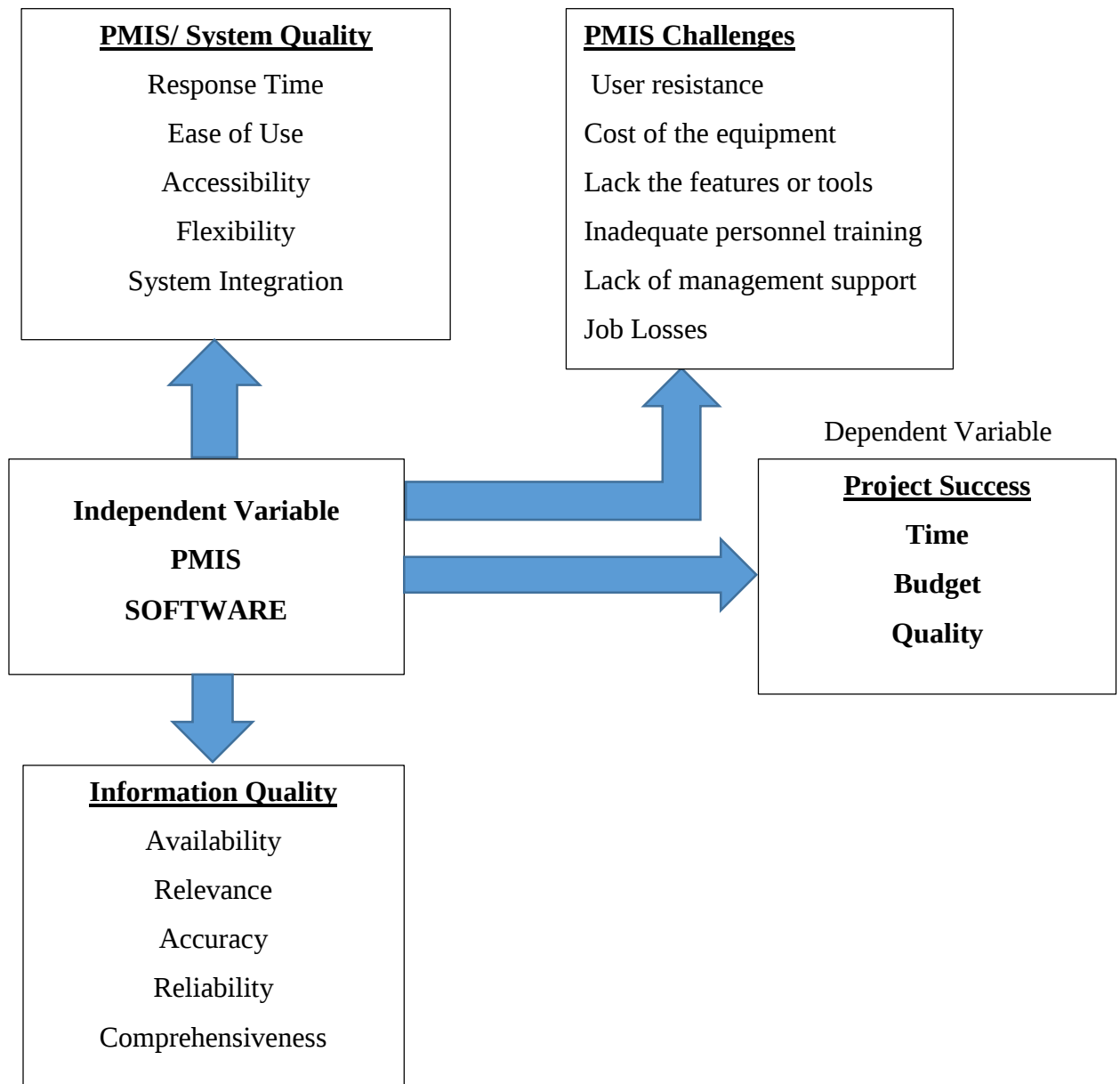
According to Awuvafoge (2013), various civil society groups have advocate for government to enhance how it engages contractors for publicly financed construction projects. This is mostly necessary as competition is anticipated to be increased or deepen for specialist construction services as the economy persist to grow. Osei (2013) indicates that there is no specific government agency in Ghana that supervises construction projects. Instead, responsibility for the built environment is shared between three (3) ministries namely: the Ministry of Transport, the Ministry of Water Resources, Housing and Works, and the Ministry of Road and Highways. The government of Ghana and several state-owned institutions (with loans from development partners) are the leading investors in the built environment. Offei-Nyako et al. (2014) posit that this is not shocking for a nation like Ghana whose level of socioeconomic development is still growing gradually, and this is predicted to change gradually as the nation becomes richer, in spite of privatization efforts.

Osei (2013) indicate that because construction projects have lengthy gestation period, the sector only reacts gradually to any impetus which acts on it, whether this is planned or not. Therefore, a lengthy period of low demand can strongly obstruct the capability of the sector to meet increasing demand, and probably delay the growth of the economy over the short run, as well as national development in the long term. Ofori (2012) have constantly given details of documentary facts of construction projects in the country taking very long periods to meet financial end and furthermore, frequently exposed to unnecessary delays, poor management and communication structures, fiscal constraints and massive systems of controls. The researcher envisages that when PMIS is adopted in the construction industry in Ghana to manage construction projects, not only will these challenges outlined be mitigated but will go a long way to ensure project success.

2.10 CONCEPTUAL MODEL

Figure 2.1 illustrates the present study's conceptual model on how the research variables are linked between independent and dependent variables. The independent variables are derived from Project Management Information System which is quality of the PMIS software and quality of information. The dependent variable is the project success. The Project success depends on the adoption of the PMIS in managing projects. The PMIS adoptions also come with various challenges which are also discussed in relation to the topic.

Figure 2.1: Conceptual Framework



Source: Researcher's Construct

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter of the study displays the research methodology adopted. The methodology is guided by the objectives established by the study and has its basis on an evaluation of the best strategy for answering the research questions. The chapter further presents discussions on the statistical and inferential tools employed in analyzing data so as to answer the research questions. Furthermore, the nature of research strategy, approach, philosophy, research design, population, sampling technique and sample size are elaborated in this chapter. In addition, the research instrument adopted in collecting data from respondents, as well as tools adopted to maintain validity and reliability of the instrument are illustrated in this chapter.

3.2 RESEARCH METHODOLOGY

Saunders et al. (2009) stipulate that research methodology is the basic theory of how a study is undertaken. It offers the philosophical and theoretical rules of the research and its effect on the approaches or approach espouse for the study. Davison and Martinson (2011) posit that it is further employed in analyzing and interpreting the data, as well as probing the research problem.

3.3 RESEARCH PHILOSOPHY

According to Saunders (2012), research philosophy is seen as the belief concerning the manner in which data relating to a phenomenon ought to be collected, analyzed and utilized. This study has espoused the positivist method to research as a result of the quantitative and empirical characteristics of the research. The researcher also adopted

this philosophy because the research has employed statistical tools and descriptive statistics to explain the variables. The scientific kind of the research, nonetheless assures that the study is set in the direction of the value free end of the axiological setting of research philosophy.

Bryman and Bell (2015) opine that there are different types of social research paradigm and these involve ontology, epistemology and axiology. Collis and Hussey (2013) further suggest that the philosophical views of a research have substantial influences on the research design. These different philosophical views are explained and the most appropriate is selected for the research. Scotland (2012) refers to epistemology as how knowledge can be developed, obtained and conveyed. Saunders et al. (2009) stipulate that the two main considerations in epistemology include positivism and interpretivism. Positivism can be described as considering only data on resources required as a natural scientist. Facts are collected and analyzed by the researcher with regards to positivism. Furthermore, the procedure of collecting data is beyond the reach of the researcher and thus, the substance of the gathered data is maintained and cannot be changed.

Another fundamental characteristic of the positivist view is that the research is in a value-free manner (Saunders et al., 2009). Hence, Scotland (2012) indicates that the choice of what to research on and how to conduct the research can be decided by an objective criterion rather than human views and interests. The interpretivist view of research suggests that it is indispensable for the researcher to gain insight into the differences between humans in our role as social actors. It stresses on the difference between undertaking a study among individuals instead of objects. In other words, the interpretivist view of research is premised on interpreting individual's beliefs or opinions and the researcher is considered part of the research procedure in an interpretive study

(Scotland, 2012). Bryman (2016) emphasizes that the researcher is involved in the event of the study and values and convictions of the researcher is seen as the motivating force in interpreting the findings.

Saunders et al. (2009) indicate that ontology is about the nature of reality. Ontology generates concerns of the expectations the researcher possesses regarding the manner the world works and the commitment to certain views. They further suggest that objectivism and subjectivism are the two main forms of ontology. According to Pathirage et al. (2008), objectivism corresponds to the view that social elements exist in reality external to and autonomous of social actors whereas subjectivism suggests that social phenomenon are developed from the views and following actions of social actors. As a result of this, the objectivist position is rooted in the positivist philosophy whereas the subjectivist position is grounded in the interpretivist philosophy. The study employs subjectivism philosophy from an ontological position.

Finally, Scotland (2012) indicates that axiology is considered as the judgements relating to values. Saunders (2012) contends that for a researcher's findings to be reliable or convincing, their own values have a task to perform in every phase of the study. According to Bryman (2016), the skill of the researcher is seen in axiological manner when their values are the foundation for making decisions regarding the research that is being undertaken. Furthermore, Saunders et al. (2009) posit that the selection of your philosophical approach employed for the research mirrors your values and data collection procedure. An instance provided to support this statement is that if a researcher undertakes a study and gathers data employing interview, then personal experience with participants is of high value than opinions put across using anonymous questionnaire. Pathirage et al. (2008) asserts that axiology breaks reality into value free and value laden.

Value free suggests that the researcher's decision on what to research on and how to undertake the study is decided by the objective criteria whereas convictions of human and experience or by subjective is value laden.

Based on the discussions above, this research employs a positivist approach of epistemology. The main rationale behind its adoption is the relationship manner of the study. Positivism paradigm relates to studies with relationships, objective assessment and predictions. Furthermore, the study is more biased in the direction of collecting data on the correlation between PMIS and project success in a way in which the researcher remains external to the research. In addition, nature of the objectives need objective assessment of the correlation between the variables of the research i.e. PMIS and project success in construction projects in Ghana. The study in axiological manner espoused value free since the research was decided by already established objectives.

3.4 RESEARCH APPROACH

Rea and Parker (2008) indicate that there are three kinds of research approach, namely; qualitative, quantitative and mixed methods. Saunders (2012) stipulates that quantitative research is usually linked to positivism, particularly when adopted with pre-established and highly structured data collection procedures; thus, quantitative data are seen as objective and employed to assess reality. Creswell and Creswell (2007) assert that quantitative research approach is aim at responding to questions link to correlation between variables and making predictions; hence, quantitative research approach assists to establish and validate associations and to establish generalizations that supports a theory. Beginning with a research problem which results to the establishment of hypothesis, collection of data and analysis of data are features of quantitative research (Creswell and Creswell, 2007).

Qualitative research method can be defined as the kind of research approach where the researcher depends on the perceptions or opinions and assumptions of participants by making inquiries and to collect data which comprises of texts from the participants. These texts are described and analyzed for themes and the questions are conducted in a subjective way. This involves engagements in the daily life of the context selected for the research (Saunders et al., 2009).

According to Ridenour and Newman (2008), the approach of gathering and analyzing data from both qualitative and quantitative in a single study is termed as mixed research method. Creswell and Creswell (2007) indicate that mixed methods research can be undertaken in a sequence or concurrent manner. Ridenour and Newman (2008) further considered mixed research methods as an extension instead of a substitution for the qualitative and quantitative research methods as they will remain to be important in the research area; hence, the mixed research method derives its strength from the two methods and restricts its weaknesses. The research follows a quantitative strategy through the use of questionnaires for data collection. The quantitative strategy provided an insight on the relationships among the various variables as they were analysed statistically. The research further adopted a cross-sectional approach in data collection in the sense that data collection occurred at a single point in time for each primary respondent.

3.5 RESEARCH STRATEGY

Saunders (2012) indicates that strategy is a plan of action to attain an objective; thus, the plan as to how the researcher will answer the research question is research strategy. Saunders et al. (2009) further suggests that it is a methodological connection between the choice of philosophy and resulting selection of approaches in collecting and analyzing

data. Barnett (2002) asserts that the kind of strategy employed ought to support the researcher to maximize the chance of attaining the objectives of the study and that a suitable research strategy should be chosen on the basis of the research questions and objectives, whether there exists adequate existing knowledge on the phenomenon to be studied, the amount of time and resources accessible, and the researcher's philosophical foundations.

Saunders et al. (2009) indicate that some of the popular research strategies known in business and management include survey, experiment, case study, action research, ethnography, cross sectional studies, grounded theory, archival research, longitudinal studies, etc. The survey strategy is deemed appropriate for this study.

According to Barnett (2002) the survey strategy is generally linked to deductive research method. It is a common and well-known strategy used in business and management research, and is most often employed to address 'what', 'who', 'where', 'how much' and 'how many' inquiries. Barnett (2002) further posits that survey strategy permits the gathering of standardized data from a large population in a highly economical manner, which allows simple comparison. The survey strategy was adopted based on the research approach chosen for the study which will permit the researcher to collect quantitative data which can be analyzed in a quantitative manner employing descriptive and inferential statistics. The primary data assisted the researcher to get original information from the respondents on key issues pertaining to this research.

3.6 RESEARCH DESIGN

Saunders et al. (2009) asserts that the research design is a mix of the research strategies and research choices as well as time horizon; therefore, correlates with the approach of enquiry which suggests particular direction for processes required to achieve the research objectives. Naoum (2013) stresses that the research design in relation to the fundamental philosophies gives a wider structure for undertaking the study and efficiently contributes by placing the researcher in the empirical world and associates the research questions to the relevant data.

The study has espoused the descriptive survey design which decides and provides the manner things are. Saunders (2012) indicates that descriptive survey refers to gaining an accurate profile of events, persons or situations. Field (2009) further posits that descriptive survey point towards basically to describe, observe and document a form of an event as it naturally happens instead of providing explanations. Hair et al. (2010) recommends the descriptive sample survey for the reason that generalizations can be made and in addition conclusions can be drawn from certain characteristics or behaviours of the population.

3.7 STUDY POPULATION

According to Hair et al. (2010), population can be defined as the collection of every possible object, element, person, etc. which is of interest to the study or the researcher. The population for this study comprised all stakeholders within the building construction industry in Ghana. However, for the purpose of this research, the study population was limited to include only the construction professionals and construction companies that were registered with the Association of Building and Civil Engineering Contractors of Ghana (ABCEG).

These construction firms had profile of having worked on high profile construction projects and have vast experiences in managing construction projects in the country. The total population was 107 and the breakdown is illustrated below;

Table 3.1: Construction firms and Population

N_o	Construction firms	Project managers
1	Asona Enterprise Limited.	3
2	China State Hualong Construction Ltd	4
3	Zakhem Construction	5
4	Berock Ventures	6
5	Consar	7
6	De Simone	6
7	Joshob Construction Company Limited	6
8	Okor Construction & Engineering Limited (OCEL)	5
9	Micheletti	7
10	Quiroz Galvao Construction Ghana	6
11	China Gezhouba Group Co Ltd	7
12	WBHO	3
13	Asterion Construction Ltd	7
14	Wilkado Construction Works	6
15	Top International Engineering (Gh) Ltd	5
16	INOCON Group Limited	7
17	Asanduff construction	4
18	Limerica Ghana limited	5
19	Jescan Construction	3
20	First Sky construction	5

Field data 2018

3.8 SAMPLING AND SAMPLING TECHNIQUE

According to Berman Brown and Saunders (2008), a sample alludes to a subset of the population which is of interest to the researcher. To be precise, a sample describes the respondents chosen for a study. A sample is chosen carefully to guarantee that the population of the study is reasonably represented. Saunders (2012) posits that the manner in which the sample size is chosen or arrived at will obviously have consequences on the confidence people will have in the data gathered and the extent of the generalization of the population. Based on this study, the sample includes construction staff that use PMIS in their daily activities or line of duty in managing construction projects. A breakdown of the sample includes project managers and supervisors. These categories of staff were chosen because they are responsible for overseeing the entirety of the project from start to finish.

Yamane (1967) provides a formula that makes it simple to calculate sample sizes. This formula was used to calculate the sample size for the study.

At 95% confidence level,

P = 0.5 and e= 5% are assumed.

N

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

Where N is the population size, n is the sample size and e is the level of precision

$$n = \frac{107}{1 + 107(0.5)^2}$$

$$n = 67$$

Hence, the sample size adopted for the study was 67.

The sampling technique employed to select respondents was purposive sampling. Scotland (2012) asserts that purposive sampling is a non-probability and judgemental sampling which does not statistically represent the total population. The researcher used his own judgement to select only respondents who were informative on PMIS usage; thus, individuals who did not have experiences in relation to PMIS or do not use PMIS in their line of duty were not considered. To gain deeper understanding on the experiences of PMIS, only those who use PMIS in managing construction projects were selected to present their views.

3.9 RESEARCH INSTRUMENT

According to Saunders (2012), data is crucial to achieve a successful research; hence, the study employed primary and secondary data sources in collecting data for this research. Secondary data used for the study were collected from books, articles, online publications, journals, etc.

Secondary data refers to data which have been collected already for other studies (Bulmer et al., 2009) and these data were reviewed to provide a guide in the research process and were also analyzed to provide further interpretations to the primary data collected. As per Bulmer et al. (2009), primary data refers to the original data collected from respondents in the form of responses or views provided in a current study. Primary data for this study were collected using the questionnaire as the research instrument. Collis and Hussey (2013) posit that research instruments alludes to the tools that are espoused in collecting, translating and organizing data into vital information via a systematic and vigorous survey to assist in interpreting data. Davison and Martinson (2011) opine that the selection of research instrument chosen for a research relies on the kind of questions

the researcher seeks to ask and the purpose of the study. Furthermore, other issues like time and resources available also affect the researcher's choice.

The nature of this empirical study makes it possible for the researcher to administer survey questionnaires in collecting data. The questionnaires were carefully designed and formulated after extensively reviewing literature. The review of literature for the formulation of the questionnaire was consistent with the assertion of Miller and Yang (2008) that the survey questionnaire can either be designed from the scratch by the researcher or the researcher can adopt questions and statements from previous studies in similar subject matter. Rea and Parker (2014) assert that the benefits of espousing existing questions are that it enables the comparison of previous and current findings in similar studies. The researcher in designing the questionnaire ensured that personal biases which could affect respondents were eliminated in the process. In line with this, majority of the constructs and the relevant measures in the research were created and altered to harmonize the current setting from existing studies.

The survey questionnaire was intentionally divided into two (2) parts with the first part which happens to be section 'A' highlighting issues on demographic information about the respondents. The other part of the questionnaire accommodates the section B, C, D and E which addresses questions on the objectives regarding PMIS. The questions in the questionnaire were designed on the basis of the likert scale format and were closed-ended questions. Questionnaires were self-administered to 67 respondents. The questionnaires offered the respondents the opportunity to answer the same set of questions posed to other participants of the study and the anticipation of the researcher to achieve a high response rate.

3.10 DATA ANALYSIS

According to Field (2009), data analysis is to examine, classify, tabulate and test or otherwise recombining qualitative and quantitative facts with the aim to address the preliminary research proposition. Miller and Yang (2008) suggest that the procedures espoused to analyze data in any given study mostly depends on the research design; the kind of variables to be examined; whether the study is longitudinal or cross sectional; the sampling procedure and the size of the sample. Kinnear and Gray (2010) postulate that the dynamic nature of data analysis demands the practicality of the researcher to be familiar in using the tools and methods to investigate data. Data gathered was properly coded and captured in the Statistical Package for Social Sciences (SPSS) version 22 software, which supported the use of the required descriptive and inferential statistics such as regression analysis.

Descriptive statistics adopted for the study include mean and standard deviation. Two main inferential statistics were also espoused for the study, namely; cronbach's alpha and multiple regressions. Multiple regressions is seen as the linear modeling technique that is utilized to assess the correlation between a set of independent and dependent variables (Hair et al., 2010). Thus, the method was used to establish the correlation between project success (dependent) and PMIS adoption (independent). This provided the means to objectively evaluate the characteristic feature of the relationship between the variables being considered through the use of statistical significance of the regression coefficient.

3.10.1 The Reliability Testing

A test for reliability was undertaken on the data instruments in the examination of determining how reliable the data instruments would be consistent in all material times. The researcher therefore analysis the indicators used for the data collection. The indicators

were under the variables of Project Management Information System (PMIS) quality areas, PMIS information quality, challenges of PMIS adoption and then Project Success Areas.

The reliability testing was carried out by the researcher using the guiding principle of Tavakol and Dennick (2011) who said in their study that a Cronbach's alpha of 0.70 benchmark is required for a reliability of data instruments to meet the needed internal reliability of test items for a data collection. An earlier study by Sekaran (2005), also said that .70 Cronbach's alpha is a requirement for reliability of an instrument for data collection in a research study. The implication of this benchmark is that a data instrument having Cronbach's alpha of lesser than 0.70 is prone to a low reliability which could infer error when used for analysis. A 0.70 benchmark of Cronbach's alpha or higher in value is therefore needed to assume the consistency of the items.

In testing of the indicators, all the items that had Cronbach's alpha lesser than 0.70 which implied being loaded badly (factor loading lesser than 0.70) and those that cross loaded with other indicators were also removed from further analysis. This means that those indicators were not used in the analysis of the data. The researcher at the end of the purification process had 7 items for PMIS quality areas, 5 items reach for PMIS information quality and PMIS adoption challenges respectively and then 3 items for Project Success Areas.

Table 3.2: Confirmatory Factor Analysis (CFA) Results

Variable	Factor Loading	T- values
PMIS Quality Areas: C.R = 0.710; AVE=0.80; Alpha= 0.743		
Ease of Use (user friendly)	0.752	3.30
Ease of Learning	0.712	3.82
Accessibility	0.832	3.22
Flexibility	0.710	4.18
System Integration (links more than one function tool)	0.712	3.14
Multi-project Capability	0.715	3.22
Security features (protecting vital information)	0.861	4.31
PMIS information quality C.R = 0.593; AVE=0.724; Alpha= 0.781		
Availability (at disposal when needed)	0.721	2.52
Relevance(appropriate to the matter at hand)	0.726	3.13
Accuracy(Correctness)	0.726	2.27
Reliability(sound and dependable)	0.704	2.12
Availability (at disposal when needed)	0.806	4.20
PMIS adoption challenges C.R = 0.608; AVE =0.541; Alpha= 0.767		
Cost of Equipment	0.709	3.26
Less training (inadequate training for staff to use the system)	0.824	3.40
Poor Internet connections	0.746	2.64
Lack of Management Support	0.815	4.01
System Failure	0.720	2.23
Project Success Areas C.R = 0.792; AVE=0.502; Alpha= 0.757		
Time (Meeting Deadlines)	0.807	2.21
Budget (Respecting Budgets)	0.822	3.51
Quality (Meeting quality specifications)	0.804	4.04

Note: CR = Construct Reliability; AVE = SQRT of average variance explained.

Source: Fieldwork, 2018

The table 3.2 as displayed above is the summary of the purification process for the test of reliability or the Confirmatory Factor Analysis as carried out by the researcher. The table 3.2 indicates that the Cronbach's alpha for the PMIS quality areas was 0.743, 0.781 for the variable of PMIS information quality, 0.767 for PMIS adoption challenges and then 0.757 for project success areas. Thus the researcher can conclude that based on the foregoing values derived for the Cronbach's alpha and in support of the studies of Alam and Mohammed (2010) and Sekaran, (2005), there is a confirmation of the indicators of the variables conforming to internal reliability.

3.10.2 The Validity Testing

A validity testing in the examination of model fit indices was carried out to assess the Chi-square (χ^2), the Degree of freedom (df), the normed Chi-square (χ^2/df), the Root mean standard error of approximation (RMSEA), the Comparative fit index (CFI), and the Standardized mean square residual (SRMR) of the indicators. This was done to assess whether the indicators of the variable would meet the criteria for the convergent validity. A standard value below 0.08 is needed for RMSEA, an equal or higher value of 0.95 for CFI, a lesser value of 0.03 for SRMR, ratio (p) of more than 5% for the Chi-square but with the ratio of the χ^2 to its degrees of freedom (*d.f*) having a value lesser than 5. These values or criteria are needed in a study for it to be classified as having achieved convergent validity. Thus the model fit of indices must be attained for the research to achieve proper convergent validity.

The table 3.3 below is based on the figures derived for the goodness of fit indices of the study in the assessment of the test items validity. Based on the figures as shown above, there is absolute indication of a presence of strong convergent validity. These values implies that the goodness of the fit model indices of the variables indicators are

noteworthy as they are within the required range to be classified as convergent validity needed for further analysis of a research work (Tavakol and Dennick, 2011). The researcher therefore conclude that the item adopted as the data instruments for the data collection are strongly valid and therefore could be used for further analysis of the study.

Table 3.3: The Goodness of fit indices (GoFIs)

Variables	χ^2	(d. f.)	$\chi^2/\text{d.f}$	P	CFI	RMSEA	SRMR
PMIS quality areas	13.61	6	2.27	0.804	0.98	0.074	0.014
PMIS information quality	8.25	3	2.75	0.0602	2.10	0.014	0.015
Challenges of PMIS adoption	8.38	4	2.10	0.061	1.16	0.012	0.020
Project Success areas	9.72	5	1.94	0.0570	1.12	0.042	0.012

Notes: χ^2 =Chi-square d.f.=Degree of freedom; $\chi^2/\text{d.f}$ = normed Chi-square;

RMSEA=Root mean standard error of approximation; CFI=Comparative fit index;

SRMR=Standardized mean square residual

Source: Fieldwork, 2018

3.10.3 Ethics

All ethical concerns at the various stages of the research were addressed. In addition, all ethical guidelines and code of conduct specified by the university were carefully complied with to achieve a high response rate. According to Saunders (2012), informed consent is the main ethical concern in undertaking a study. The researcher ensured that participants knowingly and voluntarily, and in a vivid and apparent means, gave their consent to participate. The study required human subjects to participate and since these participants are in respectable and sensitive positions, it was important to take into account their reputation in the way they were depicted as respondents in the study; hence, the researcher ensured that every participant was treated with respect and dignity.

Participants were also informed that the study was voluntary and no one will be discriminated because of their failure to participate. The researcher also assured the participants of their confidentiality and anonymity by informing them that they are not compelled to participate and that they could withdraw from the study at any particular time. The completed questionnaires were given identification numbers, rather than respondent names, to guarantee that the respondents got absolute confidentiality. The research objectives and questions were communicated to every participant in planning for the process of data collection, so that they were sufficiently conscious of what was required of their participation. The data obtained from participants was utilized solely for the purposes of the research and were not made accessible to third parties for any other purpose whatsoever.

CHAPTER FOUR

PRESENTATION, ANALYSIS AND DISCUSSION

4.1 INTRODUCTION

This research was undertaken to examine the role of Project Management Information System (PMIS) towards Project Success as a case study of Construction Projects in Ghana. The chapter four of this study however focuses on the background information of the respondents, the descriptive analysis, the regression analysis and the discussion of the findings. The study variables focus on the PMIS quality areas, PMIS information quality, Challenges of PMIS adoption and then Project success areas.

4.2 DEMOGRAPHIC ANALYSIS OF THE SAMPLE

The respondent's background information was conducted to ascertain the general information about those who participated in the data collection exercise. The main variables of the background information include sex, age, highest educational level, years of experience, years of using PMIS and rate of computer literacy. 67 respondents took part in the data collection exercise which was administered by the researcher. At the end of the data collection exercise, the researcher was able to retrieve 64 of the questionnaires distributed. Three (3) of the respondents were not available on the day of collection and all efforts to retrieve it proved futile as they had travelled. Hence, 64 questionnaires were monitored for analysis but only 60 of the questionnaires were free of errors and could be analyzed. Thus, these error free 60 data instruments collated constitutes 90% of the responses rate. The table 4.1 below summaries the general background information of the respondents who took part in the data collection exercise.

On the variable of gender, the data collected indicated that 70% of the respondents were males while 30% being females. This means that most of the respondents who took part were mainly males. On the respondents' age in the study, the analysis constituted 25% within the age group of 21-30, 45% for the age group of 31-40 years, 17% for 41-50 years age bracket and then 13% for those above 51 years. The implication of this analysis is that the usage of PMIS is dominated by comparable youth who could be noted to be adventurous in the adoption and usage of any technology in their place of work. Again, the researcher can also report that this age group is made up of active working force of any organization and therefore it is a good sign of a healthy working environment or enterprise.

On the highest education level attainment by the respondents, the responses generated which indicated 20% for HND qualification, 57% for those having Bachelor of Science background, 15% for those attaining Masters of Science level of education, 2% for a Doctor of Philosophy (PHD) and then 7% for those having other forms of qualification imply that all the level of educational background were captured by the researcher in the data collection exercise. Again, it also means that the area is dominated by those having first degree qualifications which thus indicate an elitism form of working force who are perceived to understand the nature of their working life and the organization they are engaged in.

Also in the years of experience within their occupational career in the construction industry, the respondents were tasked to assess themselves on a scale ranging from below 4 years, 4-8 years, 12-16 years and then above 16 years. The analysis carried out based on this range indicated that the respondents are having 7%, for those who have used the system for lesser than 4 years. Again, 32% reported to have used the System between 4-

8 years. While majority of the respondents constituting 45% reported to have been in the Construction Industry between 8-12 years, 13% and then 3% said to have used in the Sector for a period of 12-16 years and above 16 years respectively. This analysis means that majority of the respondents have had one form of experience or the other with the Construction Projects in the country. Thus the researcher can report that most of the respondents are experienced persons in their chosen field of work.

On the assertion of length of PMIS usage, the respondents were asked to assess themselves using a range of less than 5 years, 6-10 years and then above 10 years. The responses from this statement indicated that 8% said to have used PMIS less than 5 years. Also while 67% said to have experienced PMIS for a period between 6-10 years, 25% reported to have used the System for the period above 10 years. The analysis therefore shows that most of the respondents are noted to have advanced experienced with the usage of PMIS in the construction projects in the country.

Table 4.1: Background of the respondents

ITEMS		FREQUENCY	PERCENTAGE
Gender	Male	42	70
	Female	18	30
	Total	60	100
Age	21-30 years	15	25
	31-40 years	27	45
	41-50 years	10	17
	Over 51years	8	13
	Total	60	100
Highest Educational level	HND	12	20
	BSc	34	57
	MSc	9	15
	PHD	1	2
	Other	4	7
	Total	60	100
Years of Experience	Below 4 years	4	7
	4-8yrs	19	32
	8-12yrs	27	45
	12-16 years	8	13
	Above 16 years	2	3
	Total	60	100
Years of using PMIS	Less than 5 years	5	8
	6-10yrs	40	67
	Above 10 years	15	25
	Total	60	100
Rate of Computer Literacy	Basic	1	2
	Intermediate	10	17
	Advanced	49	82
	Total	60	100

Source: Fieldwork, 2018

The respondents were also assessed in the examination of their level of computer literacy at their field of work. The assessment was based on a scale of basic computer literacy, intermediate and then advanced form of literacy. The responses as shown in the table 4.1 below with 2% for basic form of literacy, 17% for intermediate and then 82% for advanced computer literacy is an indication of workers who possess the needed literacy which are essential for successful operation of PMIS in the construction industry.

Based on the foregoing, the researcher can conclude that as the success of PMIS usage depends on persons who possess computer literacy and who can also operate the System effectively as required, it is delightful that the majority of the respondents who took part in the data collection exercise constitutes persons who have experienced advanced knowledge level of computer in their respective level of working life. Thus as experience in a working life result in creativity and novelty (Aladwan et al., 2013), the researcher perceived that the resultant effect would be realized in the Construction Project in Ghana.

4.3 PMIS QUALITY AREAS

In order to assess the quality areas of PMIS, a descriptive analysis was undertaken by the researcher in the examination of the indicators selected for the assessment of the variable. Therefore, the indicators of PMIS quality areas namely ease of use (user friendly), ease of learning, accessibility, flexibility, system Integration (links more than one function tool) and multi-project capability and then security features (protecting vital information) were used in this direction. These indicators were assessed on a five-point scale ranging from 1-Very Poor; 2-Poor; 3- Good; 4- Very Good; 5-Excellent. Thus the respondents were asked to make their selection based on this scale on the items on the quality areas of PMIS. The responses as generated from the data collection are presented in the table 4.2 below:

Table 4.2: PMIS quality areas

Items	Min	Max	Mean	Std. Dev.	Observation
Ease of Use (user friendly)	2.00	5.00	4.84	1.22	60
Ease of Learning	2.00	5.00	5.00	0.76	60
Accessibility	3.00	5.00	4.72	0.82	60
Flexibility	3.00	5.00	4.30	1.21	60
System Integration (links more than one function tool)	3.00	5.00	5.00	0.92	60
Multi-project Capability	2.00	5.00	4.12	1.31	60
Security features (protecting vital information)	1.00	5.00	5.00	0.95	60

Source: Fieldwork, 2018

The researcher assess the PMIS quality areas using the 5-point scale ranging from 1-Very Poor; 2-Poor; 3- Good; 4- Very Good; 5-Excellent. On the indicator of ease of use (User Friendly), the mean value of 4.84 (SD 1.22), the minimum value of 2 and maximum value of 5 confirm to the assertion that there is an ease of use that is user friendly as one of the quality areas on PMIS usage. Also on the assertion of ease of learning as a quality of PMIS, the mean and standard deviation value of 5.00 (SD0.76) mean that the respondents agree that there is excellence ease learning on the quality of learning of PMIS. On the accessibility of the quality of PMIS, the response rate of 4.72 (SD 0.82) as mean and standard deviation respectively indicate that, generally, there is a very good mode of accessibility of the System usage. On the flexibility of the quality areas of the PMIS, the responses rate of mean and standard deviation values of 4.32 (SD1.21) indicate that there is a very good sense of flexibility of PMIS quality being used in Construction Project in Ghana. Also the quality of PMIS in the areas of System Integration (links more than one function tool) had mean and standard deviation values of 5.00 (SD 0.92) showing that there is in existence of an excellence system integration in the areas of PMIS component that make it possible for the system to link up more than one function

tool in its operations. The attached deviation also depicts that the responses generated are not far from each other. The responses generated on the multi-project capability assertion of the quality of PMIS came along with a mean and standard deviation of 4.12 (SD 1.31) indicating that the respondent agree that there is a very good multi-project capability of PMIS which is being used in the Construction Project in the country. The attached standard deviation however, shows that there is existence of variation in the responses that were provided by the respondents even though it does not negate the efficacy of the general responses that confirm the very good nature of the multi-project capability of the quality of PMIS. Finally, on the security features (protecting vital information) as a quality component of PMIS, the generated responses of the mean and standard deviation values of 5.00(SD 0.92) shows that PMIS has an excellent security features that make it possible for vital information to be protected. The attached deviation shows that the variations in the responses are not far from each other.

The researcher based on the above analysis conducted on the quality areas of PMIS can report that there is in existence a very good and robust PMIS which are user friendly, easier to learn how it is used, flexible, accessible, has the ability to be integrated with other system, capable of performing other project simultaneous and a presence of a highly secured configuration that protect its information content.

4.4 THE QUALITY OF PMIS INFORMATION

The quality of PMIS information was assessed using appropriate indicators that were selected for the data collection exercise. The indicators included availability (at disposal when needed), relevance (appropriate to the matter at hand), accuracy (correctness) and then reliability (sound and dependable). Availability (at disposal when needed). This assessment was carried out on a 5-point scale ranging from 1- Very Poor; 2-Poor; 3-

Good; 4- Very Good to 5-Excellent. On this, the respondents were asked to rate their responses on the of PMIS information output areas. The analysis generated is summarized in the table 4.3 below:

Table 4.3: Quality of Information output Areas

Items	Min	Max	Mean	Std. Dev.	Observation
Availability (at disposal when	1.00	5.00	4.84	0.35	60
Relevance(appropriate to the matter	3.00	5.00	4.85	0.70	60
Accuracy(Correctness)	3.00	5.00	4.92	0.82	60
Reliability(sound and dependable)	2.00	5.00	5.00	0.21	60
Comprehensiveness (Completeness	3.00	5.00	5.00	0.92	60

Source: Fieldwork, 2018

On the assertion, availability- that is its ability to be utilized whenever needed, the responses generated with the mean and standard deviation of 4.84 (SD 0.35) indicate that the respondents are in agreement that the availability of PMIS quality information output is excellently available whenever it is needed to be deployed. The attached deviation also shows the responses are not far from each other. Also on the relevance (appropriate to the matter at hand) of the PMIS information quality output, the mean and standard deviation values of 4.85 (SD 0.70) is an indication of an almost excellent output of information which are relevant to the situation at hand. The attached standard deviation also shows that the responses provided by the respondents were not far from each other. Also the respondents were asked to rate their responses on the accuracy or the correctness of the quality of PMIS information output areas using the same 5-point scale. On this a mean and a standard deviation values of 4.92 (SD 0.82) shows that there is excellent accurateness or correctness of the quality of information output that are derived from

PMIS used in the Construction Project in Ghana. The attached deviation shows that the variations in the responses given are also not far from each other.

On the reliability that is the sound and dependability of the quality of information output of PMIS, the respondents were asked to rate their responses using the scale provided. The analysis conducted with the results of 5 (SD 0.21) for the mean and the standard deviation respectively shows that the respondents agree that there is an excellent reliability of the PMIS information output. The responses thus show that information generated by PMIS is reliable and its soundness or dependability is undoubted within the Construction industry.

Finally, on the comprehensives that is the completeness over a broad scope of the information output of PMIS, the respondents rated their responses on the same 5-point scale stated. The analysis from the responses of a mean and a standard deviation of 5 (SD 0.92) shows that the respondents agree that information that are generated from PMIS covers a broad spectrum and therefore it excellent comprehensiveness is unquestionably excellent in the Construction Project sphere.

4.5 THE CHALLENGES OF PMIS ADOPTION IN THE CONSTRUCTION INDUSTRY IN GHANA

The respondents were tasked to rate their responses on the challenges militating against the PMIS adoption within the Construction Industry in Ghana using a 5-point scale ranging from 1-strongly disagree, 2-disagree, 3-neutral, 4-agree to 5-strongly agree. The analysis carried out after the data collection exercise is summarized in the table 4.4 below:

On the assertion that cost of equipment is hindrance to PMIS adoption in the country, the mean value of 4.20 (SD 0.11) shows that the respondents agree that the cost associated with PMIS equipment are on the high side. The attached deviation also shows that the variations in the responses are not far from each other which implies that the respondents perceived the costly nature of the PMIS equipment in the like manner.

Table 4.4: the Challenges of PMIS Adoption

Items	Min	Max	Mean	Std. Dev.	Observation
Cost of Equipment	1.00	5.00	4.20	0.11	60
Less training (inadequate training for staff to use the system)	3.00	5.00	4.05	0.62	60
Resistance to use PMIS because it adds another role of capturing data	1.00	5.00	3.41	2.24	60
Poor Internet connections	2.00	5.00	4.10	1.21	60
Lack of Management Support	3.00	5.00	4.61	0.42	60
System Failure	1.00	5	4.82	1.12	60

Source: Fieldwork, 2018

On the assertion of less training on the usage of PMIS that is inadequate training for staff to use the system, the mean and standard deviation of 4.05 (SD 0.62) shows that in essence, there is a limited training being provided to the staff on PMIS as indicated in the confirmation in the answer that was given by the respondents. Thus the responses show that there is a presence of inadequate training on PMIS for staff to use the system within the construction project in the country.

Also on the assertion that there are resistance to use PMIS due to it additional duty of capturing data, the responses generated and the analysis conducted with the mean and the standard deviation of 3.41 (SD 2.24) shows that the respondents were not certain on

whether there is a resistance to use PMIS as result of it additional role of capturing data. However, the attached deviation shows that there are many variations in the responses that were provided by the respondents.

Again the mean and standard deviation values of 4.10 (SD 1.21) on the statement of poor internet connection fighting against the usage of PMIS within the construction industry in Ghana shows that the respondents agree that internet connectivity is a hindrance to effective and efficient PMIS usage. The attached deviation indicates that there is somehow much variation in the responses provided by the respondent during the data collection exercise.

In furtherance to the analysis on the challenges of using PMIS, the respondents were requested to rate their responses on the support of management in using the PMIS, that is whether there is a lack of management support in the use of PMIS within their construction enterprise. On this the mean and standard deviation values of 4.61 (SD 0.42) shows that there is a confirmation that there is absence of management support to PMIS usage. The implication of this is that management of the institution into the construction hardly sees the essence of deploying PMIS in their activities and therefore do not give their subordinates the needed attention regarding the System usage.

On the statement of System failure hampering the usage of PMIS, the respondents were asked to rate their responses using the same 5-point scale mentioned earlier. On this, the mean and standard deviation value of 4.82 (SD 1.12) shows that the respondents agree to the presence of system failure as a factor fighting against the smooth usage of PMIS in the construction industry in Ghana.

The analysis carried out on the elements militating against PMIS adoption in Ghana have clearly indicated that high cost of PMIS equipment, absence of training to staff who are ready to adopt the System, poor internet connectivity, absence of management support and then system failure are hampering the adoption of the PMIS usage within the Construction Project in Ghana. The analysis also indicated that the respondents were not sure whether there is any resistance to use PMIS because it adds another role of capturing data in its deployment.

4.6 PROJECT SUCCESS AREAS

The project success areas were assessed using the appropriate indicators selected for the data collection exercise. The indicators used for the variable included Time (Meeting Deadlines), Budget (Respecting Budgets) and Quality (Meeting quality specifications). This assessment was carried out on a 5-point scale ranging from 1- Very Poor; 2-Poor; 3-Good; 4- Very Good to 5-Excellent. On this, the respondents were asked to rate their responses on the project success areas. The analysis generated is summarized in the table 4.5 below:

Table 4.5: The Project Success areas

Items	Min	Max	Mean	Std. Dev.	Observation
Time (Meeting Deadlines)	2.00	5.00	5.00	0.62	60
Budget (Respecting Budgets)	2.00	5.00	4.93	0.57	60
Quality (Meeting quality specifications)	3.00	5.00	4.78	0.38	60

Source: Fieldwork, 2018

On the assertion of time (meeting deadlines), the mean and standard deviation values of 5.00 (SD 0.62) shows that the respondents excellently agree to the ability of PMIS in helping to meet deadlines. Also the respondents strongly agree to the assertion of the success areas of PMIS project in terms of its ability of successfully helping in drawing up budgets and helping to stick to budget implementation. This is evident as the analysis of the responses generated mean and standard deviation of 4.93 (SD 0.57). The attached deviation shows that the variation in the responses is not far apart. On the ability of the PMIS to successfully meet the quality specification, the responses generated with the mean and the standard deviation values of 4.98 (SD 0.38) confirm to the respondents assumption that they excellently agree that PMIS project success is assured as it is able in helping users and clients in meeting the quality specification as stipulated in any construction project.

4.7 CORRELATION MATRIX

The researcher used the Pearson's correlation in assessing the association between the PMIS quality areas, quality information output and then the project success areas. In examining this aspect of the study, the researcher used a study by Kamasak (2011) and then Bhatti et al (2012), whose findings on the benchmark for correlation noted that correlation with low to reasonable correlated values within the explanatory variables are required for it to be qualified to be added to the model. And again, whenever the figures derived between the correlated variables of the descriptive values are more than 0.9, then, there is availability of a possible multicollinearity in the model which could therefore not be used for any meaningful analysis. From the foregoing, and based on the summarized correlated table 4.6 below, there is absence of any form of multicollinearity and therefore the correlated values are valid and could be used for further analysis.

Table 4.6: Correlation analysis

Variables	1	2	3	4
PMIS	1.00			
Project Success (Timing)	.141*	1.00		
Project Success (Budget)	.323*	.205**	. 1.00	
Project Success (Meeting Specification)	.302**	.310**	.364*	1.00*

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

Source: Fieldwork, 2018

The PMIS as an independent composite variable was tested on Project success areas as a dependable variable using its indicators namely time (meeting deadline), budget (respecting budgets) and quality (meeting quality specifications). This was carried out in examining out the linkage between the independent and the dependent variable. As shown in the table 4.7 above, PMIS correlated significantly and positively ($\beta = 0.141$; $p \leq 0.05$) with project success timing factor. Again, the analysis also indicated that there is a positive and significant relationship between PMIS and its nature of budgeting ($\beta = 0.323$; $p \leq 0.05$). Also there exist a positive and significant relationship between PMIS and its quality nature of meeting specification ($\beta = 0.302$; $p \leq 0.05$). This analysis shows that adoption of PMIS within the construction industry is able to influence a positive impact on the success of project pursued.

4.8 REGRESSION ANALYSIS

4.8.1 The Effect of PMIS on Project Success

A regression analysis was conducted using PMIS as an independent variable on Project Success areas as the dependent variable within the Construction industry in Ghana. The result of the analysis is shown in the table 4.7 below. The result of this analysis is an

indication that PMIS adoption and its proper implementation has the potential in bringing about enhanced and better project success in terms of meeting deadlines, adhering to budget and meeting the quality specification as required.

The indicators of project success namely time, budget and quality focused on asking the respondents to indicate how PMIS is able to ensure success of project within the Construction industry using this benchmark. The analysis from the result indicates that time, budget, and quality are significantly related with PMIS at the 1% level.

Table 4.7: Regression on the Effect of PMIS on Project Success

Variable	Coefficient	Stan err	t	Sig
(Constant)	3.12010	0.31202	6.24	0.00
Time	0.2800	0.111	4.00	0.003
Budget	0.1463	0.113	1.02	0.004
Quality	0.1569	0.105	1.10	0.007
Model fit				
R	0.21			
R ²	0.12			
Adjusted R ²	0.08			

Source: Fieldwork, 2018

As indicated in the table 4.8 above, assessment of the t statistics for the constant and the indicators namely time, budget and quality which are used as variables for ensuring project success within the Construction project as a result of the adoption of PMIS, the displayed estimated regression indicated that likely coefficient for constants, time, budget and quality are statistically significant at 1% level (as p value < 0.01). This indicates that PMIS have positive effect on project success. Again, the probable constant of correlation (R = 0.21) also indicated that a realistic linear correlation between Time,

Budget and Quality. The probable coefficient of determination, R^2 was 0.12 implied that a 12% differences of project success (dependent variable) is explainable through the differences or the variance of PMIS adoption (independent variables) within the Construction Project in Ghana. In conclusion, the positive relationship existing between Time, Budget and Quality as indicators of project success with PMIS show that a higher practices of a targeted level that are set for project success within the Construction Project in Ghana are likely able to result in a better and improved project success.

4.9 DISCUSSION

This research was undertaken to examine the role of Project Management Information System (PMIS) towards Project Success as a case study of Construction Projects in Ghana. The study focused on the PMIS quality areas, PMIS information quality, Challenges of PMIS adoption and then Project success areas. The study reported of male dominated field of construction sector. Also the study indicated that the usage of PMIS is mostly used by active working force who could be seen to be in their mid-working life in their place of work. Again, the researcher can also report that this age group is made up of active working force of any organization and therefore it is a good sign of a healthy working environment or enterprise. The study also indicated that the usage of PMIS is dominated by those having a first degree qualification which thus indicate an elitism form of working force who are also noted to be experienced persons in their chosen field of work with advanced PMIS usage experiences which has been made possible by the advanced computer literacy being possessed.

4.9.1 PMIS Quality Areas

This part of the study was to assess the quality areas of PMIS. This was undertaken as way of measuring the user friendliness, ease of learning, accessibility, flexibility, system integration, multi-project capability and then security features of component of PMIS. This was used as a measure to test the quality of PMIS (Jung et al., 2011). The study reported of a presence of an existence of a very good and robust PMIS which are user friendly, easier to learn, flexible, accessible, an integrated information system, capable of performing other project simultaneous and a presence of a highly secured configuration that protect its information content.

This finding is in line with earlier findings by Borstnar and Pucihar (2014) who indicated that the PMIS possess a system of integrated information, user easily accessible, protected information and essential information back up for project management. The result of the study again corroborates. The study also confirms the quality of PMIS areas as shown in the study of Pellerina, (2013); Kahura, (2013), Raymond and Bergeron, (2008) and then Obeidat and Aldulaimi, (2016) which indicated that PMIS has user friendly interface, a multipurpose project capability, a flexible and an excellent significant tool which allow users to locate tools on the interface and also permit data from various projects to be merged so that multi project analysis can be done. The implication of this result is that PMIS has the ability to be adaptable to changes and configured so as to encourage the user to create fresh applications or modify current ones relying on the requirements of the organization.

Again, the study is in corroboration with Borstnar and Pucihar (2014) and Caniëls and Bakens (2011), Kahura (2013) who said that the presence of ease of use of a system, accessibility and security features, ease to learn is a critical measure of component

needed to assess the quality of PMIS. The extent of information quality produced by an information system is a significant factor of user satisfaction for the usage of PMIS (Kombe, 2015). Thus the presence of these constructs within PMIS signifies the qualities which are needed for a successful Construction project in Ghana.

4.9.2 The Quality of PMIS Information

The quality of PMIS information was assessed using appropriate indicators that were selected for the study. This was carried out so as to measure the availability, the relevance, accuracy and then soundness and dependability of the quality information of PMIS output. The findings have indicated that the quality of information churned out by PMIS is excellently available at any material time, relevant, accurate and reliable. Thus, there is excellent accurateness or correctness of the quality of information output that are derived from PMIS used in the Construction Project in Ghana.

The study therefore means that information generated by PMIS is reliable and its soundness or dependability is undoubted within the Construction industry. In addition to this, the findings indicated that, that information that are generated from PMIS covers a broad spectrum and therefore its excellent comprehensiveness is unquestionably optimum in the Construction Project sphere. These findings from the study are in support of Pellerina (2013), who reported that information that are derived from any project management programs within this modern organizational set up must be accurate, swift, and efficient so as to be able to adopt for making sound decision needed for the growth and sustenance of organization.

PMIS has therefore become widely known project management tool and an important building block in project management due to the nature of the quality information produced thus making it an essential instrument of ensuring the efficiency, effectiveness, and performance of construction projects (Kahura, 2013). The findings therefore support the study of Li et al. (2015) who suggested that PMIS has effects on project management and is seen currently as an inseparable part of any project.

Thus, as shown in the study of Kahura (2013), PMIS information quality output is seen in the area of its availability, reliability, relevancy, accuracy, and comprehensiveness. The researcher therefore says that due to the fact that many studies have shown that the significance of high quality information is a facilitator or driving force towards the success of project management (Nitithamyong and Skibniewski, 2006; Kahura, 2013; Obeidat and Aldulaimi, 2016), effort must be put in place to ensure high quality of PMIS information within the Construction Industry.

4.9.3 The Challenges of PMIS Adoption in the Construction Industry in Ghana

The study assessed the challenges militating against the PMIS adoption within the Construction Industry. The results of the study have been that there is existence of high cost of equipment associated with adoption of PMIS, a presence of inadequate training on PMIS for staff to use the system within the construction project in the country and then the management of the institution into the construction hardly see the essence of deploying PMIS in their activities and therefore do not give their subordinates the needed attention regarding the System usage. This finding is in support of earlier findings by Stewart and Mohamed (2004) and then Jung et al. (2004) who disclosed that the cost of the equipment that is the cost of upgrading software for smooth operations in order to

attain the objectives are deemed to be a factor hindering many organizations in deploying PMIS in their set ups. The study also supports the findings of Obeidat and Aldulaimi (2016) who indicated that training of the personnel can also become an issue when adopting PMIS in an organization. The study also corroborated with the study of Karim (2011) who identified lack of management support, system failures and poor internet connections in using web-based as a factors against the adoption of PMIS.

Based on these aforementioned challenges, the researcher calls for support in terms of adequate resources to be directed to project management especially in the purchased and training of staff as it is essential for the organization to train their project team managers and members so that they could efficiently use the System in their respective working in the construction project for project success.

4.9.4 The Effect of PMIS on Project Success

Time that is meeting deadlines, budget and meeting quality specifications were deemed as critical elements in assessing the project success areas of PMIS adoption in Ghana. These elements were indicators used to measure the success of PMIS project or otherwise within the Construction Project. The project success based on the adoption of PMIS have shown as indicated in the study, that the quality of PMIS and its information output is able to effectively alter the ability of PMIS in ensuring success of construction project, that is PMIS is able to excellently help users and clients in meeting the quality specification as stipulated in any construction project. That is, PMIS adoption and its proper implementation has the potential in bringing about enhanced and better project success in terms of meeting deadlines, adhering to budget and meeting the quality specification as required.

The study indicated that time, budget, and quality are significantly related with PMIS at the 1% level. The study also confirms an existence of a significant and positive relationship between PMIS and project success as well as quality decision making (Yeganegi and Safaeian, 2012).

The findings indicated that PMIS have positive effect on project success as 12% variance of project success is explainable by the variance of PMIS adoption within the Construction Project in Ghana. The existence of this significant relationship between PMIS and overall project success, where the success is able to integrate all these outcomes of project management from cost to timeliness is a healthy outcome for the adoption and development of the Construction Industry in Ghana. This finding therefore support the earlier studies of Choudhury (2014), who said that PMIS has become a critical tool to help manage the timeline and success rate of projects. Again, the finding is in support of Caniëls and Bakens (2011) who indicated that PMIS assist in planning, executing and budget such as cost estimations and also in creating a particular schedule and specifying the baseline of the scope.

The results of this study are also in support of (PMI, 2010; Dvir et al., 2003; Fageha and Aibinu, 2013; Turner et al., 2012) whose findings said that among other things time, budget and quality as essential objective for success of any project as these are seen as the benchmark for measuring the success of a project.

Based on the above findings, and as a result of the quality of information produced by usage of PMIS, tasks undertaken are more productive because the PMIS tools are able to provide multi task functions (Obeidat and Aldulaimi (2016) which therefore support project managers to attain higher project success regarding time, budget and quality (Nitithamyong and Skibniewski (2006). The researcher in support of Kombe (2015)

perceives that project success would be highly being achievable whenever project managers stay within the project timeline, budget and specifications of quality and this is accomplished through the use of the PMIS by the project manager to carry out tasks. Therefore, to ensure success of PMI implementation, and in corroboration with Syuki and Ombui (2018), Construction Firms must invest resources into PMIS to support project managers and project team in managing and executing effectively.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 INTRODUCTION

The chapter five of this study focuses on the summary, conclusion and the recommendation of the study. The chapter is based on the summary of the study that covers the first chapter to the analysis of the data collected and analysis.

5.2 SUMMARY OF THE FINDINGS

This section of the study focuses on the summaries of the findings generated from the study based on the PMIS quality areas, quality of PMIS information output, the challenges of PMIS adoption and then the effects of PMIS adoption on project success areas. Even though every implementation of PMIS varies from others with regards to design, features and scope, PMIS applications are seen as necessary component in the Construction project. The optimal use of a PMIS therefore relies hugely on the way in which useful information is made accessible to every stakeholder and the level of activities which have been automated.

5.2.1 PMIS quality areas

This part of the study was to assess the quality areas of PMIS. This was undertaken as way of measuring the user friendliness, ease of learning, accessibility, flexibility, system integration, multi-project capability and then security features of component of PMIS. The study reported an existence of a very good and robust PMIS which are user friendly, easier to learn how it is used, flexible, accessible, has the ability to be integrated with other system, capable of performing other project simultaneous and a presence of a highly secured configuration that protect its information content. It usage is therefore

considered to be beneficial since it gives accurate and relevant information that may be needed in the daily managing of the project.

5.2.2 The Quality of PMIS Information Output

The findings have indicated that the quality of information churned out by PMIS is excellently available at any material time, relevant, accurate and reliable. Thus, there is excellent accurateness or correctness of the quality of information output that are derived from PMIS used in the Construction Project in Ghana. The study therefore means that information generated by PMIS are reliable and its soundness or dependability is undoubted within the Construction industry. In addition to this, the findings indicated that, that information that are generated from PMIS covers a broad spectrum and therefore its excellent comprehensiveness is unquestionably optimum in the Construction Project sphere. The finding therefore implies that there is a need to ensure that organization operate and utilize accurate, swift, and efficient information in order to be able to take sound decision which are considered as essential for the development of the Construction Industry in Ghana. PMIS is now popular as a result of its ability of serving as a vital component of producing an efficient and effective project management module. Thus PMIS quality information output provide the required information at various stages of decision making which broadly help the organization to achieve its goals and objectives.

5.2.3 The challenges of PMIS adoption in the Construction Industry in Ghana

The study undertaken have shown that the elements militating against PMIS adoption in Ghana included high cost of PMIS equipment, absence of training to staff who are ready to adopt the System, poor internet connectivity, absence of management support and then

system failure are hampering the adoption of the PMIS usage within the Construction Project in Ghana. The study however, could not verify whether there is any resistance to use PMIS because it adds another role of capturing data in its deployment.

5.2.4 The effect of PMIS adoption on Project Success

Time, budget and meeting quality specifications are considered as critical elements in assessing the project success areas of PMIS adoption in Ghana. These elements measure the success of PMIS project or otherwise within the Construction Project. The study indicated that PMIS is able to excellently help users and clients in meeting the quality specification as stipulated in any construction project, that is PMIS adoption and its proper implementation, has the potential in bringing about enhanced and better project success in terms of meeting deadlines, adhering to budget and meeting the quality specification.

The study indicated that time, budget, and quality are significantly related with PMIS and have positive effect on project success within the Construction Project in Ghana. The study also confirms an existence of a significant and positive relationship between PMIS and project success as well as quality decision making. This significant relationship between PMIS ensures overall project success, where the success is able to integrate all these outcomes of project management from cost to timeliness is a healthy outcome for the adoption and development of the Construction Industry in Ghana. Construction Firms must therefore invest resources into PMIS to support project managers and project team in managing and executing projects effectively.

5.3 CONCLUSION

The study was embarked upon to assess Role of PMIS on Construction Projects Success in Ghana. The study focuses on the PMIS quality areas, the quality of PMIS information output, the challenges of PMIS adoption and the effect of PMIS on project success. The study concludes on a PMIS which is user friendly, easy to learn, flexible, accessible, ability to be integrated with other system, multipurpose project capability and a highly secured configuration that protect its information content. The findings of the study have been that that the quality of information churned out by PMIS is excellently available at any material time, relevant, accurate and reliable. The study conclude that information generated by PMIS are reliable, comprehensive and therefore there is a need to ensure that organization operate and utilize accurate, swift, and efficient information in order to be able to take sound decision which are considered as essential for the development of the Construction Industry in Ghana. The study also indicated that the elements militating against PMIS adoption in Ghana included high cost of PMIS equipment, absence of training to staff who are ready to adopt the System, poor internet connectivity, absence of management support and then system failure are hampering the adoption of the PMIS usage within the Construction Project in Ghana. Also the study found out that time, budget, and quality are significantly related with PMIS and have positive effect on project success within the Construction Project in Ghana. The study also confirms an existence of a significant and positive relationship between PMIS and project success as well as quality decision making. This significant relationship between PMIS ensures overall project success as it is able to successfully integrate all time, budget and scope into an improved project development from cost to timeliness in a healthy outcome for the adoption and development of the Construction Industry in Ghana.

5.4 RECOMMENDATION

Based on the findings from the study, the researcher recommends that organizations when choosing PMIS to manage projects must evaluate and consider the ease of use and ease of learning of the application. Therefore, PMIS adopted by organizations must give project team members useful information that can be utilized to make decisions by storing, maintaining, handling and managing the information resources.

Based on the fact that quite often project manager becomes worried due to absence of efficient and effective PMIS, which is largely due to wrong configuration culminating in a loss of return of investment, the researcher recommend that as the quality of PMIS is tried and tested, appropriate technique should be employed by management of the construction project to effectively configure their PMIS application so that it can provided them with the needed benefits or there should be proper deployment of PMIS into the project management in the construction firms.

The researcher recommended that organization must attach experts to the PMIS maintenance as without these experts, utilizing the PMIS will be a problem for users since errors will go unresolved and this will lead to inefficiencies in managing tasks in project management.

The researcher based on the findings from the study recommend that management of the Construction Project should endeavour to show commitment to get the system running in terms of providing funds and incorporate it fully into the operations of the organization for it produce the best desire results in the Industry.

5.5 SUGGESTION AREA

This study, focus on the impact of PMIS have on constructions project success in Ghana.

It is recommended that further research would be conducted to investigate into the technical aspect of the system adopted by the various construction firms.

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APPENDIX
QUESTIONNAIRE
KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,
KUMASI, GHANA

**Assessing the Role of Project Management Information System (Pmis) On
Construction Projects Success in Ghana**

Dear Sir/Madam,

This questionnaire is part of a study that is being conducted by David Osafo Boateng, a student of KNUST. This study is being conducted to assess the role of Project Management Information System (PMIS) towards Project Success in construction projects in Ghana.

All information collected will be kept confidential and used for academic purposes only. We would be thankful if you could answer this questionnaire to aid this study.

Thank you!

Yours faithfully,

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SECTION A: DEMOGRAPHIC BACKGROUND OF RESPONDENTS

This section seeks to identify some basic information about the participants of the study.

Please, kindly respond to the questions by ticking (✓) the appropriate box for each item.

1. Gender ☐ Male ☐ Female
2. Age: ☐ 21- 30years ☐ 31-40 years ☐ 41 – 50years ☐ Over 51 years
3. Highest level of education: ☐ HND ☐ BSc ☐ MSc ☐ PhD ☐
Other
4. Years of experience: ☐ Less than 4 years ☐ 4-8 years ☐ 8-12 years ☐ 12-16 years
☐ Above 16 years
5. How long have you being using PMIS: ☐ Less than 5 years ☐ 6-10 years
☐ Above 10 years
6. Where can you rate yourself in computing skills ☐ Basic ☐ Intermediate
☐ Advanced

SECTION B: ASSESSING PMIS QUALITY

Kindly, indicate the level of rating of each of the following areas regarding PMIS quality being used in managing construction projects in Ghana.

[1= Very Poor; 2=Poor; 3= Good; 4= Very Good; 5= Excellent]. Please tick (✓) in the space provided.

	Quality Areas	1	2	3	4	5
7	Response Time (Time it takes to respond to a given command)	☐	☐	☐	☐	☐
8	Ease of Use (user friendly)	☐	☐	☐	☐	☐
9	Ease of Learning	☐	☐	☐	☐	☐
10	Accessibility	☐	☐	☐	☐	☐
11	Flexibility	☐	☐	☐	☐	☐
12	System Integration (links more than one function tool)	☐	☐	☐	☐	☐
13	Multi-project Capability	☐	☐	☐	☐	☐
14	Security features (protecting vital information)	☐	☐	☐	☐	☐

SECTION C: MEASUREMENT OF THE QUALITY OF PMIS INFORMATION

Kindly, indicate the level of rating of each of the following areas regarding the quality of information produced by PMIS.

[1= Very Poor; 2= Poor; 3= Good; 4= Very Good; 5= Excellent]. Please tick (✓) in the space provided.

	Quality of Information output Areas	1	2	3	4	5
15	Availability (at disposal when needed)	☐	☐	☐	☐	☐
16	Relevance (appropriate to the matter at hand)	☐	☐	☐	☐	☐
17	Accuracy (Correctness)	☐	☐	☐	☐	☐
18	Reliability (sound and dependable)	☐	☐	☐	☐	☐
19	Comprehensiveness (Completeness over a broad scope)	☐	☐	☐	☐	☐

SECTION D: CHALLENGES PMIS ADOPTION

Kindly, indicate the level of agreement of each of the following challenges associated with PMIS adoption in Ghana.

[1= Strongly Disagree; 2= Disagree; 3= Neutral; 4= Agree; 5= Strongly Agree]. Please tick (✓) in the space provided.

	Categories of Challenges	1	2	3	4	5
20	Cost of Equipment	☐	☐	☐	☐	☐
21	Less training (inadequate training for staff to use the system)	☐	☐	☐	☐	☐
22	Resistance to use PMIS because it adds another role of capturing data into the system	☐	☐	☐	☐	☐
23	Poor Internet connections	☐	☐	☐	☐	☐
24	Lack of Management Support	☐	☐	☐	☐	☐
25	System Failure	☐	☐	☐	☐	☐

SECTION E: EFFECT OF PMIS ON PROJECT SUCCESS

Kindly, indicate the level of rating on the contribution of PMIS on project success using the following areas.

[1= Very Poor; 2=Poor; 3= Good; 4= Very Good; 5= Excellent]. Please tick (✓) in the space provided.

	Project Success Areas	1	2	3	4	5
26	Time (Meeting Deadlines)	[]	[]	[]	[]	[]
27	Budget (Respecting Budgets)	[]	[]	[]	[]	[]
28	Quality (Meeting quality specifications)	[]	[]	[]	[]	[]