Adoption Of Web-Based Project Management System In The Ghanaian Construction Industry

by

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DECLARATION

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree at Kwame Nkrumah University of Science and Technology, Kumasi or any other educational institution, except where due acknowledgement is made in the thesis.

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ABSTRACT

Web-based project management system is used in so many advanced countries in managing construction project information and document and can be used as a communication tool between team members in a project. The use of this system has improved productivity in these countries. The aim of this research is to investigate the factors that facilitate the adoption of web-based project management systems in the construction industry. The objectives were to identify the factors that facilitate the adoption of web-based project management system in the construction industry and to identify the level of impact of the identified factors to the individual's behavioural intention in adopting web-based project management system. The constructs in the Unified Theory of Acceptance and Use of Technology (UTAUT) 2 model were used and modified with identified factors in Ghana. The study was conducted in the Sunyani Municipal in the Bono Region and the Kumasi Metropolis in the Ashanti Region. The purposive and snowball sampling technique were used in the selection of the respondents. This sampling technique ensured that professionals who are engaged in managing construction projects and its related issues are selected. Data was collected using a questionnaire survey and was analysed using SPSS by using the following tool; Descriptive Statistic, Ranking and Multiple linear regression to analyse the outcome of the data. The study uncovered various factors that facilitate an individual's intention to adopt web-based project management system and other new technologies. Respondents identified performance expectancy of the system, culture of adopting technology both on the part of the individual and the firm or company he/she works at, effort expectancy of the system, internet reliability, facilitating condition, habit, hedonic motivation and social influence to be the factors that facilitate the adoption of web-based project management system in the construction industry. It came to light that when these constructs or factors are analysed individually most of these constructs appear to be very significant with a good p-value but when analysed collectively a few become significant and have a better beta value and t- value. Most of the hypothesis proposed earlier was proven and some were nullified. However, the study could not exhaust all the factors using other accepted models as well as benefits and challenges of web-based project management system. Also, the study covered only a small part of the construction industry and therefore proposed further studies into other regions**.**

Keywords: Web-based project management system, Unified Theory of Acceptance and Use of Technology (UTAUT)

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LIST OF ABBREVIATIONS

WPMS	-	Web based Project Management System
UTAUT	-	Unified Theory of Acceptance and Use of Technology
TAM	-	Technology Acceptance Model
SME	-	Small and Medium sized Enterprise

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DEDICATION

I dedicate this work to my family for their motivation, support and deepest love.

CHAPTER ONE
INTRODUCTION

1.1 OVERVIEW OF CHAPTER

This chapter gives an overview of the research which seeks to present the research starting with the background of the study, addressing and highlighting the main problems under examination in the problem statement. This will be followed by the aim and objectives of the research, then the vital research questions which will serve as a guide for the inquiry. It will be continued by justifying the significance of the study and giving the scope of this research study which will be guided by the main aim and objectives of the study. Subsequently, a summary of the research methodology adopted. This will end with highlights of the organization of the research.

1.2 BACKGROUND OF STUDY

Construction projects were being managed years ago during the Egyptian and Hebrew era, before various institutes of project management and also updated knowledge books and guides came into being. This also paved the way for various web technologies and management systems to be created to improve project management. Examples of these iconic old project include the Great Wall of China, Coliseums, the pyramids of Giza etc. From the examples given, it can be concluded that construction project management has been in existence for long. However, according to Kwak (2005), the utilization of standardized tools and techniques in managing complicated projects started about half a century ago.

According to Seymour and Hussein (2014), the United State Navy has contributed largely to the assembling and documenting of fundamental and regulating of modern management of projects

with its various procedures. He continued that the Manhattan project has undoubtedly made a huge impact in upgrading or improving standard practices in managing modern projects. This gave way to smaller companies who could afford personal computers during the 1980s to use the computers for managing various projects including construction projects.

Kozak (2011) also argues that the history of managing a project successfully is not a 20th-century discipline. For all these construction projects to be successful, various engineers had to act as project managers, brainstorm about the project starting from the initial phase through to the execution, monitoring, controlling and closing of the project. Communication is a key component during all these stages in the project. Each project team member must be updated on the project and this comes with proper communication. This helps to prevent misunderstanding that may occur during the execution of works. A constant supply of updated information helps to sustain the project and keep it on track.

Improvement and acceptance of project management have gone through several adjustments over the past forty (40) years, which has led to the modern project management practised now and it is expected to continue for all the years to come (Kerzner 2017).

Due to the accelerated growth of Information Technology (IT) and globalization, interest in solutions to solve project management problems have been in constant demand throughout every construction project because of various constraints in the scope, cost and time of construction projects. Managing a project in the construction sector mostly consists of sequences of tasks combined to form a process of continuous elaboration by continuous working with project team members to successfully reach project schedule, cost and technical performance objectives (Chitkara 1998). To achieve the project goal and objectives, there must be a detailed plan drawn for the project. This includes well-quantified resources, estimated budgets and adequate timelines

for various tasked in the project. For the detailed plan to be communicated and managed properly, there is the need to introduce web-based construction project management technologies (Alshawi and Ingirige 2003).

The construction industry plays a massive role in the improvement of infrastructure in every country. The construction process itself is complex by nature, typically buildings constructed on made-up grounds. The responsibilities of the client, architect, various engineers, contractor and subcontractor rely on the efficiency, accuracy and timeliness of information provided which will lead to a successful project. Responsibilities given to team members requires intensive project management techniques and skills to be executed successfully.

Web-based technology and management systems for construction projects was introduced in the mid-1990s and have gained ample attention in the construction industry with many professionals expecting it to revolutionize how business is conducted in the industry (Nitithamyong and Skibniewski 2011). It has so many diversities in managing all types of projects. A web-based construction project management system is simply programmed to manage and store all construction project information from the initiation stage to the completion stage (Alshawi and Ingirige 2003). These pieces of information are used in web-based applications by the various project members. These applications include communication applications, progress reports applications, management applications etc. Many companies have applied these applications to their work especially the construction companies and the consultancy firms due to the variety of project management systems and its advantages to the various users. The web-based project management system consists of the basic type and the advanced type (Nitithamyong and Skibniewski 2011). Their study continues that the basic type is mostly aimed at supporting various project collaboration and sharing of information among project participants whiles the advanced

web-based project management system boost users of the system in gathering information such as permits, cost data, economic trends and online business operations. Service providers offer all the computing power, network infrastructure, security, power, storage, backup. They also have the technical staff to manage the various platforms. It is very costly for companies that do not have in-house knowledge but are very helpful for companies with in-house skills because of the systems technicalities and know-how to function.

Improvement in project implementing performance has been noticed based on the idiosyncratic nature of web-based construction project management system. This is such because web-based project management system enables the project manager or any user to monitor the status or the success of the project at any time and from any geographical location and also the user can identify problems that may occur later. This enables the project manager or any user to solve the problem ahead or avoid it from happening in the first place. Aadamsoo (2010) therefore makes a point that due to web-based project management, there can be an enhancement in a company's performance.

1.3 PROBLEM STATEMENT

From the information given in the background of this study, it is palpable that the importance and emerging roles of web-based construction project management system cannot be overlooked for the success of a project. As conveyed by Anumba and Ruikar (2002), the flow of information and communication using the traditional system in the construction industry mostly lead to a slow process. This is constituted with the production of numerous copies of documents and drawings, expenses to be incurred for the delivery of project documents to project members who are geographically not closer to the firm and the reliance on delivery servicing companies to deliver

various documents. The introduction of the web-based project management system can help avoid all these issues.

It is obvious that in this century the construction industry is broken down into many levels because of the involvement of stakeholders, scrutinizers and phases involved in the process of construction (Fox 2003). He continued that it has led to problems in communication between parties involved and has contributed to the generation of antagonistic relationships between the parties of a particular project. According to Chassiakos et al. (2008), one of the most important elements in interaction or communication is how pieces of information are processed and transferred and this adds to the determinant factors for the efficiency of human resource cooperation in the industry. He continued that effective communication among various parties i.e contractor, client and consultants is the third most important factor for a successful project. Force and Britain (1998) concluded that adequate management of information is a fundamental mechanism for the increase of productivity in the construction industry. Absence of this serves as one of the major factors for poor productivity in the construction sector (Cheung et al. 2004).

Project management is one of the major issues in the construction industry in Ghana. There has been the need to create transparency and efficient use of available resources. The use of technology in the construction industry has become very relevant in the day to day processes on the field. This has given rise to various types of construction procedures and fabrication of various impossible projects.

Project managers can increase their efficiency and productivity by employing web-based project management system for construction projects in their day to day management of their construction business for integration, collaboration, management of knowledge, procurement, management of the site and improvement in its process (Sarshar and Isikdag, 2004).

This has encouraged most of construction industry in other countries to adopt various technological system to minimize the limitation of the traditional system. This system includes Web based Project Management System. This is used by most firms and have recorded significant increase in their job performance.

Besides all these advantages of using web-based project management system in the construction industry, it has been noted by Mak (2001) that most construction firms still lack the use of Information and Communication Technology (ICT) in their core business processes. This is because of computer illiteracy and inadequate knowledge of ICT by professionals in the various firms (Samuelson, 2002). Besides this, there is an Advanced Construction Technology System (ACTS) which is a computerized database system for classification, documentation, storage and retrieval of information about upcoming or emerging construction technologies (Ioannou and Liu 1993).

However, in the construction sector, there are a lot of Small and Medium sized Enterprise (SME's) who think that the online world is strange, difficult or complex and thus will have more difficulty if they adapt to this world, but it will surprise you that they can make lots of profit from a tool like the internet that can help them manage their small business without incurring unnecessary cost (Nitithamyong and Skibniewski 2004).

Web-based systems have been linked with construction management systems to produce a web-based project management system, which is used to manage all types of construction project. These systems include the use of the internet, extranet and most importantly the use of Information Technology (IT). Cheung et al. (2004) made it clear that IT is now widely used in the construction industry as a tool to reduce most of the fragmentation problems caused in the industry.

While this situation could probably be true for the construction industry in Ghana, specific details regarding the extent of application and problems facing the use of web-based project management system in the Ghanaian construction industry still remain unclear. This study seeks to investigate the factors that facilitate the adoption of web-based project management system in construction firms in Ghana.

1.4 AIM

This research aims to investigate the factors that facilitate the adoption of web-based project management systems in the construction industry.

1.5 OBJECTIVES

The following objectives are set to achieve the aim of the study;

1. To identify the factors that facilitate web-based project management system adoption in the construction industry.
2. To identify the level of impact of the identified factors on the adoption of web-based project management system in the construction industry

1.6 RESEARCH QUESTIONS

The study will seek to find answers to the following relevant questions in other to help achieve the objectives.

1. What are the factors that facilitate web-based project management system adoption among construction professionals in the construction industry?
2. What is the level of impact of the identified factors on the adoption of web-based project management system in the construction industry?

1.7 RESEARCH METHODOLOGY

The study depended on the positivist approach and epistemology to direct the data collection, analysis and interpretation of the findings that dealt with the aim and objectives.

The research study took a quantitative approach. The quantitative approach measured the data collected by using numerical values which led to the determination of frequencies of occurrence. The quantitative data were analysed by employing statistical processes. The themes were subjected to further analysis to determine the frequencies of occurrences for the purposes of validating or expanding the findings of the survey.

Furthermore, this strategy helped in obtaining the level of impact of the identified factors that facilitate the adoption of web-based project management system in the construction industry. This was affirmed by Cresswell, (2003). He explained that a quantitative strategy involves approving a post-positivist claim in an investigation that helps develop knowledge and explore relationships among variables in terms of accuracy, reliability and removal of bias.

Purposive and snowball sampling method which are non-probabilistic sampling methods were adopted and this choice helped the researcher choose respondents who are willing to give information by merit and provide answers in the field of study (Tongco, 2007). The target group

were professionals working in government agencies, consultancy firms and construction companies involved in the construction process.

A structured survey questionnaire was used in collecting data for the research. The design of the structured survey questionnaire was dependent on the variables obtained from the literature and the objectives of the study. Questionnaires administered to respondents were in the form of close-ended questions. The questionnaire was in two parts, the first part comprising of demographic information and the second part assessing each specific objective.

Analysis of the collected data was conducted using the mean score to rank the factors. The multiple regression analysis tool was used to aid the researcher to identify the level of impact of the identified factors that facilitate the adoption of web-based project management system in the construction industry. The analysis was conducted with the aid of the Statistical Package for Social Sciences version twenty (SPSS v 20).

1.8 SCOPE OF THE STUDY

This study was aimed at investigating factors that facilitate the adoption of web-based project management system in the construction industry. The survey considered experts from the Department of Urban Roads, Ghana Highways, Department of Feeder Roads, Architectural and Engineering Services Limited and various contractors in Sunyani (Bono Region) and Kumasi (Ashanti Region). Data for the study was taken from academic journals, books, reports and publications from reputable international organisations around the world and the internet.

1.9 SIGNIFICANCE OF STUDY

Findings of this study have significant practical suggestions for the related field of study. This can be implemented as a means of eradicating various errors and avoidable mistakes in the construction industry and improve the flow of information and dependable communication. First of all, this research investigated the factors that facilitate the adoption of web-based project management systems in the construction industry, because of its advantages over the traditional system of handling documents and communication in the construction industry and continued with identifying the level of impact of each of the factors to the adoption of web-based project management system among construction professionals in the industry. At the end of the research, awareness was created to enable most professionals in the construction industry to have more knowledge about the various systems available and how it can help in their management cycle to improve efficiency in their working environs.

1.10 STRUCTURE OF THE STUDY

The study has been divided into five main chapters. Chapter one entails the introduction, which includes a general overview, a background to study, problem statement, aim and objectives, the scope of the study, research methodology, significance of the study and structure of the study. Chapter two brings together, the review of journals, works, articles and books, previously undertaken by different authors on the topic under study. Chapter three, which provides into detail the research methodology adopted and provide a discussion on the data analytical tools. Chapter four presents an analysis of data and discussion of the data collected from a field survey that

answers the research objectives and, then finally, Chapter five provides the concluding and recommendation part for the study

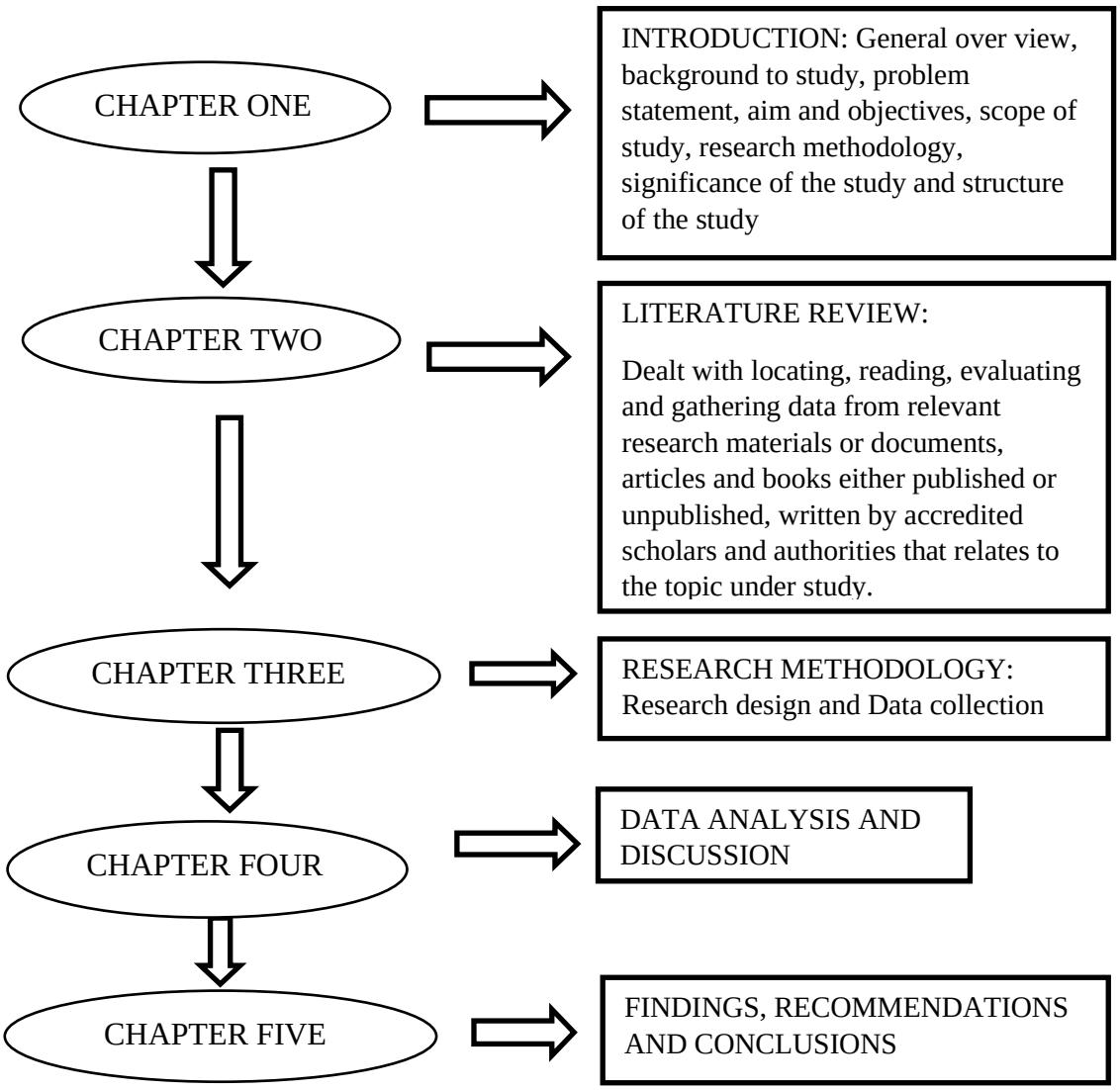

Figure 1.1: Summary of the workflow

Source: Author's construct (2019)

CHAPTER TWO

LITERATURE REVIEW

2.1 OVERVIEW

This chapter gives an overview of the books, journals and articles related to this research. This chapter will describe reviews, strategies and results of prior research. It will start by summarizing the construction industry and giving the category of construction projects. Which will be continued with shortcomings of traditional management of projects which will talk about the shortfall of this system. Information and communication technology in the construction industry will continue followed by the formation of a web-based project management system. An overview of web-based project management which includes its implementation, factors that facilitates its adoption and various barriers in the adoption of the system. The chapter will end by an overview of the unified theory of acceptance or use of technology which will be used to analyse the factors.

2.2 THE CONSTRUCTION INDUSTRY AND CONSTRUCTION PROJECTS

2.2.1 The Construction Industry

The Ghanaian construction industry is one of the dominant industries in the country that undoubtedly contributes to the socio-economic development of the country. In the past years, there has been substantial growth in the construction industry in Ghana. According to Oxford Business Group-OBD (2019), budget prioritising infrastructure investment which is one of the world's fastest-growing economies is the major factor accelerating the Ghanaian construction industry. It continues that the construction sector growth has led to reviving calls for instituting official bodies

to control and improve the business of the construction industry especially tackling malpractices in the industry. After all these accelerating factors and growth, the Ghanaian construction industry is still facing challenges such as delay in payments, ineffective communications, delay in project completion, cost overruns and inefficient management of progress. Oxford Business Group-OBG in 2011 expressed in their report that the high cost of materials for construction and high capitals for construction projects is also a major problem facing the industry which is same as till now.

According to Dadzie et al. (2012), the construction industry is very sophisticated in nature. This is because it has to bring together professionals for the initiation, planning and controlling of the project both in procurement state and production state and does this while having a wide scope of stakeholders. Regulating a project in the construction industry is an unceasing task which starts with a successful tender and ends with an acceptable final account. Calvert et al. (1995), explained that effective controlling or regulating a project in the construction industry involves a frequent comparison of actual progress and performance against estimated or planned targets or requirements, which will be continued by taking appropriate measures or actions to achieve or maintain the estimated targets.

2.2.2 Construction Project

Adinyira (2010), explains construction projects to be any building and civil engineering works which include a single room apartment to skyscrapers and very complicated bridges which are suspending. He continued that these construction projects can be categorized into two types which are:

1. The heavy civil engineering construction

2. Building construction: Industrial construction, Commercial building construction, Institutional construction and Residential building construction.

2.3 SHORTCOMINGS OF TRADITIONAL PROJECT MANAGEMENT SYSTEMS

According to Jesus and Howitt (1998), the construction team requires different types of information for the success of its projects. These include reports, cost management information, equipment management information, scheduling methods, quality control and quality assurance. The complexity and intensity of some of this information according to Yang et al. (2007) have rendered the traditional management system ineffective. Vadhavkar and Pena-Mora (2002) and Pena-Mora et al. (2009) both stated in their research that, the traditional project management system provides a finite approach to information and this is said to be one of the major barriers to management of projects in the construction industry. Wamelink et al. (2002) and Chan et al. (2004) suggested that if effective management is not brought up, the traditional system will end up affecting the quality of the project as well as incurring extra debtor cost. Chan et al. (2004) continued that the progress of a construction project is dependent on so many factors and among these is the project management actions which consist of communication, information management, feedbacks and overall managerial actions.

2.4 INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN THE CONSTRUCTION INDUSTRY

The construction industry is one of the most information-dependent industry in the world. Construction projects involve a lot of skilled professionals and mostly involve repetitive activities and accumulation of paperwork. According to Murray et al. (2001), all these project participants require regular updates on the projects.

Sexton and Barrett (2004) made it known that ICT is an enabled collaborative working prime tool used to drive revolutions in the construction industry. Sarshar and Isikdag (2004) agreed and added that ICT can be used as the enabler of collaboration and knowledge management through the use of knowledge in the database, Enterprise and Management system etc.

ICT is known by a lot of practitioners in the construction industry and they understand its benefits and importance in the industry but the level of usage in the industry is below average according to Asare et al. (2016). He continued that in overall, most professionals in the construction industry make use of commercially available applications for specific work task such as general office administration, planning, scheduling, architectural and engineering works.

2.5 FORMATION OF WEB-BASED PROJECT MANAGEMENT SYSTEM

In this 21st century, Information Technology (IT) is now consistently used worldwide in the construction industry as a tool to curtail most of the complications found in the industry and not only the construction industry any industry existing outside the construction industry. With the help of Information Technology, there is a mammoth enhancement in coordination and

participation between firms participating in a construction project, which has led to an exceptional communication process than earlier. According to Hurtado (2003), various firms in this century including Architectural, Engineering and Construction firms now spend significantly on Information Technology which indicates that the interest in Information Technology has increased over the past years.

Benefits of Information Technology include improvement in a variety of documents, speed and accuracy of work, exceptional management of finances and communication and simple and speedy access to available data as well as a lessening error in works. The internet also came in to help overcome the incompatibilities of data formats with the help of browsers and servers. Various individuals involved in a particular project could share the same system over the web through different hardware platforms (Rojas and Songer, 1999). Skibniewski and Abduh (2000) categorized the merits of web technologies in the construction industry into three (3) areas; communication between project participants, engineering and management computing. Mansuri, (n.d) also added the support of consistent information services to the category from Skibniewski and Abduh. These categories helped in building the concept of how the web combined with its numerous technologies can be used to manage projects in the construction industry as well as widely recognized by various practitioners in the industry. This is referred to as the web-based project management system (Nitithamyong and Skibniewski, 2004).

2.6 WEB BASED PROJECT MANAGEMENT SYSTEMS

Aadamsoo (2010) explained web-based project management system to be a design, designed to regulate and store project information used in a web-based application.

Web-based project management system is an out-sourced internet-based project information and workflow management service for the construction industry and enables construction projects to be completed under budget and ahead or on schedule because of the specialized tools it provides for all the individuals involved in the construction processes.

Nitithamyong and Skibniewski (2004) continued that web-based project management system is an electronic project management system which is conducted through the extranet and it is a private network which uses internet protocols to transmit information. The system can be assessed by all project team members both in the same organization and ones in a different organization thereby making it a centralized commonly reachable and a dependable means of dissemination and saving project information (O'Brien 2000). The information on a particular project is stored on a server and a standard web browser is used as a gateway to access or exchange this information regardless of your geographical location.

The figure below highlights the functional scheme of Web-based project management system (WPMS).

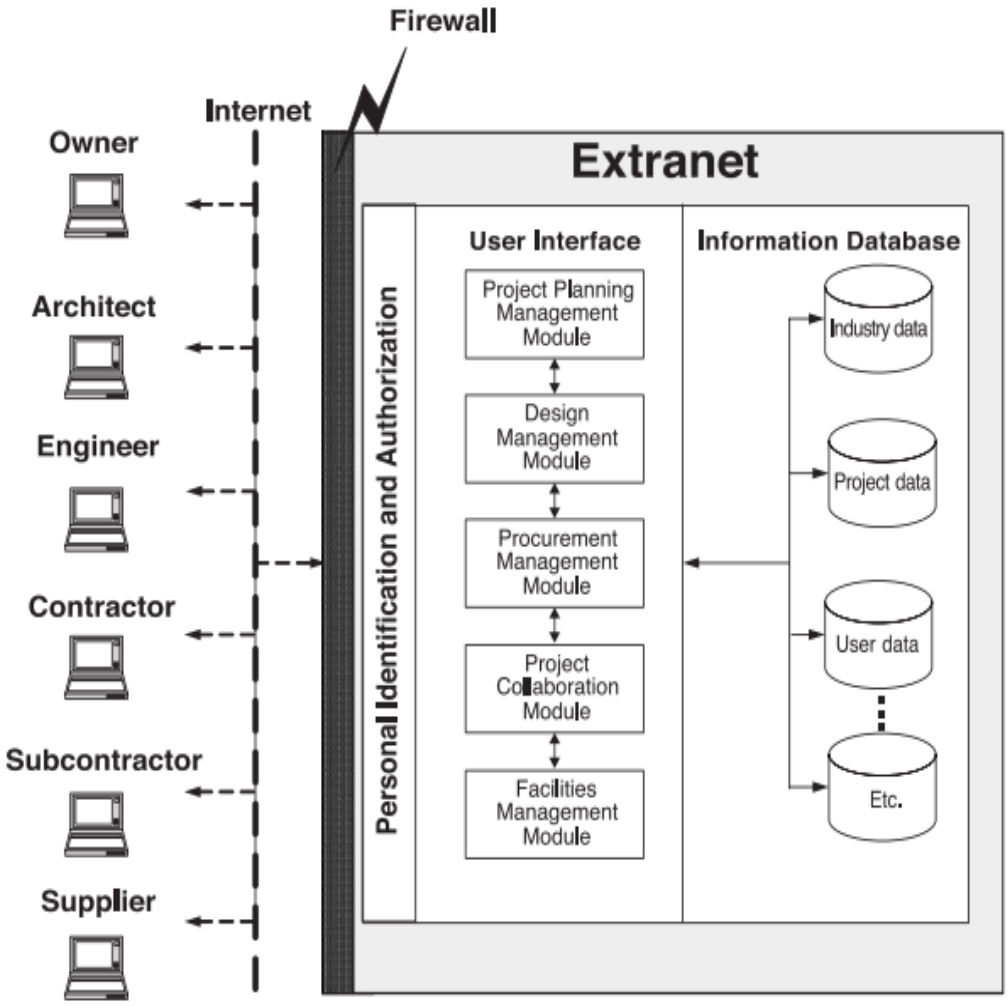

Figure 2.1: Functional scheme of Web-based project management system in construction

Source: Nitithamyong and Skibniewski (2004)

2.7 PROJECT INFORMATION PASSED THROUGH WEB-BASED PROJECT MANAGEMENT SYSTEM

According to Mead (1997), there are four major categories of construction project information that are usually passed through web-based project management system. These categories include;

1. Design information: This information is mostly created by the project design team and it includes computer-aided architectural drawings, specifications, structural drawings, electrical drawings, layouts and various punch list.
2. Financial information: This information is mostly developed by the financial or accounting team. They produce the cash flows, various projections in the project both positive and negative and reports on the contract status at a point in time and various future implications.
3. Project information: This type of information consists of all details concerning the project which includes all stakeholders of the project, the participants of the project, description of the project and photo archive for the projects report.
4. Management Information: This includes all minutes from meetings, shop drawings, change order status logs, as-built drawings and project schedule mostly developed by the manager of the project.

As the project progresses, there will be changes made to various information which can be updated with new data easily on the server's database. Project team members will be able to access this updated information by using their digital user identification and password from a remote geographical location at any time when needed. This helps to eradicate all types of problems that occur in the linear scheme of communication. The system is programmed to be a close network where users need permission to be able to access the system and doing that every user is identified through their user identification and password. This makes it easy for the system to automatically

record and track the information accessed by the user and all comments and changes made to the information. The system can also be programmed in such a way for hierarchical order of accessing high-level information in the system. People with a specific clearance will only have access to such documents or information in the system. Online management of projects always make sure that there is a constant, reliable and a secure solution for every participant of a project and also an established connection to allow team members to communicate, make documents available by sharing and collaborate using a standard web browser. With this, errors caused during communication are minimized as well as the delays in moving documents around for approvals from people of higher authority.

Figure 2.2 summarizes the communication and collaboration schema of web-based project management system. It includes

1. Business Process Automation: This includes browser compatible in running the system on one's computer, phone, tablet, PDA etc, plotting, third party viewer, server located in a secure data centre, firewall installed, user identification and password needed to access the information, virus protection and security.
2. Document Management: Involves sharing and viewing multiple file-formats online, marking up the documents, downloading and uploading multiple documents, document full-text search, back up facilities, keeping a document revision history.

3. Team Communication: Having a real-time discussion either group or a particular person who can access the system.

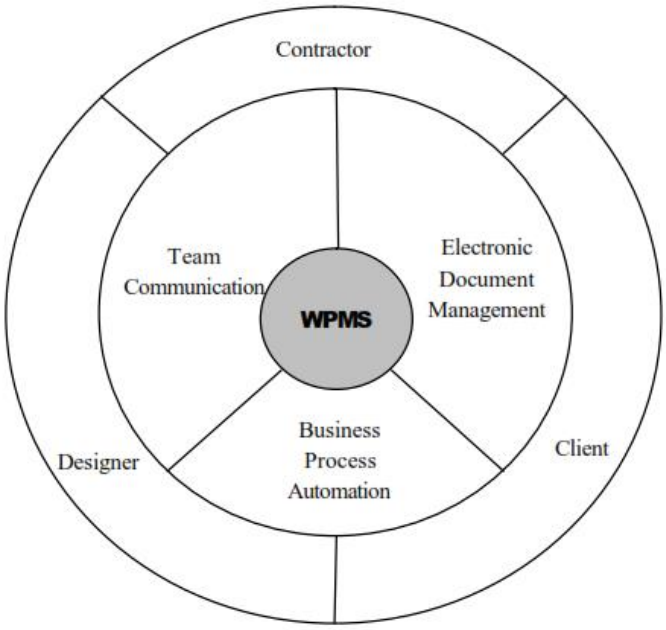

Figure 2.2: Communication and collaboration schema of web-based project management system

Source: Thorpe and Mead (2001)

Thorpe and Mead (2001) forecasted that web-based project management system will hasten communication in the construction industry, advance the level of communication among participants of the project and build up teamwork and coordination in the industry. This will no doubt advance the eradication of problems faced with respect to unnecessary delay in the industry. Web-based project management system makes it easier to manage construction projects by focusing on specific easier tools and services.

2.8 IMPLEMENTATION OF WEB-BASED PROJECT MANAGEMENT SYSTEM IN THE CONSTRUCTION INDUSTRY

According to Burchard (2001), in order to implement web-based project management system in the construction industry, there are three option a company can choose from or can decide to adopt all three options. This include:

1. Hiring a consulting company or a programmer to develop a custom-built Web-based project management system for your company.
2. Buying a web-enabled software from an approved store and installing it on the company's internal servers or the company's mother station. This software is not limited to Microsoft Project, Sure Trak, Prolong Project Pack, WebProject and Teamflow. There can also be a collaborative software. The importance of this software is to create a process whereby all documents are made electronic and locating it at a secure central location thus enabling it to be accessed by specific project participants who have the authority to access the various documents kept in the system and at the same time maintaining business processes, supply chain relationships and organization hierarchies. These are all recognized and registered software in the industry.
3. An Application Service Provider (ASP) renting or leasing their comprehensive developed Web-based Project Management system for an agreed fee. Normally these providers charge either per project, per the volume of space required by your company in their servers or/and per user they have to register to use the logins. Examples of this comprehensive developed web-based project management system in the construction industry include Buzzsaw which is created by Autodesk, Project village, BIW Information Channel etc.

He continued that among the three options provided above, Application Service Providers are becoming very known in managing projects in the construction industry and mostly used because it requires not many financial, technical and human resources to develop and operate.

2.9 BENEFITS FOR THE ADOPTION OF WEB-BASED PROJECT MANAGEMENT SYSTEM IN THE CONSTRUCTION INDUSTRY

a. Enhanced Communication

Web-based project management system (WPMS) does not only makes progress in project communication in the construction industry but also regulates construction process and increases transparency which is one of the barriers in the industry (Matheu 2005). There is no need for rework when using this system because the system is a collaborative system and can store not just information but how the information was derived or the knowledge used in achieving that information.

A study conducted by Nitithamyong & Skibniewski (2007) concurs with the conclusions of Matheu (2005) and they continue that improving the coordination among construction participants is 3rd in the rankings of the benefits of WPMS in the construction industry. Alshawi and Ingirige (2003) add up that web-based project management system helps to shorten lead times for tasks by improving substantially the speed of communication in the industry. They further commented that there are fewer errors and rework cost as a result of veracity in communication in the system.

b. Enabled Complete Audit Trail

The web-based project management system has the capacity to store data and various communication threads. The system can secure all information and communication threads of the

project and tracked them in an organized and satisfactory manner (Becerik and Pollalis 2006). This is an important benefit according to Cox (2007). This enables all project participants using web-based project management system easily and securely see the various types of information used by any of the project participants and who is holding back essential information for successful completion of the project at hand.

c. Faster Reporting and Feedback

With the help of web-based project management system, team members of a project can handle complicated projects with few administration workers and communicate very effectively (Becerik and Pollalis, 2006). O'Brien (2000) makes a contrast statement to Becerik and Pollalis that it must be made clear that the system is not necessarily labour-saving devices for all individuals on the project team. Ilich et al. (2006) posited that web-based project management systems boost the speed of communication on all projects and this is confirmed by Alshawi and Ingirige (2003). They added that the system enhances its performance through reliable, faster and detailed information between the head office and the various construction sites.

Web-based project management system gives room for faster response to Requests for Information (RFIs), Change Orders (Cos) and clarification of specification when needed (Matheu 2005). This is ranked as 5^{th} from web-based project management systems benefits according to Nitithamyong and Skibniewski (2007).

d. Improved Version Control

Web-based project management system makes it possible for all participants of a project to have access to updated documents and information without having to wait for hard copies to be printed

out (Becerik and Pollalis 2006). This is very important to all construction projects because of its ability to save money and time and also avoid delays in the activities of the project. The current information of a project is always made available as soon as it is published, curtailing the risk of working with old information (Matheu 2005). This helps in eliminating some risk in the industry. The study conducted by Alshawi and Ingirige in 2003 jibes with the conclusions of Matheu (2005) and Becerik and Pollalis (2006) and further continued that, mistakes can be avoided in the construction industry when all drawings and documents are complete and always update when changes occur and made available for all project participants who would need it. This is ranked as the biggest benefit from web-based project management systems according to Nitithamyong and Skibniewski (2007).

e. Better Project Monitoring and Control

Web-based project management system allows users to create progress reports for individual work packages as well as the project as a whole and can handily go through documents to find what is needed for their reports. Securing all information of a project in one unified space helps team members control the estimated budget and the schedule of the project more effectively (Becerik and Pollalis. 2006). Matheu (2005) supports this by saying consultation cycles for decision making are shorten due to faster circulation of updated information.

f. Availability of Document and Improved Information

According to Becerik and Pollalis (2006), web-based project management system allows project participants to access project information worldwide or globally thus enabling them to work from anywhere in the world. Cox (2007) adds up to this that securing all up-to-date information of a

project in one unified space makes it convenient for all project participants to access whatever needed to complete their various responsibilities. He continues that these project participants can also access all archived historical data by using their login ID and passwords through the system which can help them appreciate how risen issues were solved. This is ranked as 4th from web-based project management systems benefits according to Nitithamyong and Skibniewski (2007).

g. Improved Information Management

Web-based project management system is extensively programmed to manage all documents and information securely. These documents and information can only be accessed by only authorized users by using their user login IDs and passwords. There are restrictions to what a user can access, the type of user you are and your level of restriction. This is ranked as 2nd from web-based project management systems benefits according to Nitithamyong and Skibniewski (2007).

Web-based project management system gives users the same updated information and this avoids error in the circulation of information (Becerik and Pollalis, 2006). They continue that not only does the project participant has the updated version of the document but can also trail the earlier information posted there and monitor other users who accessed or made changes to the information. This can only be done by people with higher clearance.

h. Improved Process Automation and Standardization

Web-based project management system structures and formats information and documents in the system in a very structured and organised way. It is user-friendly to all project members who access it for various information and documents. One of the respondents to Becerik and Pollalis (2006)

study noted that the system makes it easy to respond to Request for Information and write minutes from various meetings because of the how structured the system is.

i. Reduction of Cost and Wasted Time

Findings from Matheu (2005) notes that costs for printing, postage and document administration are reduced when a company uses web-based project management system because of how all information and document are stored centrally. Travelling time and visit to the various site just for pictorial progress of the project can be reduced. This is because most of the updated progress photograph of the project can be uploaded frequently to the system and made consistently available for viewing (Alshawi and Ingirige, 2003). They further continued that web-based project management system reduces time and money spent on dispute because of its ability for audit trails. Cox (2007) concurs this and concludes that web-based project management system helps to eliminate project delays and cost by eliminating costs obtained by change orders and claims.

j. Reduction of Storage Space

Physical storage spaces for keeping documents in the firm is minimized because of web-based project management system which uses electronic storage (Alshawi and Ingirige 2003). All the documents and information saved on the web-based project management system can be saved in the cloud to avoid loss when there is any unforeseen incident rendering the system inactive.

In summary, it is indisputable that the construction industry can benefit so much when they implement web-based project management system. The utilization of web-based project management system in the construction industry is a way to avoid unnecessary delays, save time,

reduce cost, improve project performance, improve communication and improve the exchange of information. Prima facie, when one observes these outstanding benefits of web-based project management system, one may question why these systems are not utilized in the Ghanaian construction industry. Ongoing research suggests that the Ghanaian construction industry has been slow to adopt Information and Communication tools available.

2.10 BARRIERS TO THE ADOPTION OF WEB-BASED PROJECT MANAGEMENT SYSTEM IN THE CONSTRUCTION INDUSTRY

Unavailability of certain technologies is one of the major barriers to the adoption web-based project management, however, a study by Peansupap and Walker in 2005 showed that there is a shift from the unavailability of technology being a major barrier to management problems in the construction industry. Ahuja et al. (2010) also made a similar conclusion in their studies about management problems being one of the major barriers in the construction industry and needed to be taken seriously.

According to Hewage et al. (2008), the construction industry falls behind other industries in the creating of long-term plans for the adoption and implementation of Information Technology and this has led to the slow adoption of web-based project management system. Peansupap and Walker (2005) continue that adoption of IT should be planned critically and thought through very well otherwise very little benefit will be obtained from it. This can decrease the level of competition in the industry.

Other barriers include:

a. Lack of Understanding

Most of the construction practitioners have scanty experience in the know-how in management and strategic adoption of ICT which has been a major barrier according to (Peansupap and Walker 2005). This has led to lack of understanding by project team members in the construction industry of the benefits derived from the use of a web-based project management system. Hewage et al. (2008) made it clear in their research paper that construction team members are not mindful of the benefits that are derived from the adoption of web-based management project system making it the highest-ranked barrier.

b. Security and Access to The System

All information and documents flow through the system making it commercially sensitive. This has given doubt to most project team members because of how sensitive some construction projects information are and how it can cause agitation if not handled carefully. Reputable and secured Application Service Provider (ASP) will be needed to run the system (Matheu, 2005). O'Brien (2000) makes an argument on who has access to the project website and the boundaries the person can cross when accessing the site. This makes it impossible to give authority to every team member. The higher the security, the complex the system becomes making team members deter the use of it (O'Brien, 2000). Security is a major concern and it foists a lot of monetary constraints on the project team as the costs need to be incorporated into project feasibility studies (Alshawi and Ingirige, 2003).

c. Infrastructure and Difficult Internet Access

Matheu (2005) posited that most of the Architectural firms, Consultant firms, Construction firms and Suppliers lack the necessary infrastructure to support web-based project management system and also most of the construction sites do not have coverage for good internet access. Not surprisingly, Nitithamyong and Skibniewski (2007) expressed in their research that the more project practitioners have access to good and reliable internet on the site, the more beneficial the web-based project management system is to the project. Alshawi and Ingirige, (2003) concluded that because the system is web-based enabled, there is the need for constant upgrade of the system and software used to avoid crash of software.

d. Training

A company which cannot afford an Application Service Provider would like to buy the web-based project management system software package. The project team need to be trained on how to use the software competently and efficiently. This comes with a cost that needs to be incurred by the company in training its members. According to Nitithamyong and Skibniewski (2007), companies or firms that train their team members acquire higher performance in all perspectives.

2.11 ADOPTING OF UTAUT MODEL AS FACTORS FOR ADOPTION OF WEB-BASED PROJECT MANAGEMENT SYSTEM USING

2.11.1 REVIEW of TECHNOLOGY ACCEPTANCE MODEL (TAM) To UNIFIED THEORY OF ACCEPTANCE and USE OF TECHNOLOGY (UTAUT)

According to Venkatesh and Davis (2000), a lot of theoretical models have been recommended to improve the understanding of various factors that facilitates the acceptance of information technologies. Marchewka and Kostiwa (2007) added that the Technology Acceptance Model (TAM) among other models is the most effective in adoption behaviour of Information technology and Information systems. Davis (1989) posited that TAM basically proposes a fundamental framework with regards to the study of Technology Acceptance Behaviour to make clear the effectiveness of external factors towards behavioural ideas. The initial idea for developing TAM by Davis was to make clear the determinants of acceptance of computers. Davis (1989) posited that in all, TAM has the capacity to make clear of various user behaviours across a broad range of end-user computing technologies and user populations theoretically justified. It is based on these two core concepts:

1. Perceived Usefullness: This is defined as the users' subjective perception of an increase in job performance after accepting and using a computer.
2. Perceived ease of use: This is explained as a user's subjective perception of the ease in use of a computer system.

These two core concepts influence the perceived uselfullness of a computer to the user thus having an indirect on the acceptance of technology by the user. The figure below explains the concept of TAM.

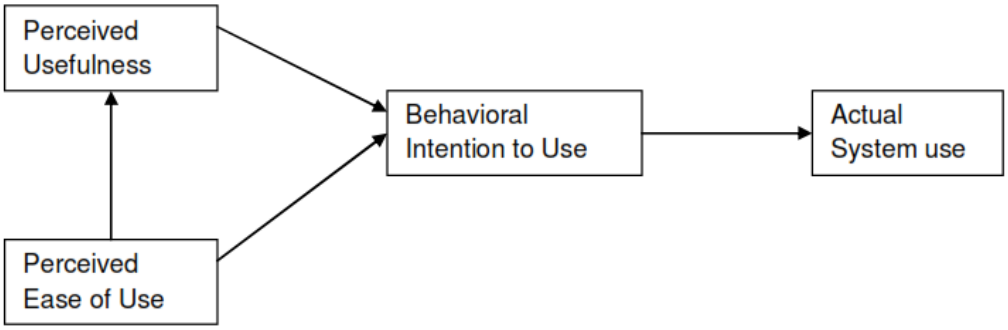

Figure 2.3: Technology Acceptance Model (TAM)

Source: Venkatesh et al. (2003)

The Unified Theory of Acceptance and Use of Technology (UTAUT) model was developed by Venkatesh et al. (2003) to make firm TAM. This model's goal is to make clear users' intentions to use an Information System (IS) and subsequent usage behaviour.

2.11.2 REVIEW OF UTAUT to UTAUT2

There has been much progress in the improvement of information technologies and computerization power, but for this to improve productivity, these information technologies must be accepted and used by people (Venkatesh et al., 2003). He continued that, Social Cognitive Theory (SCT), Theory Acceptance Model (TAM), Theory of Reasoned Action (TRA), Innovation Diffusion Theory (IDT), Theory of Planned Behaviour (TPB), Model of PC Utilization (MPTU), Motivational Model (MM) and Combined Technology Acceptance Model were the eight theories of technology that were combined to develop UTAUT. The UTAUT model offers a solid foundation for reviewing and further studying multiple factors that influence technology adoption.

The UTAUT constructs, based on the same similarities of conceptual and empirical across the user acceptance model, include performance expectation, effort expectation, facilitating conditions and social influence. The UTAUT was further developed to include three additional constructs, namely hedonic motivation, price value and habit, and was labelled as UTAUT2 afterwards. According to Venkatesh et al. (2012), studies prove that, compared to UTAUT, the extensions suggested in UTAUT2 resulted in significant improvements in the variance described in behavioural intention (56 to 74%) and use of technology (40 to 52%). This research, therefore, adopts the UTAUT2 model.

2.12 THE CONSTRUCTS OF UTAUT2

Performance expectancy

Performance expectancy which is known as the stage at which individuals claim that a specific technology enhances their job performance. This is the first construct in UTAUT2 according to Venkatesh et al. (2003). Expectations of performance include constructs of perceived usefulness, work fit, comparative benefit and expectations of results (Addy et al., 2018). Performance expectancy will be used in this research to capture the construct on how one believes the adoption of web-based project management system will improve job performance.

Effort expectancy

Effort expectancy is the second construct. Venkatesh et al. (2003) explain this construct as the ease that comes with the use of a particular technology. Moore and Benbasat (1991) and Davis et al. (1989) explains the ease of use to be the stage or level a person accepts that the use of a particular

system or technology does not require any physical or mental exertion. Hong et al. (2002) study declare that the ease of use of technology is mainly affected by individual differences such as computer self-efficacy and subject understanding.

Facilitating conditions

Facilitating conditions is the third construct under UTAUT2 model which is explained as the existence of organisational and technical infrastructure believed to promote the use of a particular technology (Addy et al., 2018). The study continues that under this construct, there are three other facilitating conditions which are, perceived behavioural control, facilitating conditions and compatibility. Datta (2011) affirms that facilitating conditions provides the required circumstances for technology adoption.

Social influence

Social influence is the fourth construct and is explained as the extent to which a person perceives how significant others think he or she should use a particular new technology or innovation. This variable indicates the willingness of an individual to carry out a particular behaviour and is an instant source of behaviour (Ajzen, 2002). He continues that there are three factors under this construct. They are the subjective norm, social factors and image (Addy et al., 2018). Ajzen (2002) averred that a person’s behaviour depends on the person's intention and perception of behavioural control and consequently, perceived behavioural control moderates the effects of intention on behaviour.

Hedonic motivation

Hedonic motivation is the fifth construct and is described by Higgins (2006) as the promptness of a person's pleasure and pain receptors on their willingness to hit a target or move away from risk. Hedonic motivation has been playing a vital role in determining the acceptance of a particular technology and its usage (Brown and Venkatesh, 2005). Hedonic motivation is an idea which is derived from the classical theory of motivation which talks about individuals always ready to approach pleasure by avoiding pain (Addy et al. 2018).

Price value

Price value is the sixth construct of UTAUT2. This is described by Dodds et al. (1991) as the balance between the money charge for a particular technology and the actual benefits of that technology to the user. Venkatesh et al. (2012) explain further that, when the perceived benefit of a particular technology exceeds the cost of the technology then a positive price value is achieved and this enhances behavioural intention.

Habit

The final construct is habit. Habit is explained by Hope (1995) as a repetitive behaviour which usually happens unconsciously. Lally et al. (2010) add up that this habit happens without the individual even noticing. This is so because individuals do not need any self-analysis before conducting such behaviour. Venkatesh et al. (2003) averred that gender, age, experience and voluntariness of use are the four basic control factors of habit. This study will, therefore, consider the four basic control factors of habit as a factor for the intention to use a particular technology. Morris et al. (2005) posited that long use of a particular technology makes one very comfortable with that technology even if it has troubles in processing certain types of information. This makes

it very difficult for the user to adapt and learn new technologies. Posner (1997) averred that this habit or nature of an individual is ascribed to declination in their memory and cognitive capacity usually associated with the ageing process.

2.12.2 Control Factors of UTAUT

Age

Almost all construct with UTAUT is moderated by age (Venkatesh et al., 2003).

Experience

Experience on the other has the ability to moderate the relationship between behavioural intention and facilitating conditions. A study conducted by Notani (1998), shows that individuals who are not familiar with a particular technology depend more on facilitating conditions. Chiemeke and Evwiekpaefe (2011) added that experienced users of a particular technology are usually driven by the benefits and usefulness of that technology. Inexperienced ones tend to demand the ease of use of technology first before thinking about its usefulness and benefits.

Level of Education

Addy et al. (2018) posited further that the ease in the learning of a particular technology is influenced by the individual's level of education.

The figure below shows the model of UTAUT2 included with age, experience and educational level which may influence an individual's intention to adopt web-based project management system.

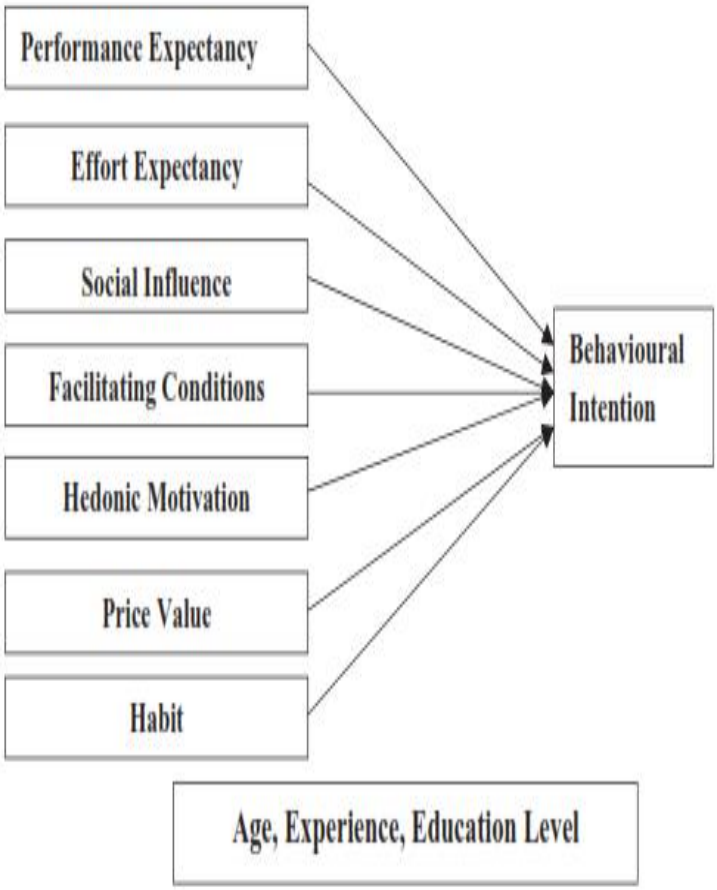

Figure 2.4: Unified theory of acceptance and use of technology (UTAUT)

Source: Addy et al., (2018)

2.12.3 Ghanaian Factors Used to Modify UTAUT2 Model

Internet Reliability

The Internet has become everyday use in Ghana. Almost all companies rely on the internet for most of their activities. Ghana was the second country in sub-Saharan Africa to get internet connectivity (Quarshie and Ami-Narh, 2012). Web-based Project Management system is an

internet-based system and will need reliable internet for efficient use. Bad connectivity will hinder the successful usage of the system.

Power supply in the context of energy

In the context of energy, supply is the process of bringing energy from the point of creation, such as a power plant, all the way to the point of consumption at a home or business. Web-based project management system is dependent fully on constant energy supply.

Culture of adopting technologies

Dasgupta and Gupta (2012) describe culture as the values and beliefs of a group of people in a unit. These beliefs can also apply to a particular person. The job conduct of an individual is affected by different cultural standards, ranging from supranational, national, organizational to professional cultures. Companies with the high culture of adoption of new technologies tend to adopt various technologies that improve their productivity.

From the theories discussed above, the following hypothesis is proposed:

H1: Performance Expectancy will have a significant positive impact on an individual's intention to adopt a Web-based project management system.

H2: Effort Expectancy will have a significant positive impact on an individual's intention to adopt a Web-based project management system.

H3: Social Influence will have a significant positive impact on an individual's intention to adopt a Web-based project management system.

H4: Facilitating conditions will have a significant positive impact on an individual's intention to adopt a Web-based project management system.

H5: Hedonic motivation will have a significant positive impact on an individual's intention to adopt a Web-based project management system.

H6: Price value will have a significant positive impact on an individual's intention to adopt a Web-based project management system.

H7: Habit will have a significant positive impact on an individual's intention to adopt a Web-based project management system.

H8: Reliable internet will have a significant positive impact on an individual's intention to adopt a Web-based project management system.

H9: Consistent supply of power will have a significant positive impact on an individual's intention to adopt a Web-based project management system.

H10: Adoption of technology culture will have a significant positive impact on an individual's intention to adopt a Web-based project management system.

Figure 2.5 shows the model that was adopted for the study and how they contribute to the behavioural intention of individuals on adopting web-based project management system in their firms or companies.

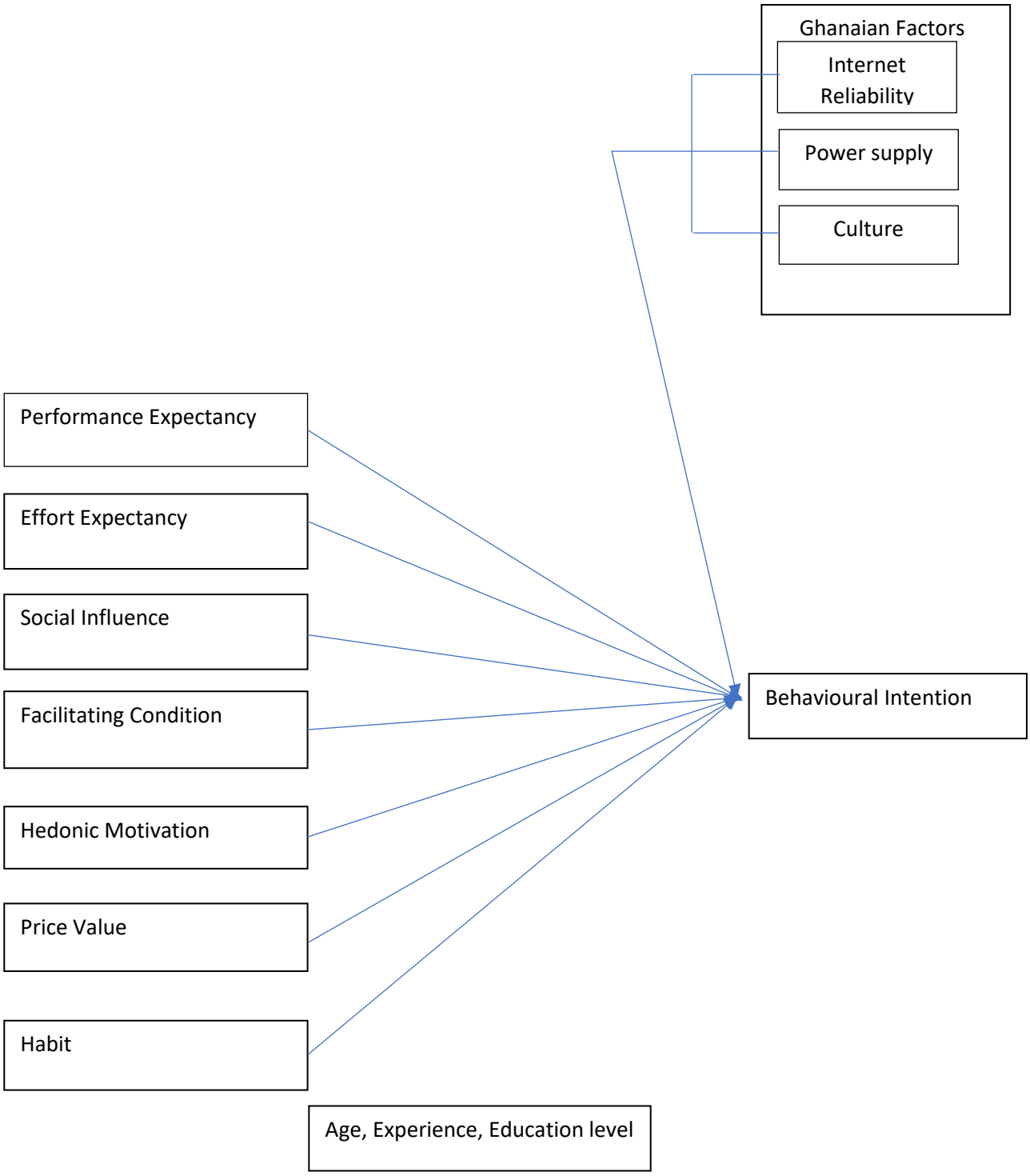

Figure 2.5: Model adopted for this study

Source: Author's construct (2019)

2.13 SUMMARY OF THE CHAPTER

This chapter gave an insight into the Ghanaian construction industry and how for the past years, it has had substantial growth. It continued with categorizing the types of construction project which are heavy engineering construction and building construction. The chapter also brought up the shortcomings of the traditional project management system and how it has a finite approach to information. The formation of Web-based Project Management System was also discussed, types of information that can be passed through the system, its implementation, benefits and barriers.

A review of Technology Acceptance Model (TAM) to Unified Theory of Acceptance and Use of Technology (UTAUT) was conducted and the constructs of UTAUT2 was modified with three other Ghanaian factors which helped in the developing of a model for the study. The construct used for the study include performance expectancy, effort expectancy, facilitating condition, social influence, hedonic motivation, price value, habit, internet reliability, power supply and culture.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 OVERVIEW OF CHAPTER

This chapter explains in details how the study was conducted in order to achieve its aim and objectives. It continues to discuss the research strategy, research design, research approach, research or study population, sampling technique, data collection and instrument used, data analysis, validity and reliability and ethical consideration.

3.2 RESEARCH METHODOLOGY

Thurairajah et al (2006) posited that research methodology is considered as the general method to the strategy process of a study from the theoretic foundation to the collection of data and its subsequent examination. Saunders et al. (2009) continued that it, therefore, denotes the underlying concept of how research ought to be conducted, thus providing theoretical and philosophical assumptions of the study and its consequence on the method or methods adopted for the study. This is subsequently used to probe the research problem, collect, analyse and interpret the data (Dainty, 2007). Drawing from this basis, a study submitted by Owusu-Manu in 2008 makes a statement that executing research involves a robust procedure of merging a group of principles, outlooks and concepts with a collection of precise practices, techniques and strategies to generate and legitimize knowledge. This, in essence, will ensure that the research methodology encompasses the methods, rationale and the philosophical assumptions that underlie the study (Dainty, 2007).

3.3 RESEARCH STRATEGY

The strategy of research explains and shows how the procedures of research or a study are being administered (Wedawatta et al., 2011). Selection of a research strategy is influenced by a number of factors which include, the research objective, the research questions, availability of time, existing knowledge and the research paradigm (Baiden, 2006; Saunders et al., 2009). The research strategies among which one may choose from include survey, case study and experiment (Bryman, 2004).

The survey strategy selected for this study is the collection of data using a structured questionnaire.

3.4 RESEARCH DESIGN

The research design is a plan that provides details on how the research is to be undertaken. That is the method for data collection, interpretation, data analysis and sampling process. O'Sullivan et. al. (2016) adds that research design should adequately address the problem of the study. According to Trochim (2006), the design adopted for any research is informed by the problem of the research. Research may be descriptive, exploratory or explanatory (Saunders et al., 2009).

Descriptive research accurately presents or describes what is there. It shows the characteristic of an individual, situation or event.

Exploratory research, on the other hand, seeks for new insight and understanding into problems.

Thus, this research followed the descriptive method. A questionnaire was used to gain knowledge into the factors that facilitate the adoption of web-based project management system.

3.5 RESEARCH APPROACH

A quantitative research approach is a procedure where data is converted into numbers and statistically analysed. It is used to establish how well facts in theories and findings of past researches support each other. This method is often used in the collection of data involving large numbers of participants (Fellows and Liu, 2008).

A qualitative approach, on the other hand, involves gathering data at the research site. It requires researchers to have direct contact with participants through either interview or prolong observation (Creswell, 2008). Analysis of qualitative research is based on the subjective assessments of the opinions, behaviours and attitudes of participants to the study. Results obtained from this approach are either in non-quantitative forms or in other formats that are not usually subjected to laborious quantitative analysis (Kothari, 2004).

Based on the above explanations given to the various approaches of research, this study adopted the quantitative approach.

3.6 RESEARCH POPULATION AND SAMPLING TECHNIQUE

3.6.1 Research Population

The population of this study is the totality of all the different construction professionals. The study also considered team professionals within the building and civil engineering contractors, and Consultancies. This instituted the population because according to Yount (2006), it is important for every study population to conform to the needs of the study. The study was conducted in the Sunyani Municipal in the Bono Region and the Kumasi Metropolis in the Ashanti Region because a blend of the stakeholders needed for the study was found there. The professionals selected are Architects, Quantity surveys and Engineers from the Ghana Highways Authority, Department of

Urban Roads, Department of Feeder Roads, Architectural and Engineering Services Limited. In addition to these are civil engineering and building construction companies and other consultancy firms who are within the municipal and the metropolis.

3.6.2 Sampling Technique

The target population for the study were Architects, Quantity surveyors and Engineers at Kumasi and Sunyani. The total number of registered professionals was given as 3,714 as of August 2019. This was a large sample to use since the registered professional provided were not broken down to their various regions of work. The study was limited to only Sunyani and Kumasi and this made it difficult for the researcher to identify most of them. The sampling techniques adopted for this study was the purposive and snowball sampling technique.

The purposive sampling technique enabled the researcher to select the respondents who are assumed to be skilled and have similar interest and will best enable the researcher in the study. According to Teddlie and Yu (2007), purposive sampling technique is a type of non-probability technique where units, thus respondents are selected based on specific purposes and characteristics that they possess.

The snowball sampling technique enabled identified professionals in the industry to direct the researcher to other professionals who have similar interest and will best enable the researcher in the study. Snowball is a non-probability sampling technique.

3.6.3 Sample Size

A sample size of 100 was used for the study. This was decided based on the proximity and convenience of the researcher and also list of the target population could not be obtained from their various professional institutions. The circumstance aforementioned made the researcher choose the sample size provided.

3.7 DATA COLLECTION INSTRUMENT

3.7.1 Questionnaire

The objective of a questionnaire is to collect data that can be used for analysis. It contains questions in line with the objectives of the study (Denscombe, 2010). A structured survey questionnaire was used by the researcher for data collection for the study. The structured questions were there to restrict the respondents to a laid down option provided by the researcher. The content of the questionnaire was clear and easy to understand. The layout of the questionnaire was simplified and the font size was also pleasant to the eye. Data for the questionnaire development was sourced from the literature review. The questionnaire was designed in two sections labelled section A and section B. Section A considered the background information of the respondents and section B considered the two objectives of the study. The motive for section A of the questionnaire was to help identify the background of the respondent. It also has a link to the factors which will be analysed because their education level, experience and age has an impact on the adoption of the system in their companies, institution and firms. Section B was to help identify the factors for the adoption of web-based project management system and also their impacts in their decision of adopting the system. All the structured questions had their options pre-coded with numbers and

choices ranked on a six-point ordinal scale where ***-2 = Strongly Disagree, -1 = Disagree, 0 = Uncertain 1 = Agree 2= Strongly Agree***. The ordinal scale afforded the respondents the opportunity to select their correct choices by ticking in the boxes numbered -2 to 2. Respondents were asked to tick only one box on a row for each choice provided.

3.7.2 Questionnaire Administration

The questionnaires were administered and collected by the researcher and also with the assistance of volunteered correspondents. Others were sent through emails with the consent of the respondents. A google form was created and the link sent to some of the respondents.

3.8 DATA ANALYSIS

The data collected from the questionnaire were analysed using descriptive statistics and multiple regression tool. Descriptive statistics and the multiple regression analysis would be used for the quantitative data (ordinal data). The descriptive statistics helps the researcher to lessen, summarise and describe quantitative data to be obtained from empirical evidence (Polit and Beck, 2004). This statistical analysis was aided by a computer program (SPSS) in defining the frequencies of occurrence of responses and percentage rates for the quantitative data. This form of analysis was employed because of its ease of interpretation and appreciation.

Multiple regression analysis enabled the researcher to determine the level of impact of the factors to behaviour intention. Thus, the hypothesis suggested was tested individual to know their impact. Multiple regression is used when one wants to predict the value of a variable based on the value

of two or more other variables. The variable we want to predict is called the dependent variable and the variables used to predict are called the independent variables.

This analysis enabled the researcher to determine the significance of all the constructor factors when analysed together with the behavioural intention of the respondents. The multiple regression analysis enabled the researcher to conclude on the level of impact of the factors and how it influences the adoption of web-based project management system. This enabled the researcher to test the hypothesis.

The collected text data were subsequently coded for analysis. The coded data were analysed quantitatively to show which themes occurred most frequently and in what contexts, and how they are related to some of the issues revealed in the quantitative results. Mean score ranking was used to determine the average ranking of each variable hence identifying the factors that facilitate the adoption of the system. To ensure a better understanding of results, the data collected were presented in tables.

3.9 A TEST OF VALIDITY AND RELIABILITY

The reliability measures the extent to which a construct was consistent (Bhattacherjee, 2012). The instrument used in this study was dependable, consistent and yielded steady results. It could be used continually over some period on the same persons, or be used by two different researchers and yield the same results (Polit et al, 1997). The sources of data and the data itself can be depended on since it is consistent with the research objectives and aim.

Validity is the degree to which the tool used measures what it scheduled to measure or mirrors the construct being observed (Polit et al., 1997; Burns and Grove, 2005). The measure has sufficiently

represented the fundamental construct it was supposed to measure. The content of the questionnaire was also validated by my supervisor. Construct validity was achieved by relating the items in the questionnaire to the underlying concept of the study. The achievement of descriptive and interpretive validity was done by ensuring that data collected were not distorted but rather interpreted in such a way that their actual meanings were brought to the fore (Maxwell, 1992). Validity was achieved internally by ensuring that the subjects who were selected to represent the population were people who have a deep understanding of the issue of procurement. The external validity was enhanced by ensuring that a larger sample was selected from the population to respond to the questionnaire. This ensured that the results of the study at the end could be generalised to other regions in Ghana where these categories of subjects could be found.

3.10 ETHICAL CONSIDERATIONS

Creswell (2008) defined ethics in research as, the considerations taken to protect the rights and welfare of participants and other parties associated with research activity. In view of that, there was a cover page indicating the researcher and the purpose of the study. Also, owing to the sensitive nature of some of the items, the verbal consent of participants was sought and explanation of the purpose of the study before handing out questionnaires to respondents. Again, the respondents for the questionnaires were assured of their confidentiality and anonymity and also informed that the information obtained from them is solely for academic purposes, and in ensuring that, identifiers were strictly excluded such as contact numbers, names, street names and name of the place of work of the respondents. Participation in the research was solely based on the principle

of voluntarism and no form of inducement was used to entice the participants to partake in the study.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION

4.1 OVERVIEW

This chapter presents the analysis of the data obtained from the field. Analytical results were presented in tables in order to adequately communicate the results of the study. The analysis was presented beginning with the background characteristics of the respondents and followed by the objectives in sections to address the questions of the study. The sections were presented as follows; the factors that facilitate the adoption of web-based project management system and the level of impact of the identified factors that facilitate a person's behaviour intention to adopt web-based project management system.

4.2 RESPONSE RATE

Fifty-four (54) of the questionnaires were retrieved representing 54% of the sample size. This was as a result of continuous email reminders, phone calls and visits made to their offices of respondents. According to Kumar (1999) if 50% response rate is obtained then the researcher is lucky because sometimes it may be as low as 20%. The results of these respondents are presented and discussed as follows.

4.3 BACKGROUND CHARACTERISTICS OF RESPONDENTS

With regards to the ages of the respondents, it is noted from the table below that 7 of the respondents were between the ages of 20 to 25 representing 13% of the total response. Thirteen of

the respondents were between the ages of 26 to 30 representing 24.1% of the total respondents, 10 of the respondents were between the ages 31 to 35 also representing 18.5% of the total response received. Ages 36 to 40 had a frequency of 14 representing 25.9% of the total response received. Seven of the respondents were between the ages 41 to 45 representing 13% and 3 of the respondent recording between the ages 46 to 50 representing 5.6% of the entire response. The age of an individual is key in adopting new technologies. According to Morris et al. (2005), older people tend to face a lot of difficulties when processing new technologies than younger ones. The difficulties man be attributed to the decline in cognitive and memory capabilities associated with the ageing process (Posner 1997).

4.3.1 Level of Education

With regards to the level of education of the respondents, it is noted from the table that only 2 of the respondents had an HND/Diploma certificate and Technician(CTC I, CTC II, CTC III) representing 7.4% of the total respondents. 24 of the respondents were first degree holders representing 44.4% and 26 of the respondents had a master's degree representing 48.1% of the total response. This is shown in table 4.1.

4.3.2 Work Experience

A chunk of the respondents had working experience between 5 -15 years representing 61.1% of the total response. 5.6% of the respondents had between 16 to 20 years and over 20 years of experience in the construction industry each. 15 of the respondents had a working experience less than 5 years with most reporting to be in their 4^{th} year representing 27.8% of the total response

collected. Indeed, it was imperative to find out the working experience of respondents in order to be convinced that the respondents really have adequate knowledge and experience about their organizations' and their collaborative activities with other organizations and thus the appropriate people to respond to this survey. The result, therefore, vindicates this theory as it gives a strong indication that the respondents have the maximum level of experience required for the survey. This is shown in table 4.1.

4.3.3 Knowledge and Use of Web-Based Project Management System

Web-based project management system is not a widely known system used in the construction industry in Ghana. Out of the fifty-four (54) respondents, seventeen (17) of them uses WPMS in their organisation mostly been the software package. This represented 31.5% of the total respondents. Out of these 17 respondents, 41.2% of them used the system voluntarily as in they brought the idea of the system to the company and the company adopted it. 58.8% of the 17 respondents went to meet it in their company and used it. The users of the system made comments about how the system has improved productivity of the firm and edged others to adopt the system to replace the paper works which are predominant in the industry. This is shown in table 4.1

Table 4.1: Frequency distribution of background characteristics of respondents

	Category	Frequency	Percent
Age of respondent	20 - 25 yrs	7	13.0
	26 - 30 yrs	13	24.1
	31 - 35 yrs	10	18.5
	36 - 40 yrs	14	25.9
	41 - 45 yrs	7	13.0
	46 - 50 yrs	3	5.6
		54	100.0
Level of Education	HND/Diploma	2	3.7
	First Degree	24	44.4
	Master's Degree	26	48.1
	Technician (CTC I, CTC II, CTC III)	2	3.7
		54	100.0
Years of Experience	Less than 5 years	15	27.8
	5 – 10 years	20	37.0
	11 – 15 years	13	24.1
	16 – 20 years	3	5.6
	Over 20 years	3	5.6
		54	100.0
Type of Projects engaged by the firm	Civil Engineering	18	33.3
	Building	36	66.7
	Construction	54	100.0
Do you use WPMS?	YES	17	31.5
	NO	37	68.5
		54	100
Was it a voluntary decision?	YES	07	41.2
	NO	10	58.8
		17	100

Source: Field study (2019)

4.4 RELIABILITY OF THE CONSTRUCTS

Reliability means ensuring that findings obtained from the analysis are consistent (Bhattacherjee, 2012). That is, the repeated use of the research instrument should produce the same data as before (Polit et al., 1997; Denscombe, 2010). Reliability was established by ensuring that all sources of data were consistent with the research objectives and aim. Cronbach's alpha was used to examine the reliability of the scales used to measure the construct. Cronbach's alpha value > 0.70 was very reliable and all the constructs alpha values were greater than 0.70.

Table 4.2: Reliability of constructs

Constructs	N	No. of Items	Cronbach's Alpha
Performance Expectancy	54	5	0.867
Effort Expectancy	54	5	0.927
Facilitating Condition	54	5	0.887
Social Influence	54	5	0.915
Hedonic Motivation	54	4	0.980
Price Value	54	4	0.897
Habit	54	4	0.854
Internet Reliability	54	3	0.862
Power Supply	54	3	0.872
Culture	54	3	0.784
Behavioural Intention	54	4	0.917

Source: Field study (2019)

4.5 FACTORS THAT FACILITATE THE ADOPTION OF WEB-BASED PROJECT MANAGEMENT SYSTEM USING THE MODEL DERIVED FOR THE STUDY.

Table 4.3: Factors that facilitate the adoption of WPMS

Variables	N	Mean	Std. Dev.	Ranking
Performance Expectancy	54	1.39	0.763	**1**
Culture	54	1.20	0.762	**2**
Effort Expectancy	54	1.09	0.759	**3**
Internet Reliability	54	1.02	1.173	**4**
Facilitating Condition	54	0.87	0.933	**5**
Habit	54	0.83	0.885	**6**
Hedonic Motivation	54	0.80	0.998	**7**
Price Value	54	0.61	0.787	**8**
Social Influence	54	0.61	1.036	**8**
Power Supply	54	0.24	1.181	**10**

Source: Field study (2019)

There are many factors that can inspire the adoption of web-based project management system. Using the UTAUT2 model gives the real intention of an individual's decision to adopt the system. From the means scored by each of the constructs from the table above, performance expectancy scored 1.39. This means that most of the respondent agreed that performance expectancy is a major factor one thinks of before adopting the system. Performance expectancy is known as the stage at which individuals claim that using web-based project management system will enhance their job

performance. This is the first construct in UTAUT2 according to Venkatesh et al. (2003). Expectations of performance include constructs of perceived usefulness, work fit, comparative benefit and expectations of results (Addy et al., 2018).

Culture of individuals to adopt new technology was ranked 2nd having a mean of 1.20. The respondents agreed to the fact that one can adopt to technology when he/she has the willingness to adopt. They agreed that the adoption of web-based project management system depends on the culture of the company and the individual. If an individual is willing to adopt technology and the company does not have that edge, it obviously diminishes the edge of the individual to adopt the technology.

Effort expectancy and internet reliability were ranked 3rd and 4th with a mean score of 1.09 and 1.02 respectively. The respondent agreed that the ease that comes with the use of a particular technology will influence the adoption of the system. Moore and Benbasat (1991) and Davis et al. (1989) explains the ease of use to be the stage or level a person accepts that the use of a particular system or technology does not require any physical or mental exertion. Internet reliability is also needed to enable the system to work and the respondents agreed to tat factor also. The system uses the internet in other to allow various users to access the information and communicate with another team member.

Facilitating condition, Habit and Hedonic motivation ranked 5th, 6th and 7th with a mean score of 0.87, 0.83 and 0.80 respectively. This shows that more than 80% of the respondents agreed to this factor with a few been uncertain. Facilitating condition is explained as the existence of organisational and technical infrastructure believed to promote the use of a particular technology (Addy et al., 2018). Without these infrastructures, one cannot use the system. The habit of an individual is explained by Hope (1995) as a repetitive behaviour which usually happens

unconsciously. Lally et al. (2010) add up that this habit happens without the individual even noticing. Individuals habit influences him/her to adapt to a particular system. Hedonic Motivation is explained by Higgins (2006) as the promptness of a person's pleasure and pain receptors on their willingness to hit a target or move away from risk. Hedonic motivation is an idea which is derived from the classical theory of motivation which talks about individuals always ready to approach pleasure by avoiding pain (Addy et al. 2018).

About 61% of the respondents agreed that price value and social influence can facilitate one's adoption of web-based project management system. Both had a mean score of 0.61. About 40% of the respondent agreed that when the system is able to enhance their productivity exceedingly than the value charge for the system will minimally influence their adoption. The rest agree that even though if the system increase their productivity and it's been sold at a higher rate, it will still influence their decision and tend to look for another solution.

Social influence is the extent to which a person perceives how significant others think he or she should use a particular new technology or innovation. About 60% of the respondent think this influence one's behaviour in the adoption of web-based project management system.

Power supply had a mean of 0.24 ranking last. Most of the respondents agreed that power supply was the least among the factors that influence the adoption of web-based project management system.

4.6 THE LEVEL OF IMPACT OF THE IDENTIFIED FACTORS THAT FACILITATE THE ADOPTION OF WEB-BASED PROJECT MANAGEMENT SYSTEM IN THE CONSTRUCTION INDUSTRY.

The multiple regression analysis tool was used to identify the level of impact of the identified factors between each factor and the intention of adopting the system. Regression analysis is a powerful statistical method that allows you to examine the relationship between two or more variables of interest. The analysis enables us to bring out the p values for each of the factors to the intention of adoption of the system. The table below shows the level of impact of each identified factor to the intention of an individual adopting web-based project management system.

Table 4.4: Level of impact of each factor

Variables	N	P-value	Std. Dev.
Performance Expectancy	54	0.002019	0.763
Culture	54	0.014424	0.762
Effort Expectancy	54	0.000054	0.759
Internet Reliability	54	0.008103	1.173
Facilitating Condition	54	0.027337	0.933
Habit	54	0.074412	0.885
Hedonic Motivation	54	0.013063	0.998
Price Value	54	0.081606	0.787
Social Influence	54	0.000008	1.036
Power Supply	54	0.180878	1.181

Source: Field study (2019)

From the table above it is noted that social influence had the lowest p-value which signifies how higher its level of impact on an individual's behavioural intention of adopting web-based project management system. This posits that social influence has a strong significance with the intention to adopt the system (behavioural intention). This can be interpreted that most of the respondents have a perception that what others perceive about them has a higher influence on their decision to adopt web-based project management system. Social influence recorded a p-value of 0.000008 which is far lower than 0.05. This posits that social influence has a very low probability of not influencing the decision of the respondents to adopt web-based project management system and this proves the hypothesis that it has a significant impact on individuals' intention to adopt web-based project management system.

Effort expectancy had the second-lowest p-value signifying its level of impact on behavioural intention of the respondents in adopting web-based project management system. Effort expectancy is explained as the ease that comes with the use of a particular technology (Venkatesh et al. 2003). There is a higher degree of significance between effort expectancy and the behavioural intention of the respondents to adopt web-based project management system. This gives a p-value of 0.000054 which is far lower than 0.05. This shows that effort expectancy has a higher significance in the adoption of web-based project management system and this proves the hypothesis that it has a significant impact on individuals' intention to adopt web-based project management system.

Performance expectancy recorded the third-lowest p-value signifying its level of impact in the adoption of web-based project management system. Performance expectancy is known as the stage at which individuals claim that a specific technology enhances their job performance. Most of the respondent agreed that performance expectancy has a medium moderate impact with behavioural intention. There is a moderate increase in performance expectancy as behavioural intention

increases. It recorded a p-value of 0.002019 which is lower than 0.05. This indicates that performance expectancy is significant to the respondent in the adoption of web-based project management system and has a higher level of impact. This proves the hypothesis that it has a significant impact on individuals' intention to adopt web-based project management system.

Internet reliability recorded the fourth-lowest p-value signifying its level of impact on the adoption of web-based project management. This posits that there is a certain level of significance between internet reliability and behavioural intention according to the respondents. Web-based project management system is an internet-based system and requires internet accessibility in order to enable the user access the system. This has made the internet gain a higher degree of influence in adopting the system. Internet reliability recorded a p-value of 0.008103. The value recorded is far lower than 0.05 which is the benchmark for the significance of a variable or factor. This stipulates that internet reliability is very significant in the adoption of web-based project management system and proves the hypothesis that it has a significant impact on individuals' intention to adopt web-based project management system.

Higgins (2006) described hedonic motivation as the promptness of a person's pleasure and pain receptors on their willingness to hit a target or move away from risk. Hedonic motivation recorded the fifth-lowest p-value signifying its level of impact on the adoption of web-based project management system. It shows that it has a moderate degree of significance between it and behavioural intention. It recorded a p-value of 0.013063. This is lesser than 0.05 making it significant in the adoption of web-based project management system. It has an adequate level of impact to an individual's behavioural intention to adopt web-based project management system in their job performance. This proves the hypothesis that it has a significant impact on individuals' intention to adopt web-based project management system.

Culture recorded a significant p-value of 0.014424. This indicates that culture has an impact on an individual's behavioural intention to adopt web-based project management system. This is such because any p-value lesser than 0.05 is described to be significant. This proves the hypothesis that it has a significant impact on individuals' intention to adopt web-based project management system.

Facilitating condition recorded a significant p-value signifying its level of impact on behavioural intention of individuals to adopt web-based project management system. It recorded a value of 0.027337. This indicates that facilitating condition has an impact on an individual's behavioural intention to adopt web-based project management system in their job performance. This is such because any p-value lesser than 0.05 is described to be significant. This proves the hypothesis that it has a significant impact on individuals' intention to adopt web-based project management system.

Price value and habit recorded a p-value of 0.081606 and 0.074412 respectively. Their values are higher than 0.05 which is the cut off of p-value significance. Any value higher than 0.05 is described as not significant hence it has a lower level of impact on the behavioural intention of adopting web-based project management system. This nullifies the hypothesis that price value and habit have a significant impact on individuals' intention to adopt web-based project management system.

Power supply recorded a non-significant p-value signifying that it has a very low impact with behavioural intention of individuals to adopt web-based project management system. It recorded a value of 0.180878. This value is higher than 0.05 which is the cut off of p-value significance. Any value higher than 0.05 is described as not significant hence it has a lower level of impact on the behavioural intention of adopting web-based project management system. This nullifies the

hypothesis that price value and habit have a significant impact on individuals' intention to adopt web-based project management system.

From the results above the following hypothesis were proven to be significant.

H1: Performance Expectancy will have a significant positive impact on an individual's intention to adopt a Web-based project management system.

H2: Effort Expectancy will have a significant positive impact on an individual's intention to adopt a Web-based project management system.

H3: Social Influence will have a significant positive impact on an individual's intention to adopt a Web-based project management system.

H4: Facilitating conditions will have a significant positive impact on an individual's intention to adopt a Web-based project management system.

H5: Hedonic motivation will have a significant positive impact on an individual's intention to adopt a Web-based project management system.

H8: Reliable internet will have a significant positive impact on an individual's intention to adopt a Web-based project management system.

H10: Adoption of technology culture will have a significant positive impact on an individual's intention to adopt a Web-based project management system.

Table 4.5: Coefficient table

Variables	Beta	T - value	Sig. Value
Performance Expectancy	0.186	1.125	0.267
Culture	**0.300**	**2.492**	**0.017**
Effort Expectancy	**0.287**	**2.111**	**0.041**
Internet Reliability	-0.099	-0.648	0.520
Facilitating Condition	0.156	1.124	0.267
Habit	-0.160	-1.017	0.315
Hedonic Motivation	0.087	0.563	0.567
Price Value	0.070	0.486	0.630
Social Influence	0.285	1.507	0.139
Power Supply	-0.141	-1.021	0.313

Source: Field study (2019)

The table above shows the relationship between all the factors when analysed together and the behavioural intention of the respondents to the adoption of web-based project management system. Using the multiple regression tool from SPSS version 20, the Beta, T value and Sig. values were ascertained helping in making inference about the relationship. Working with a confidence level of 95%, all T - statistic values of 1.920 and above depicted a significant relationship with project success. Furthermore, the Beta values were used to ascertain the extent of the relationship. Beta values closer to 1 showed higher effect and vice versa.

From the table, culture of adopting technology showed the highest relationship with behavioural intention with a beta value of .300 and a T value of 2.492. This shows that culture with every

increase in culture there will be about 30% increase in behavioural intention to adopt web-based project management system. It recorded a sig. value of 0.017 which is lower than the alpha value chosen for the study which is 0.05. This was followed by effort expectancy which recorded a beta value of 0.287, t value of 2.111 and a sig value of 0.041. Venkatesh et al. (2003) explain this construct as the ease that comes with the use of a particular technology. Moore and Benbasat (1991) and Davis et al. (1989) explains the ease of use to be the stage or level a person accepts that the use of a particular system or technology does not require any physical or mental exertion. Hong et al. (2002) study declare that the ease of use of technology is mainly affected by individual differences such as computer self-efficacy and subject understanding. This explains that easy use of a particular technology will record a higher percentage of adoption.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 INTRODUCTION

The study was conducted to investigate the factors that facilitate the adoption of web-based project management system in the construction industry. I sought to identify the factors that facilitate individual's decision in adopting web-based project management system in their various firms or companies and to identify the impact or significance of those factors and also determine their correlation on individual's intention to adopt web-based project management system. Below is the discussion of how the objectives of the study were achieved.

5.2 SUMMARY OF FINDINGS FOR EACH OBJECTIVE

5.2.1 Objective One

The first objective was to identify the factors that facilitate the adoption of web-based project management system in the construction industry. To achieve this objective, descriptive analysis was used to measure the mean score of each of the factors and ranked from the highest to the lowest. The major factors identified were performance expectancy individuals perceive the system will bring, the culture of an individual and the company or firm he/she works at to adopt technologies, effort expectancy and internet reliability and others. Table 4.3 presents the ranking of the factors.

5.2.2 Objective two

Drawing heavily on the literature review a questionnaire survey was conducted to identify the level of impact on the identified factors that facilitate the adoption of web-based project management system. Multiple regression tool was used to achieve this objective. First the level of impact of each of the factors was analysed with the help of the p-values gotten from the multiple regression tool. It was noted that out of the ten factors listed, seven of them proved to have an accepted significance level. Three of the factors had their p-value higher than 0.05 making them obtain lower impact. This is presented in table 4.4.

The coefficient table from the analysis depicted that when all the factors are analysed together in correlation to the behavioural intention of an individual to adopt web-based project management system, effort expectancy and culture with a higher beta value and T – value. This is presented in table 4.5. Most of the hypothesis proposed in the literature review were found to be true but after analysis all the factors together only two were found to have a higher significance therefore proven only two of the hypotheses.

5.3 RECOMMENDATION

It was noted that an individual need to have the culture to adopt the system and this can help them have the intention to adopt the system. The system doesn't come with so much effort to access it. People always consider how easy technology is before they have any intention to use it. Most people do their best to avoid complex technologies even though they might improve productivity. From the findings of the research, the users of web-based project management system were

enthusiastic about the system and edged others in the construction industry to adopt this system to decrease the paper works in the industry.

5.4 LIMITATION OF STUDY

The study was limited to constructs from the UTAUT model and a few identified factors in Ghana to modify the constructs. Respondents made it difficult in answering the questionnaire which resulted in the fewer number used for the discussion. Some of them were never met at their office after a series of calls for the collection of the answered questionnaire. The time range for the study also presented itself as a limitation since much could not be done within it.

5.5 RECOMMENDATION FOR FURTHER STUDIES

The study could not cover most of the professionals in the construction industry, as well as other dominant regions in Ghana, where most of the construction firms have their head offices. The study can further be conducted at these places and also sought to find the benefits of the system and also various challenges that prevent construction professionals in adopting the system as well as other technologies that can improve productivity in the country.

A study can also be conducted to identify the basic factors in the Ghanaian construction industry that limits professionals to adopt various technologies that can improve their job performance because the industry lacks behind others.

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APPENDIX

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

COLLEGE OF ART AND BUILT ENVIRONMENT

DEPARTMENT OF CONSTRUCTION AND TECHNOLOGY MANAGEMENT

MSC PROJECT MANAGEMENT

RESEARCH TOPIC:

FACTORS THAT FACILITATE THE ADOPTION OF WEB-BASED PROJECT MANAGEMENT SYSTEM IN THE CONSTRUCTION INDUSTRY

Dear respondent,

This research is part of a Master's Thesis being conducted in the Department of Construction and Technology Management, Kwame Nkrumah University of Science and Technology, KNUST, Kumasi.

This purpose of this research is to investigate the factors that facilitate the adoption of web-based project management system (WPMS).

The information from this survey shall be kept confidential and completely anonymous and only findings in aggregate form will be submitted to the relevant authority.

Your participation in this survey is much needed and I will be grateful if you can answer these few questions. I will like to thank you in advance for your cooperation as you complete these questions.

WPMS = Web-based Project Management System

NB: A web-based project management system is simply programmed to manage and store all construction project information from the initiation stage to the completion stage and can be accessed by all project team members using a user id and password. It saves all documents and information in the firm for future uses to avoid reworking and well as improve management of a project.

For any enquiries please contact

Joshua Koranteng Odamey - 054 508 5601 **E-mail: jkodamey@gmail.com**

SECTION A: BACKGROUND OF RESPONDENT

This section seeks to elicit the basic personal background of the respondents.

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

1. Please kindly indicate your age range below

a) 20 – 25 [ ] b) 26- 30 [ ] c) 31- 35 [ ] d) 36- 40 [ ] e) 41- 45 [ ] f) 46- 50 [ ]

g) 51 – 59 [ ] h) 60 and above [ ]

2. What is your educational level?

a) HND/Diploma [ ] b) First Degree [ ] c) Master's Degree [ ] d)Doctorate Degree[ ]

e) Technician (CTC I, CTC II, CTC III) [ ]

f) Others please specify……

3. How long have you been working in the Ghanaian construction industry?

a) Less than 5 years [ ] b) 5 – 10 years [ ] c) 11 – 15 years [ ] d) 16 – 20 years [ ]

e) Over 20 years [ ]

4. What is your company's years of experience in the Ghana construction industry?

a) Less than 5 years [ ] b) 5 – 10 years [ ] c) 11 – 15 years [ ] d) 16 – 20 years [ ]

e) Over 20 years [ ]

5. Profession:

a) Engineer [ ] b) Architect [ ] c) Quantity Surveyor [ ]

d) Other please specify …….

6) What type of projects does your firm work on?

a) Civil Engineering [ ] b) Building Construction [ ]

7) What is the value of your companys highest projects project?

a) up to GH₵400,000 [ ] b) up to GH₵1,000,000 [ ] c) up to GH₵2,500,000 [ ]

d) above GH₵2,500,000 [ ]

SECTION B: FACTORS THAT FACILITATE WEB BASED PROJECT MANAGEMENT SYSTEM ADOPTION IN GHANA

Indicate the extent to which you agree with the following statements as influencing your decision to adopt or use WPMS using the given scale below.
(-2: Strongly Disagree, -1: Disagree, 0: Uncertain, 1: Agree, 2: Strongly Agree)

SCALE	**-2**	**-1**	**0**	**1**	**2**
Performance expectancy					
WPMS would be useful in my work					
Using WPMS would help me accomplish things more quickly					
Using WPMS would increase my productivity					
Using WPMS would increase my chances of achieving things that are important to me					
Effort Expectancy					
Learning how to use WPMS would be easy for me					
My interaction with WPMS would be clear and understandable					
I would find WPMS easy to use					
It would be easy for me to become skilful at using WPMS					
Facilitating Conditions					
I have the resources necessary to use WPMS					
I have the knowledge necessary to use WPMS					
WPMS is compatible with other technologies I use					
I can get help from others when I have difficulties in using WPMS					
Social Influence					
People who are important to me think that I should use WPMS					
People who influence my behaviour think that I should use WPMS					
People whose opinions that I value prefer that I use WPMS					
The senior management of the business would be helpful in the use of WPMS					
Hedonic Motivation					
Using WPMS would be entertaining					
Using WPMS would be enjoyable					
Using WPMS would be fun					

Price Value					
I think WPMS is reasonably priced					
I think WPMS is good value for the money					
At the current price, I think WPMS provides a good value					
Habit					
The use of WPMS would become a habit for me					
I would be addicted to using WPMS					
I must use WPMS					
Internet Reliability					
I have a reliable internet in Ghana to use WPMS					
Internet is expensive in Ghana					
Power supply					
Constant supply of power in my company					
I have a generator or plant to use in case the power goes off					
Culture					
My company adopts new technology					
I like to adopt new technology when made available					
Behavioural Intention					
Given that I had access to WPMS, I intend to use it					
Given that I had access to WPMS, I predict I would use it					
Given that I had access to WPMS, I plan I would use it					

Please kindly indicate below any further comment.

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THANK YOU.