

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,  
KUMASI, GHANA**

**The Impact of Information Management on Project Delivery in Ghana**

**by**

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College of Arts and Built Environment

in partial fulfilment of the requirements for the degree of

**(MASTER OF SCIENCE IN CONSTRUCTION MANAGEMENT)**

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## DECLARATION

I hereby declare that this submission is my own work towards the MSc. in Construction Management and that, to the best of my knowledge, it contains no material previously published by another person, nor material which has been accepted for the award of any other degree of any University, except where due acknowledgment has been made in the text.

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## ABSTRACT

Information management is paramount to the construction industry's processes and operations. It is a cycle that runs from identification of information needs and continues through to its use. The management of information within the construction industry, which helps it to strive well, is not always given the needed attention from senior executives or management, let alone project team members. Due to the lack of appropriate information policy guideline, most project have failed. As a result most projects do not meet their expected cost budgets, safety requirements, quality expectations and time schedules. The research aimed at investigating the role of information management in the performance of project team members. It sought to identify the kinds of information that are available, explore their relevance and challenges associated with information management by project team members. The research was based on a quantitative survey approach. Snowball sampling technique was adopted to get responses from professionals in the construction industry. A total of fifty seven (57) questionnaires was distributed in all among nineteen (19) companies. The most important documents available to the project team members on construction project delivery were master construction programme, progress reports, bill of quantities, architectural and engineering drawings and many more. It was also discovered that the most significant challenges associated with information management on construction project delivery were discrepancies in project documents, lack of information management policy guidelines, unclear definition of roles and functions, and many other challenges. It was however recommended that project documents should be scrutinised to eliminate discrepancies, clear information management policy guidelines should be put in place and enforced, roles and functions of team members should be clearly defined before the start of any project by competent

and experienced professionals. A well organised and effective information management would lead to a reduction in reworks, disputes, cost and time overruns. It would also improve the quality of workmanship which will bring proper coordination among stakeholders and project team members in the delivery of good construction projects in the construction industry in Ghana. The study used the snowball sampling technique due to the lack of accurate data on the respondents. As a result, the representativeness of the sample cannot be ascertained, limiting the extent to which the findings can be generalised in the report.

**Keywords:** Information management, Construction industry, Project delivery.



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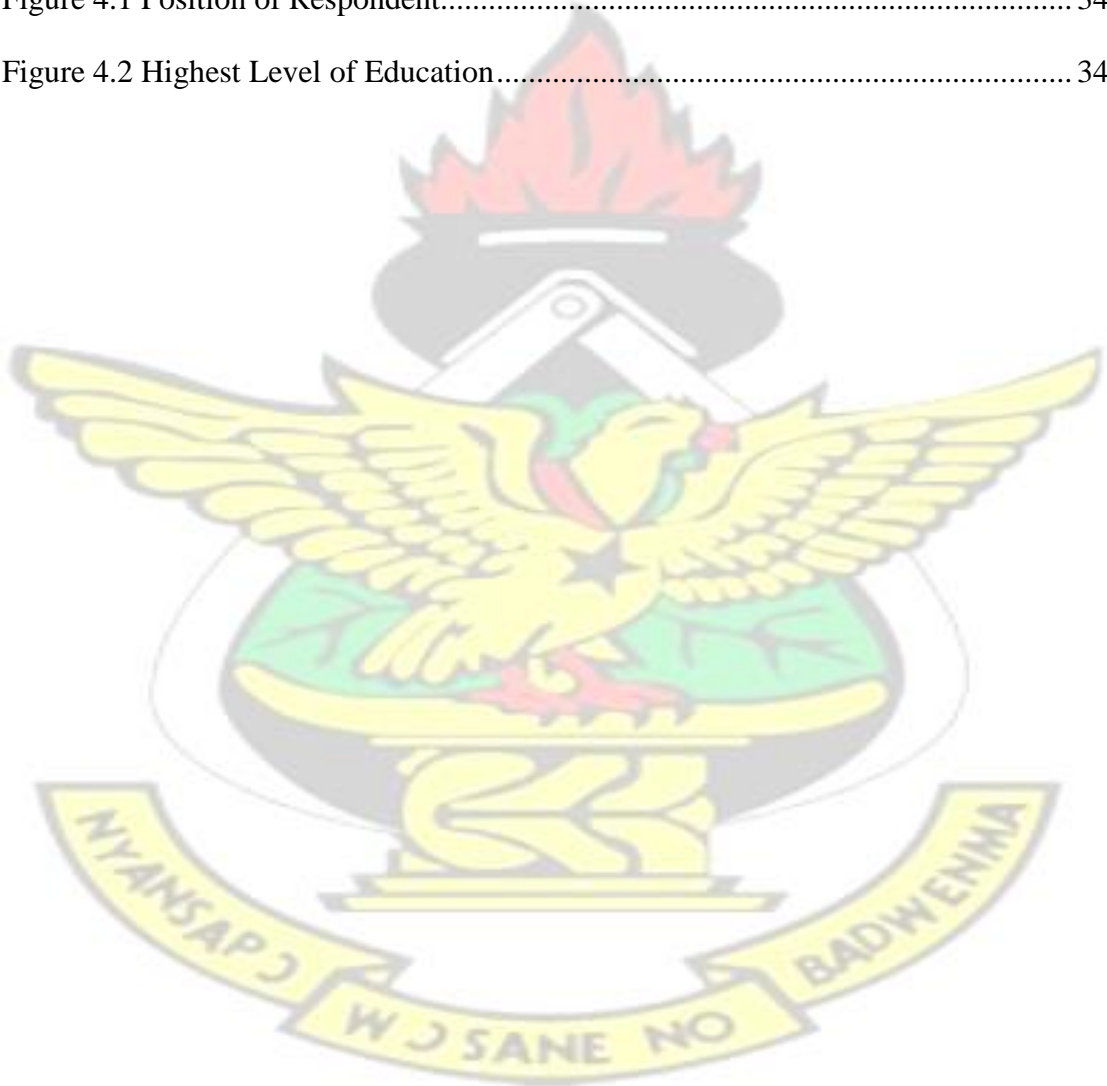
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I thank the Almighty God, the most gracious and the most merciful.

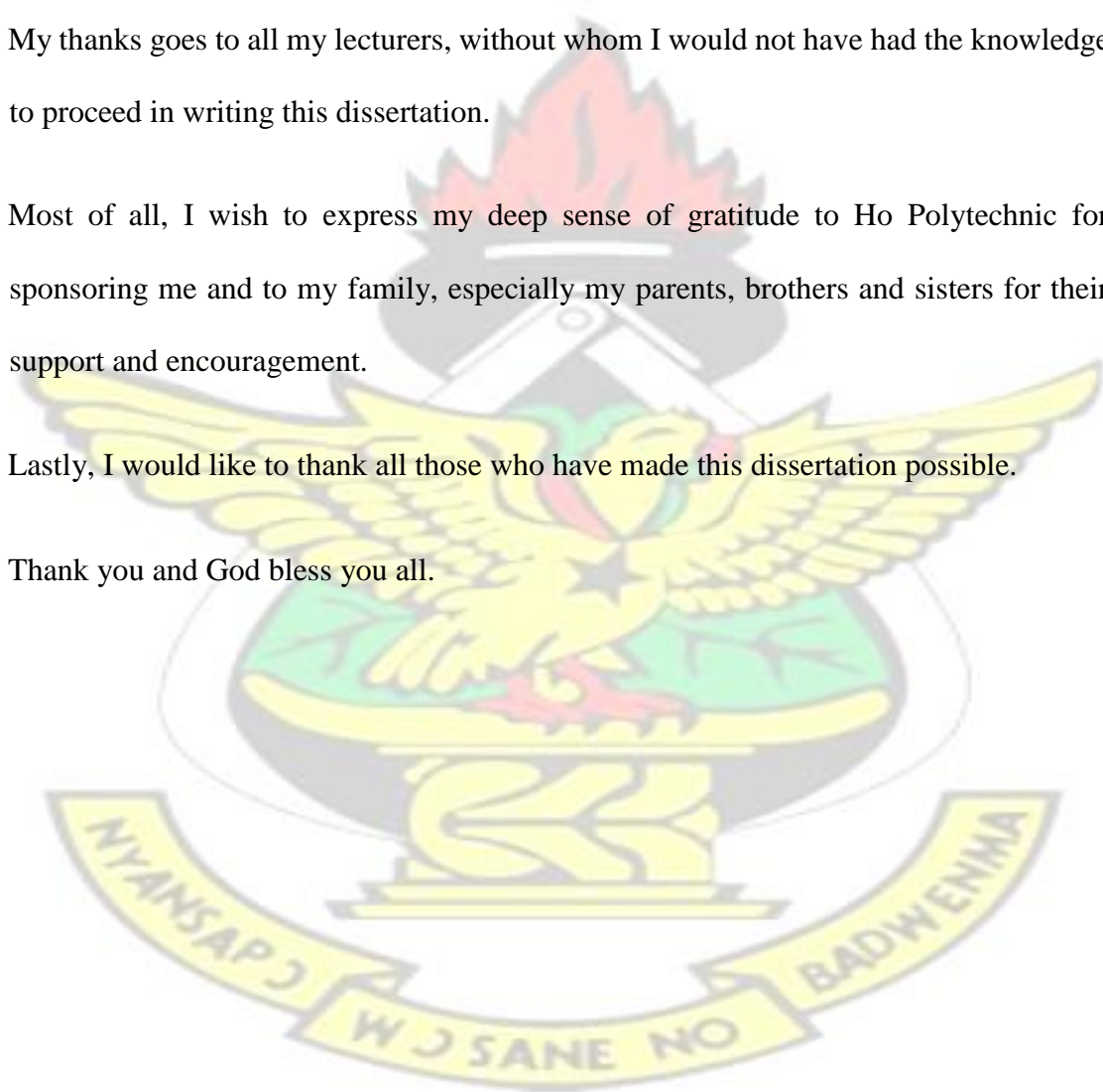
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## **DEDICATION**

This piece of work is dedicated, firstly to the Almighty God, in whom all wisdom, strength and grace came from, secondly to Ho Polytechnic my employer for the sponsorship and lastly to my Parents, Brothers and Sisters for their love and support.

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# CHAPTER ONE

## INTRODUCTION

### 1.1 BACKGROUND

Information management is paramount as one of the resources on which the construction industry's process and operation are run smoothly. However, most industries strive on information in order to operate and the construction industry is not an exception.

The management of information within the construction industry is given less attention from senior executives (Harris, *et al.*, 2013) let alone project team members. According to Harris *et al.* (2013), some of the processes involved estimating, marketing, tendering, design, construction and others are geared towards the achievement of the Construction industry's business.

The uniqueness of the construction industry relative to its diverse actors such as consultants, clients, contractors, sub-contractors or specialist contractors and suppliers who are involved almost in any project delivery needs information in one way or the other to see the successful initiation, implementation and completion of projects (A.Weippert, *et al.*, 2003).

However, information that are well organised, stored for easy access and the way they are communicated to the key actors for decision making, enhances the achievement of organizational goals and objectives. Construction project team members depends on accurate and timely information right from the design stage through to completion stage to effectively manage a particular project well (Jaggar, *et al.*, 2001). Project information outputs are vital and helps in decision making by project team members at each succeeding stage in project delivery in Ghana.

Furthermore, collaboration among construction project team members as a results of adequate project information which are made available to them helps to clarify task that are required of a particular products and process to ensure their effectiveness and efficient delivery of that project (Bouchlaghem, *et al.*, 2004). How well information are managed would lead to minimize or eliminate problem of cost and time overruns, poor planning, price changes, delay etc.in project delivery in Ghana.

## 1.2 PROBLEM STATEMENT

Lack of information policy frame work in the construction industry has led to the failure of most projects, particularly not meeting expected cost budget, safety requirements, quality expectations and time schedule. Less emphasis is laid on project information necessary for successful project delivery.

However, ineffective, inadequate and inaccurate organisation and controlling of information resources in the construction industry has negatively influence the outcome and the overall output of project team members in Ghana.

Project information are carefully generated on series of construction projects over time, and kept in a retrievable manner in a database which serve as a valuable asset on which most reliable decisions making would be benchmarked against. Hence, these will lessen the time taken to make some decisions like coming out with realistic early project estimates which will curtail unnecessary cost overruns (Ahiaga-Dagbui & Smith, 2014).

Construction projects comprises a lot of activities like design, procurement and construction which are handled by different professionals as team depends on much information from diverse sources for their operations and processes. According to Harris *et al.* (2013), these sources can be classified into internal and external sources, which the internal sources are found within the organisation's formal and informal

reporting systems in managing their projects and controlling activities and access to these information is easier, and the external sources are those sourced outside the organisation with the business environment which are diverse in nature and these information are not in stable manner.

However, construction projects delivery needs a pragmatic strategy for sourcing, updating and managing information for use by project team members in their respective roles in achieving project goals and objective. With the current technological era of construction it is vital that information flow among project team or participants is precisely accurate, timely and meets the need of users (Jaggar, *et al.*, 2001).

Series of researches has been conducted on information management in the built environment but less attention is drawn on the impact of it on project delivery by construction project team members' performance in Ghana. The industry is noted for its numerous activities encompassing diverse professionals who dwell much on information to perform their tasks. However, information on its project teams' performance is scanty hence this study.

### 1.3 RESEARCH QUESTION

The study was guided by the following basic questions which were relevant to the area of study.

- ❖ What kinds of information is available to project team members?
- ❖ Do project team members manage information well?
- ❖ What are the barriers to information management in Ghana by project team members?

### 1.4 AIM AND OBJECTIVES

#### 1.4.1 AIM



The research aims to investigate the role of information management in the performance of project team members in construction project delivery.

#### 1.4.2 OBJECTIVES

- ❖ To identify the kinds of information available to project team members.
- ❖ To explore the relevance of available information in the performance of construction project team members.
- ❖ To identify challenges associated with information management in construction project delivery.

#### 1.5 SIGNIFICANCE/JUSTIFICATION OF THE STUDY

As a result of cost overruns, schedule overruns, delay in project delivery, poor project documentation, claims and disputes etc. which among the lots are project related problems can be traced to insufficient project information management. Even though, information organization and controlling is fundamental to project outcome less attention has been given to it, whereas other activities within a construction project such as health and safety, risk, quality, cost, material, plant management etc. relied so much on information but one hardly hears of information manager or information policy in the construction industry.

This research will throw more light on the relevance of information management particularly by project team members in aiding their performances on construction project delivery in Ghana.

#### 1.6 SCOPE /DELIMITATION OF THE STUDY

The impact of information management on construction project delivery concern all construction projects in the whole country Ghana. Even though information management goes with information system and information communication

technology, this research only focuses much on information management. The research was expected to reflect the true situation of project delivery in the country. However, due to time and resources constraint Ho Municipality in the Volta Region of Ghana was selected for the research. The targeted group was limited to key project team members which typically comprise of the Project or Construction Managers, Project or Works engineers, Quantity Surveyors, Architect, Clerks of works or Foremen who works with building contractors in order to have a fair and balanced view of the situation in the Municipality.

## 1.7 STRUCTURE OF THE REPORT

Chapter One - Introduction and background study

Chapter Two - Literature Review

Chapter Three-Methodology

Chapter Four - Data presentation and Analysis of findings

Chapter Five - Conclusion and Recommendations

## 1.8 SUMMARY OF CHAPTER

Uniqueness of the construction industry relative to its diverse actors such as consultants, clients, contractors etc. who are involved almost in any project delivery demands appropriate information management to keep all actors informed about a project status in a manner that is well organized, stored for easy access and their communication to key actors for appropriate decision making which enhances the achievement of project goals and objectives. Information management in the construction industry is given less attention which impact negatively on project delivery by construction project team members' performance in Ghana. Lack of information policy framework in the

construction industry has led to the failure of most projects, particularly not meeting expected cost budgets, safety requirements, quality expectations and time schedules. Less emphasis is laid on project information necessary for successful project delivery hence, the research aimed at investigating the role of information management in the performance of project team members in construction project delivery by identifying the kinds of information available to project team members, exploring the relevance of the available information in the performance of construction project team members and to identify challenges associated with information management in construction project delivery.



## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

Information is important in the construction industry's business. All the processes and procedures rely heavily on both internal and external sources of information from top

management to operative on site for their operation. The success or failure of project delivery depends on how accurate and timely these information are sourced and utilized for prompt decision making by decision makers or project team. Information has become the driving force in the construction industry for competitive advantage.

## 2.2 INFORMATION

Information can be defined as data that is accurate, precise, timely, and organized for a purpose, presented in a manner which gives it understanding, importance and can lead to an increase in understanding and decrease in indecision. Information can influence decisions, performance and the corresponding outcome of a construction project (Floridi, 2010).

Information is that which “informs” that is an answer to a question, as well as that from which knowledge and data can be derived (Floridi, 2010). Information is data that are manipulate, process and organised to give a contextual meaning to enable users to take action (Tuuli & Maila, 2015).

### 2.2.1 SOURCES OF INFORMATION IN CONSTRUCTION

The construction industry depends on information from diverse sources. Harris *et.al.* (2013) grouped them into two main sources namely internal and external. The internal sources can be located within the organisation’s reporting system whilst the external sources can be found outside the organisation but addresses the interaction between it and the business environment. The external information available sources are not stable in nature.

*Table 2.1 Construction information sources.*

Information type	Primary source	Secondary source
------------------	----------------	------------------



New development	<ul style="list-style-type: none"> <li>❖ Research publications</li> <li>❖ Corporate communications</li> <li>❖ Commercial journals</li> <li>❖ Technical aspects</li> </ul>	<ul style="list-style-type: none"> <li>❖ Industry magazines</li> <li>❖ Academic journals</li> </ul>
Processes	<ul style="list-style-type: none"> <li>❖ Corporate documentation</li> <li>❖ Research publications</li> <li>❖ Internal reports</li> <li>❖ Cost data</li> <li>❖ Output performance</li> </ul>	<ul style="list-style-type: none"> <li>❖ External benchmarks</li> <li>❖ Internal benchmarks</li> <li>❖ Quality Control Unit</li> <li>❖ Professional bodies</li> <li>❖ BCIS</li> </ul>
Competitiveness	<ul style="list-style-type: none"> <li>❖ Companies in the same strategic group</li> <li>❖ Construction industry organisation outside strategic group</li> <li>❖ Benchmarking reports</li> </ul>	<ul style="list-style-type: none"> <li>❖ Construction Forecasting Group</li> <li>❖ Statistical Digest for construction</li> </ul>

Source: (Harris, *et al.*, 2013)

*Table 2.1 Continued*

Information type	Primary source	Secondary source
Future workload	<ul style="list-style-type: none"> <li>❖ Forecast by major client organisations</li> <li>❖ Development plans and budgets for central government departments</li> <li>❖ Development plans and budget for local government departments</li> <li>❖ Official Journals of the European Commission</li> </ul>	<ul style="list-style-type: none"> <li>❖ Regional economic trends</li> <li>❖ National economic forecasts</li> <li>❖ Global economic trends</li> </ul>



Standards	<ul style="list-style-type: none"> <li>❖ HMSO</li> <li>❖ BSI</li> <li>❖ HSE</li> <li>❖ ISO</li> </ul>	<ul style="list-style-type: none"> <li>❖ Research institutes</li> <li>❖ TRADA</li> <li>❖ CIRIA</li> <li>❖ Professional Bodies (ICE etc.)</li> <li>❖ Trade associations</li> </ul>
Specifications	<ul style="list-style-type: none"> <li>❖ Trade associations</li> <li>❖ Bodies concerned with regulatory compliance</li> <li>❖ Electronic Libraries (Barbour Index, GENIAL)</li> </ul>	<ul style="list-style-type: none"> <li>❖ National Building Specification Services</li> <li>❖ EMAP Business Publishing</li> </ul>

Source: (Harris, *et al.*, 2013)

In the past construction managers or project teams were faced with situations in which such information were mainly paper-based where they have to be source from several outlets which was tedious and time consuming but currently with the advent of technology most of these information could be accessed electronically (Harris, *et al.*, 2013).

### 2.2.2 INFORMATION CLASSIFICATION

Information has many characteristics and can be classified in many way. These are few examples according to (Lucey, 1995) as follow:

*Table 2.2 Classification of information.*

Classification	Examples
By Source	Internal, external, primary, secondary, Government etc.
By Nature	Quantitative, qualitative, formal, informal etc.
By Level	Strategic, tactical, operations etc.
By Time	Historic, present, future etc.
By Frequency	Continuous, hourly, daily, monthly, quarterly, annually etc.
By Use	Planning, control, decision making etc.
By Form	Written, aural, visual, sensory etc.
By Occurrence	At planned intervals, occasional, on demand etc.
By Type	Detailed, summarized, aggregated, abstracted etc.

Source: (Lucey, 1995)

### 2.2.3 TYPES OF INFORMATION ON PROJECT DELIVERY

In the delivery of a successful project which meets almost all the requirements, most especially to meet time, cost, quality, health and safety etc. the following documents are found to be relevant to project team members which provide them with the necessary information.

- ❖ Architectural and Engineering drawing - This document basically is developed from the project requirement or brief. The most common means of communication for all types and sizes of projects (Brook, 2004). The purpose or function of the construction project is depicted graphically or in an image form to represent what is to be built, how is to be built etc. (Yuan & John, 2008). It provides the basis on which the determination of expected cost, time, quality etc. needed to meet the stated goal.
- ❖ Specifications – It highlights information provided in the contract drawings and bill of quantities, and also describes in much detail the work to be done under the contract. It also stipulates nature and quality of the materials, components and workmanship. Where there is a bill of quantities, the specification will not be a contract document unless so prescribed, and it may be incorporated in the bill of quantities in the form of preambles (Seeley & Winfield, 1999). It is prepared normally by an Architect, Quantity Surveyors or consulting engineers. This document provides a written technical information on standards required of the construction project (Mehta, *et al.*, 2013). They provide information mainly on the quality, types of finishes, materials to be used, sizes of aggregates and other materials that cannot be shown graphically etc.
- ❖ Bill of Quantities – The quantity surveyor, is guided by standard method of measurement (SMM) to come out with quantities that would be involved in the

elements of the proposed project. The quantities so derived assist the estimating team to come out with approximate estimate of materials and cost of the projects to be built. This helps in managing the project to be within budget and time. This document acts as a unifier basis for inviting competitive tenderers and helps in valuing work done or work in progress (Jaggar, *et al.*, 2001). It is price during tendering by contractors which later form part of the contract for a successful tenderer and becomes a control tool for construction project teams' monitoring and evaluation.

- ❖ Method statement – This document detailed out the actual construction project to be executed. Normally it deals mostly with labour and plant in respect to types, gang size and their expected output (Brook, 2004). It is used by site or project managers together with some other vital contract documents as a control tool in managing a project, just as design teams also uses it to assess a chosen methodology by the contractor to executing a particular construction project at the tendering stage (Gyampoh-Vidogah, *et al.*, 2003).
- ❖ Material schedule – This document detailed out material quantity inflows as to what is to be purchase, how, when and which type of material that is to be delivered for a particular projects (Topliss & Hurst, 2010).
- ❖ Plant and Equipment schedule – This schedule also detailed out the type of plant and equipment that is required to carry out a particular project. The schedule gives the time the plant and equipment would be brought to site, whether to hire or own.
- ❖ Master construction programme - This document give out the whole sequence of several activities to be carried out and clearly shows the interrelationship between them and the resources needed and how they are allocated to activities.

Whether the project is making progress or not rests on the shoulders of the construction or project manager and his team, so the project team compares anticipated progress to actual progress for activities during construction according to (Gyampoh-Vidogah, *et al.*, 2003).

- ❖ Cash flow forecast – The outcome of a construction project which is delivered within financial plan and time depends on how well the funds are likely to be required or anticipated to know how much would be expended and how much is expected in to run the project activities by stakeholders (Ashworth, 2010).
- ❖ Progress report – This document report mostly on the value of work done as against what is expected to be completed within a particular schedule time and also reports on cost expended against expected cash inflow from value of work done. It also report on challenges and future projection of works to be executed.
- ❖ Minute of meetings – This document highlight discussions that transpired at meetings. Where issues pertaining to project are deliberated upon and those that needs to be address are dealt with whilst those that needs further actions are assign to stakeholders or key project team members.
- ❖ Risk, Health and Safety plan – This document identifies, analyses, assess and control organizational policy on project and map out ways to avoid, mitigate and transfer risk issues on health and provide information, training and instruction for the welfare of people.

#### 2.2.4 INFORMATION CYCLE

Information as an asset in an organisation has an associated value that is relative to the impact of threat which affects the availability, confidentiality and authenticity. However, the threat model for information stored and retrieved locally in an



organisation allows the control access to be secured within a specified users (Jericho Forum, 2009).

Information management is a cycle that is continuous and have closely related activities as

- ❖ Identification of information needs;
- ❖ Acquisition and creation of information;
- ❖ Analysis and interpretation of information;
- ❖ Organisation and storage of information;
- ❖ Information access and dissemination;
- ❖ Information use;

The understanding is that just as an organisation plans and manages its resources such as human, material, plants and financial assets, it should purposefully manage information resources and processes because all the functions of managing an organizational processes and procedures apply to information management such as defining goals, developing policies, allocating resources, providing leadership, training staff, evaluating and feedbacks (Choo, 2002).

Information must be correctly and accurately classified for identification sake in the organisation such that team members or users can have access and handle it as required to secure the storage and probably disposed of it safely especially the relevant information aspect (Jericho Forum, 2009).

Information shared have value associated to its organisation such that the information content should be labelled with a protection policy as per information classification scheme and impact sensitivity categorisation. The information classification scheme and impact sensitivity categorisation should be reviewed and updated constantly to



depict the most recent sensitivity of the information. All these together with policy for creation, storage, transfer, update and deletion of information demand information lifecycle management process which should be analysed periodically (Jericho Forum, 2009).

#### 2.2.5 CONSTRUCTION INFORMATION MANAGEMENT

Information Management is the gathering and management of information from one or several sources and the sharing of that information to one or several stakeholders who need or have right to such information. Management however, deals with the organisation of information and the control over the structure, processing and delivery of information. Information, nowadays entails both electronic and physical information and the structure of the organisation must be capable of managing such information throughout the information lifecycle irrespective of the source or format such as data, paper documents, electronic documents, audio, video etc. that are communicated through multiple means or channels that may include cell phone, contract document and web interfaces (Fama, 2005).

Information management according to Johnson (1992) as cited by (GyampohVidogah, *et al.*, 2003) as the overall management of information and the control of the organisation's investment in it, which entails the identification and sharing management information by ensuring uttermost control, standardization, security and integrity of valuable data stored.

However, the principle of a good information are that, they are relevant, accurate, complete, simple and timely available when needed for prompt decision making (Gyampoh-Vidogah, *et al.*, 2003) by project teams as well as stakeholders because these factors have a great bearing on project delivery as well as on the organisation's business.

The focus of construction industry to find solution to most of the problems encountered or that existed in managing information is convoluted in such a way that one could hardly tell whether or not information and document management are the same in construction. According to Joia (1998) as cited by (Gyampoh-Vidogah, *et al.*, 2003) document is an information presented in a structured form. However, (Gyampoh-Vidogah, *et al.*, 2003) argue that documents remain the way to creating and communicating information irrespective of the advent of modern information technology which is true for the construction industry.

#### 2.2.5.1 BENEFITS OF INFORMATION MANAGEMENT

It is undeniable fact that information management brings in value (Titus & Brochner, 2005), the value so achieved from information makes it possible for people and system to take pragmatic decisions on information that is relevant, complete, simple, accurate and timely that have great bearing on the achievement of core goals in the performance of team members in project delivery.

Cost reduction is one of the most important benefit of information management, for instance the US Government's Paperwork Reduction Act of 1980 which was amended and enacted as law in 1995 identified two specific objectives as "to minimize the paperwork burden," and "to minimize the cost to the Federal Government of the creation, collection, maintenance, use, dissemination and disposition of information" (Choo, 2002). The Act provide the driving force and model for the management of information more efficiently by most of its Government agencies.

Reduction in uncertainty by managing information flow which minimizes the risky processes in successful discoveries, marketing and developing product and services which focuses and guide other activities in the organisation.

Information management adds value by leveraging information about customers, products and services which aids a lot of innovations that brings convenience and efficiency to a system (Choo, 2002). It also creates value by bringing on board none exiting systems to improve the existing product and services in an organisation (Bytheway, 2014).

#### 2.2.5.2 BENEFITS OF INFORMATION MANAGEMENT TO CONSTRUCTION PROJECT TEAM

Effective management of project is paramount to the success of it (Chen, *et al.*, 2010). Managing information particularly in the construction project delivery has greater influence on the efficient flow of information which are relevant, complete, simple, accurate and timely between project parties and team members which is key to improving the quality, time and cost factors of the project. Love *et al.* (2008) as cited by (Tuuli & Maila, 2015) found out that 70 per cent of rework carry out in the construction industry was as result of discrepancies in design documentation which could have been avoided to reduce the cost incurred in reworks. Information so managed well minimizes conflicts between parties. The quality of information helps project team members to take action on what problem the information is supposed to solve (Tuuli & Maila, 2015). Monitoring and controlling the performance and the extent of deviations from planned activities; team members are better able to communicate development, plans, forecasts and impending changes to control operation by reducing uncertainties (Lucey, 1995).

Information management improves productivity, quality of decision making, performance of task, learning curve, up-grade work function importance and improve team spirit were some of the benefits identified by Feather & Sturges (2002).

### 2.2.5.3 CHALLENGES OF INFORMATION MANAGEMENT TO CONSTRUCTION PROJECT TEAM

The culture of an organisation in particular is a serious challenge because it is its customary and traditional way of thinking and doing things which is shared to a greater or lesser degree by all its members, which new member must also learn, and at least partially accept, in order to be accepted. It covers a wide range of behaviours, the method of production, job skills and technical knowledge, attitudes toward discipline and punishment, the customs and habits of managerial behaviour, object of the concerns, its ways of doing business, the method of payment, the values placed on different types of work and the less conscious conventions and taboos (Jaques, 1952; p.251) as cited by (McCabe, 2001).

According to McCabe (2001) culture is a social guide that holds people together in an organisation because the stronger the culture which exist the more that people will adhere to the values and accepted practices that are believe to exist.

If management of an organisation wish to ensure that its customs and practices receive the best services possible, it is essential that all employees believe in this ethos. However, the challenge here is what need to be done in order to achieve change in the culture of the organisation which will create this sort of cohesiveness among the workforce (McCabe, 2001).

Some key observation of challenges identified was that functional departments have separate filing and dispatch system to themselves which makes duplication of information prevalence among them, insecurity of information becomes obvious in the sense that anybody at all could lay hands on sensitive and vital records and alterate data store, the use of manual means makes the system and processes very slow in information search and finally, due to the lack of storage space as companies or



organisations grows demand for space becomes much expensive to store information (Gyampoh-Vidogah, *et al.*, 2003).

In a study by A. Weippert, *et al.*, (2003) argue that due to the numerous stakeholders in the industry and its uniqueness access to vital information which needed to perform some task get lost. They further attributed these challenge to factors like clients demand for innovation informative communication and technologies, increased competition, globalisation of the economy, greater performance expectations from clients etc.

#### 2.2.5.4 PERFORMANCE OF INFORMATION MANAGEMENT

Performance according to the business dictionary is the accomplishment of a given task measured against preset known standards of accuracy, completeness, cost and speed. In a contract performance is deemed to be the fulfillment of an obligation, in a manner that releases the performer from all liabilities under the contract

The overall purpose of performance of information management is to exhibit that the project team members are supporting its organizational information management vision, mission, guiding principles or policies, program plans in achieving the organisation preset targets in a master construction program for a particular project in order to be within a cost budget, time schedule not to overrun them as well as quality of workmanship. The demonstration of performance by evaluating work ongoing with the program and identifying areas that demand change or improvement to maintain or adjust resources allocation on the planned activity schedules according to a government report on performance by Office of the Chief Information Officer (OCIO) Newfoundland Labrador, Canada,(2014).

#### 2.2.5.5 IMPORTANCE OF DOCUMENT MANAGEMENT



The construction industry transfers huge volumes of information between construction project team as a result of improving information management which means that document management cannot be relegated to the background (GyampohVidogah, *et al.*, 2003).

According to a research by Joia (1998) as cited by (Gyampoh-Vidogah, *et al.*, 2003) on consulting engineers it came out that:

- ❖ On an average, only 5% of the company's documentation is on-line and 90% is on paper.
- ❖ The information received by engineers is often outdated.
- ❖ Engineers, on average, waste more time looking for documents than using them.
- ❖ It is bare possible to create documents with the collaboration of partners, as there is no process to achieve a workgroup environment.
- ❖ Documents are created from scratch, as it is very difficult to find a template that might be useful and
- ❖ Finally, it is sometimes difficult to find the most recent version of engineering documents.

### 2.3. PROJECT

PMBOK defines Project as “A project is a temporary endeavor undertaken to create a unique product, services or result”. Project also involve commercial risk and they involve people (Murdock & Hughes, 2008). Projects have a beginning and an end. Project objectives position factors for project success (Chen, *et al.*, 2010). A set up at the beginning of a particular phase may call for an appropriate organisational arrangements to solicit all the necessary consent for the execution of a project as well as a safe procedures (Harris, *et al.*, 2013). A project comes to an end when its objective

have been satisfied or when it has been terminated due to the fact that its objective will not or cannot be achieved or the project is no longer of importance.

The PMBOK identifies and grouped five processes as follows:

- ❖ Initiation process which is the phase of formally authorizing a new project. This phase married the project to the work the organisation does or performs. Projects are initiated because of one or more of the following reasons as a market demand of a product or services, a customer request, a new technology, a business need or a social intervention or need.
- ❖ Planning process deals with defining and refining project objective and identifies and select the best of the alternative path of action to solving or attaining the set objectives.
- ❖ Executing process simple coordinates people and other resources such as equipment, plant and materials to carry out the plan to do the project.
- ❖ Monitoring and Controlling process ensures the high quality of achievements of the project plan and updating it when necessary.
- ❖ Closing process formalize acceptance of the project by its customers and stakeholders and bring it to an orderly conclusion.

### 2.3.1 TYPES OF PROJECTS

Projects come in diverse forms depending on the need, however, the following were identify according to PMBOK as some examples of projects, but not limited to:

- ❖ Developing a new product or services or result;
- ❖ Effecting a change in the structure, process, staffing, or style of an organisation;
- ❖ Developing or acquiring a new or modified information system (hardware or software);

- ❖ Conducting a research effort whose outcome will be aptly recorded;
- ❖ Constructing a building, industrial plant or infrastructure; or
- ❖ Implementing, improving or enhancing existing business processes and procedures.

### 2.3.2 CONSTRUCTION PROJECT

The word Construction could consist of repair works, erection of new or demolishing of existing structures such as shops, houses, dams, offices, bridges, motorways, factory buildings, airports etc. (Murdock & Hughes, 2008).

According to Gould (2005), defined a project whether it is in construction or not by the following characteristics:

- ❖ A defined goal or objective
- ❖ Specific tasks not routinely performed
- ❖ A defined beginning and end
- ❖ Defined deliverables
- ❖ Resources being consumed

Gould (2005) draws on the fact that the goal of construction project is simply to build and that its projects are large and built on site which distinguish it from other industries. Construction projects make use of so much resources which are a cost to the owner or owners. However, the project team manages these resources such as time, labour, equipment, material and money in order to meet the project goals (Gould, 2005).

Construction project drives so much on critical planning processes which depends heavily on accurate information as a key factor that improves the project success (Zwikaël, 2009). Activity planning and definition follows a series of logical and definable sequential construction process which is depicted in the master construction

plan. These activities have inputs resources which helps to achieve a better success project results.

### 2.3.3 PROJECT DELIVERY

Project is delivered through accomplishing the right instrumentation and integration of appropriate management processes and procedures such as project initiation, planning, execution, monitoring and controlling the sequential activities in resolving all concerns, requirements, and expectation of all those who matters in delivering a project which is within stated scope, schedule, quality and budget of an organisation (Project Management Institute, 2013).

In delivering a successful project, the technical competency of the team members plays a vital role as well as how well information are communicated among them and the exigency with which accurate information are acted upon and how feedbacks are also worked on (Bytheway, 2014).

Projects are carried out through systems which defines management functions of stakeholders in the executions and touch on their respective role, responsibilities and risk allotments (Chen, *et al.*, 2010).

### 2.3.4 CONSTRUCTION PROJECT DELIVERY

Construction project outcome is commonly measured by four cardinal factors namely cost, time, quality of performance and safety by Hughes *et al.*, (2004) as cited by Zwikael, (2009).

Construction projects are mostly delivered by a design-bid-build or a design-build method according to (Heidemann & Gehbauer, 2011). The construction project team members may sometimes be part of the bidding process and part of the construction team as well, hence becomes more conversant with most of the resource inputs and



processes. However, their prior information and knowledge position them in a better way to integrate and plan the execution of the project with the aims and objectives of the organisation as well as the project which is to be delivered.

Integration of the project team earlier base on delivery method are able to use their technical know-how, expertise and experience to identify possible short falls in designs and project documentation, come out with a master construction programme, channel of communicating project information, as well as innovative ways of approaching work, dispute resolution procedures, adaption of tools and techniques in planning, coordinating, monitoring and evaluation of plan activities against actuals of a construction projects.

Construction nowadays is dominated by the price, and a competent team is necessary to reach the best outstanding performance in terms of cost, time and quality of work executed (Heidemann & Gehbauer, 2011).

The organizational policy guidelines encourages the team members to work together closely to achieve one common goal by sharing, timely delivery, easy and timely accessibility of project information.

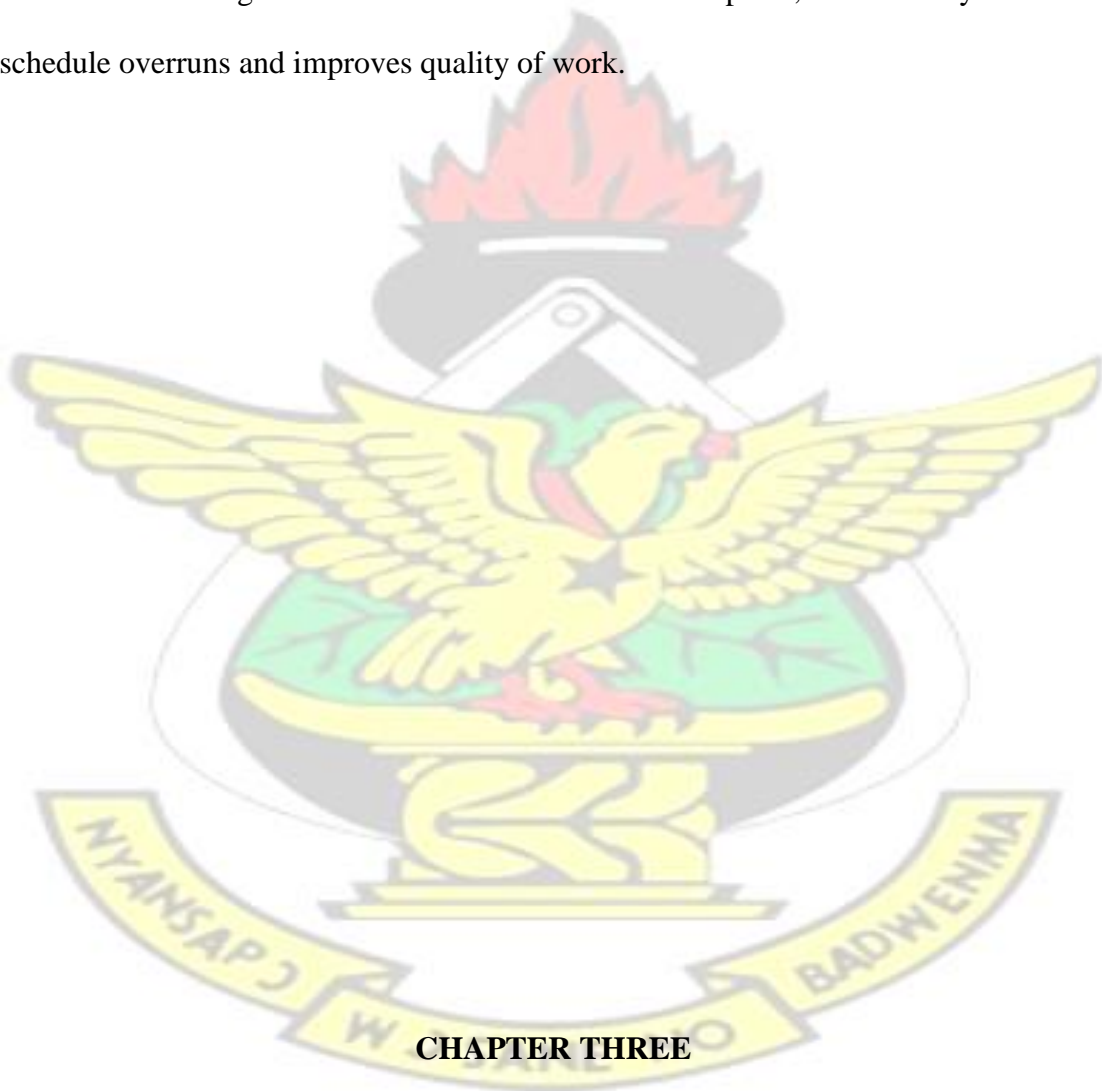
## 2.4 SUMMARY OF CHAPTER

This chapter much tried to identify the kinds of information available to project team member in literature by trying to collect appropriate information geared towards the objectives of the study.

It dealt with information as the data that is accurate and timely, necessary for decision making by project team members. Sources of information to organisations could be internal or external depending on the need or problem to be addressed. Some could be for new development, to improve the existing process of the organisation for

competitive advantage and for future workloads. The nature, source, time, level etc. are some of the characteristics of information.

Information management is a cycle that runs from identification of information needs that continues through to its use. Information management has its own associated challenges in diverse ways that affect project delivery from management level to project team members, due to the cultural dynamism in an organizational setup. Effective information management leads to a reduction in disputes, unnecessary cost and schedule overruns and improves quality of work.



## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1 INTRODUCTION**

The chapter deals with research methodology which outlines research design, research method, the population, the sampling technique and data collection technique important towards the research objectives. Ethical issues were also considered.

### 3.2 RESEARCH DESIGN

According to Singh (2006) “Research design is a choice of an investigator about the components of his project and development of certain components of the design. A design of research does not consists of an ordered sequential step-by-step procedure. It is a planning stage of research which is usually made logically visualizing its practicability”.

Singh (2006) further simplified the definition of research design and state that it is a planning process or approach which is objective in an investigation, evidence gathering and finally reporting on the outcomes of a research.

Research design is the strategy to solve a research problem. It helps the researcher to plan and apply the study in such a way that will enhance the researcher to derive purposeful results, thus maximizing the opportunity of getting data that could be accustom with the real situation.

The study adopted the descriptive research design approach because it is meant to report on the impact of information management on construction project delivery.

### 3.3 RESEARCH APPROACH

The quantitative approach was employed in investigating the role of information management in the performance of project members in construction project delivery in Ghana.

However, relevant data for the study was collected using questionnaires and personal interactions. The views of key project team members of construction firms were solicited on the relevance of available information and their associated challenges faced on construction project delivery.

### 3.4 RESEARCH PROCESS

Identifying the main aim of this dissertation was initially carried out by clearly stating the problems and the research objectives.

Subsequently, an extensive literature review on the topic was done. Comprehensive literature was reviewed to identify the kind of information available to the construction project team members and to explore the relevance of available information on their performance as well as the challenges associated with information management on project delivery.

Questionnaire survey was adopted and questionnaire was distributed and collected from key project team members of construction firms to solicit their views on the impact of information management on construction project delivery.

Finally, analyzing and discussing the research result was carried out using the Statistical Package for Social Sciences (SPSS) software version 22.0 and relevant Microsoft application such as Excel and providing the conclusion and recommendation thereafter.

### 3.5 RESEARCH LOCATION

The research was done in the Ho Municipality in the Volta Region to offer a fair representation of the study. Volta Region is one of the Ghana's ten Administrative regions. It is to the east of Lake Volta and west of Republic of Togo. It covers about 20,570 square kilometers of land signifying 8.6% of Ghana with a population of



2,118,252 people and has 25 Administrative Districts. Ho is a town and the capital of Ho Municipal Assembly and the Volta Region of Ghana. Ho Municipality has a settlement population of 271,881 people according to 2010 Population and Housing Census.

Ho Municipality is fast growing in the provision of general building infrastructure to meet diverse needs. Due to the influx of Financial institutions, Telecommunication industries, provision of building facilities to new public and private Universities, the Polytechnic, Nurses training college and other second cycle institutions, hotels, restaurants, guest houses as well as other social interventions, this has increased the demand for office spaces, hospitality services, housing facilities, lecture theaters leading to many building construction projects ongoing, some of which have been completed and some yet to be initiated.

### 3.6 POPULATION, SAMPLE SIZE AND SAMPLING TECHNIQUE

A population consist of the full set of cases from which a sample size is deduced. Targeted people for this study included key project team members which typically comprised of the Managing Director, Project or Construction Manager, Project or Work Engineer, Quantity Surveyor, Architect, Clerks of Works or Foremen who are working with building construction firms within the Ho Municipality because of its Municipality outlook and also due to the fact that a lot of constructional activities are ongoing, as such it constituted a fair representation of the Population.

A list of registered construction companies was obtained from the Association of Building and Civil Contractors with their contact details at the Volta Regional Secretariat. The list could not be used because some of the addresses were not correct,

others none and most of the contact numbers provided were also wrong and could not be reached. It was extremely difficult locating respondents in this situation.

A non-probability sampling technique thus snowball sampling technique was employed to sample respondents. Snowball is a non-probability sampling technique normally used by researchers in the situation where the population is very small and where it becomes very difficult for a researcher to locate potential respondents. The initial subject identified is asked to link the researcher to another potential subjects in the population under study and it moves on and on until the list is saturated (Dawson, 2002). The researcher initially started with a known company and delivered three (3) questionnaires to the Managing Director and move on to other referral companies. Questionnaires was given to companies that were ready to assist. In all nineteen (19) companies were identified through the snowballing process. Each company was given three (3) questionnaires to enable the researcher to collect varied views and opinions from different project team members. By the end of the process a total of fifty seven (57) respondents were contacted.

### 3.7 DATA COLLECTION

In this research, information was sourced by adapting structured questionnaires. A structured questionnaire was circulated in order to collect relevant data to the research objectives and questions.

#### 3.7.1 DATA SOURCE

In order to achieve the research objectives and questions both primary and secondary data collection methods were used.

##### 3.7.1.1 SECONDARY DATA

Literature was reviewed through secondary sources such as textbooks, publications, electronic journals and the internet which has been very useful tool in collecting data.

#### 3.7.1.2 PRIMARY DATA

The primary data for this study was gathered through questionnaires and personal observations. Primary data was collected by the use of printed questionnaires with series of question that was asked on the relevance and challenges of information management on project delivery which respondents responded to.

Personal observation were made on some sites visited and interactions with some project team members on how information was managed.

#### 3.7.1.3 DESIGN OF QUESTIONNAIRE

Important information regarding the research objectives has been sourced and studied from literatures.

According to Dawson (2002) the closed ended structured questionnaires approach is used to generate statistic in quantitative research and easier for respondents to respond to the questions asked. This was adopted for the second and third objectives of the study. Questionnaires with covering letters explaining the tenacity of the research, the aim, method of responding and privacy of information given in order to encourage the response of respondents.

The questionnaire was designed into three sections.

##### Section A: General or personal information

This section focused on general information about position, educational level and years of experience of respondents.

Section B: Relevance of available information to project team members.

This section dealt with some list of relevant documents available from which information which are necessary for project team members in their performance on construction project delivery. For each list there is a scale for measuring the level of importance of that document to project delivery. The respondents were asked the level of importance of these documents based on a five- point Likert scale

*Table 3.1 Five—Point Likert Scale*

Highly Important	5
Very Important	4
Not Very Important	3
Important	2
Not Important	1

Section C: Challenges associated with information management on project delivery  
This section includes the list of likely challenges associated with information management on project delivery most especially encountered by project team members in discharging their duties on construction projects. Respondents were asked to state their degree of agreement to how those challenges impact on project delivery.

*Table 3.2 Five—Point Likert Scale*

Strongly Agree	5
Agree	4
Neutral	3
Disagree	2
Strongly Disagree	1

### 3.8 APPROACH TO DATA ANALYSIS

Quantitative method of data analysis was employed in analyzing collected data. The collected data from the completed questionnaires was numbered and coded to facilitate data entry and analysis. The data was analysed by determining mean scores, standard deviations using Statistical Package for Social Sciences (SPSS) and Relative Importance Index (RII) technique has also been employed to analyse data collected



from the questionnaire survey. The Relative Importance Indices was calculated for each variable to determine the ranks of each of the variables as perceived by the respondents. The five-point likert scale of one to five (1-5) has been used to calculate Relative Importance Index for each item. Base on the objectives of the study, the results regarding issues of the study were presented through frequency distribution tables and charts.

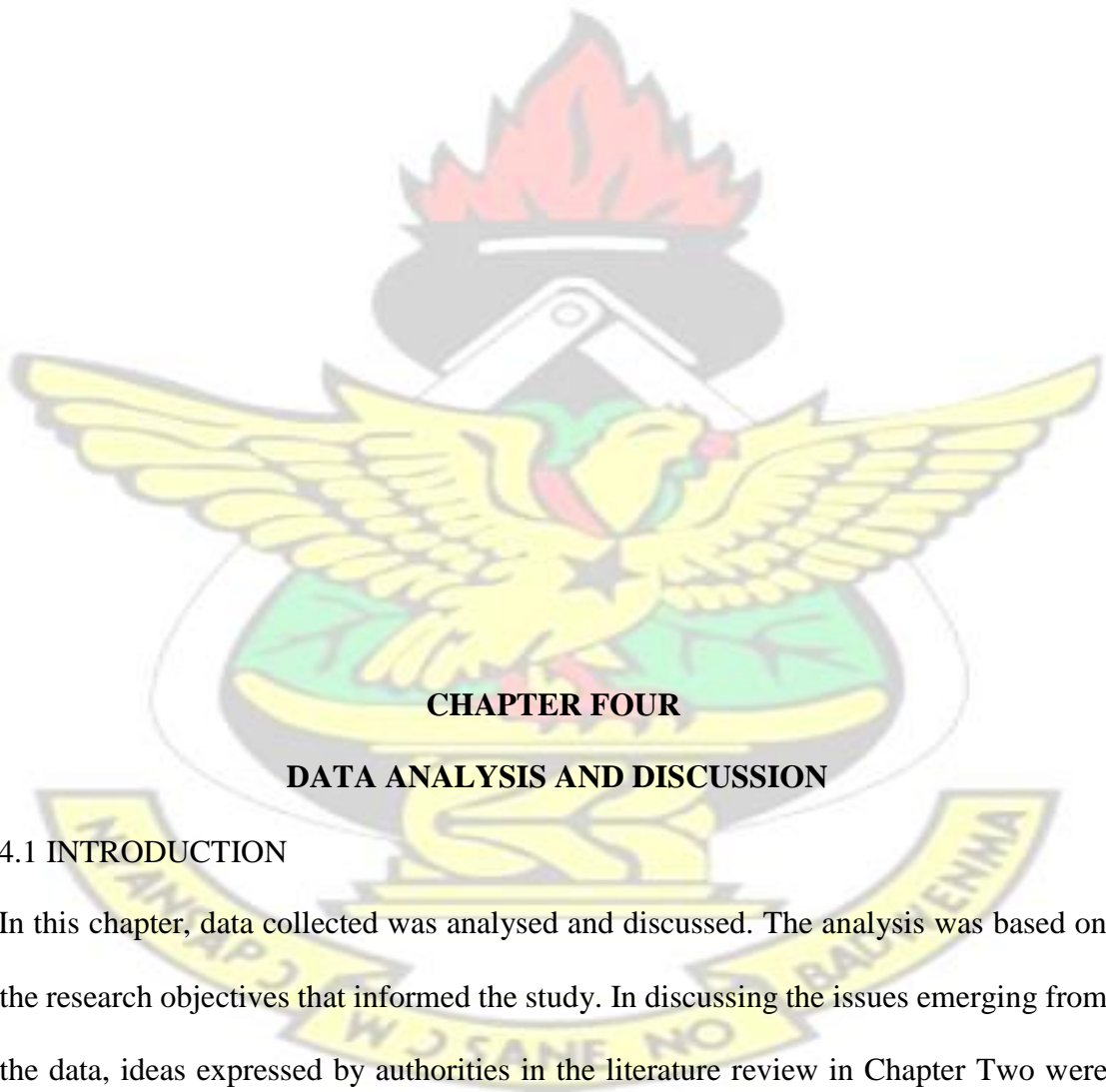
### 3.9 ETHICAL CONSIDERATIONS

In dealing with humans in a research investigation, it becomes very necessary to exercise the right of those individuals who participated in the study. This was done by protecting the information they gave out with uttermost confidentiality. The purpose of the research and its implication was communicated to respondents to avoid any doubts or deception. This aided the response of respondents in a voluntary manner with respect to the questions asked for which they provided answers.

### 3.10 SUMMARY OF CHAPTER

This chapter involves the research methodology employed in investigating the impact of information management on construction project delivery. A descriptive research approach was used. Structured questionnaire was the research tool used for data gathering to report on the findings. A total of Fifty-seven (57) questionnaires was sent to securing quantitative data from the targeted construction professionals engaged in building construction works currently within the Ho Municipality for their responses. A snowball sampling technique was used to reach out to respondents for their responses. Ho Municipality in the Volta Region was used to offer a fair representation of the study. Ho Municipality is fast growing in the provision of general building infrastructure to meet diverse needs.

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## **CHAPTER FOUR**

### **DATA ANALYSIS AND DISCUSSION**

#### **4.1 INTRODUCTION**

In this chapter, data collected was analysed and discussed. The analysis was based on the research objectives that informed the study. In discussing the issues emerging from the data, ideas expressed by authorities in the literature review in Chapter Two were considered for purposes of confirming or contrasting ideas. The results covered demographic data on respondents, ranking of relevant documents available on

information management to project team members and ranking of the various challenges associated with information management in construction project delivery.

#### 4.2 QUESTIONNAIRE DISTRIBUTION

A total of fifty seven (57) questionnaires were distributed but fifty two (52) was retrieved which constitute the total valid questionnaire that was used for the analysis representing ninety one (91%) percent and this indicate a high response rate.

However, five (5) questionnaires could not be retrieved.

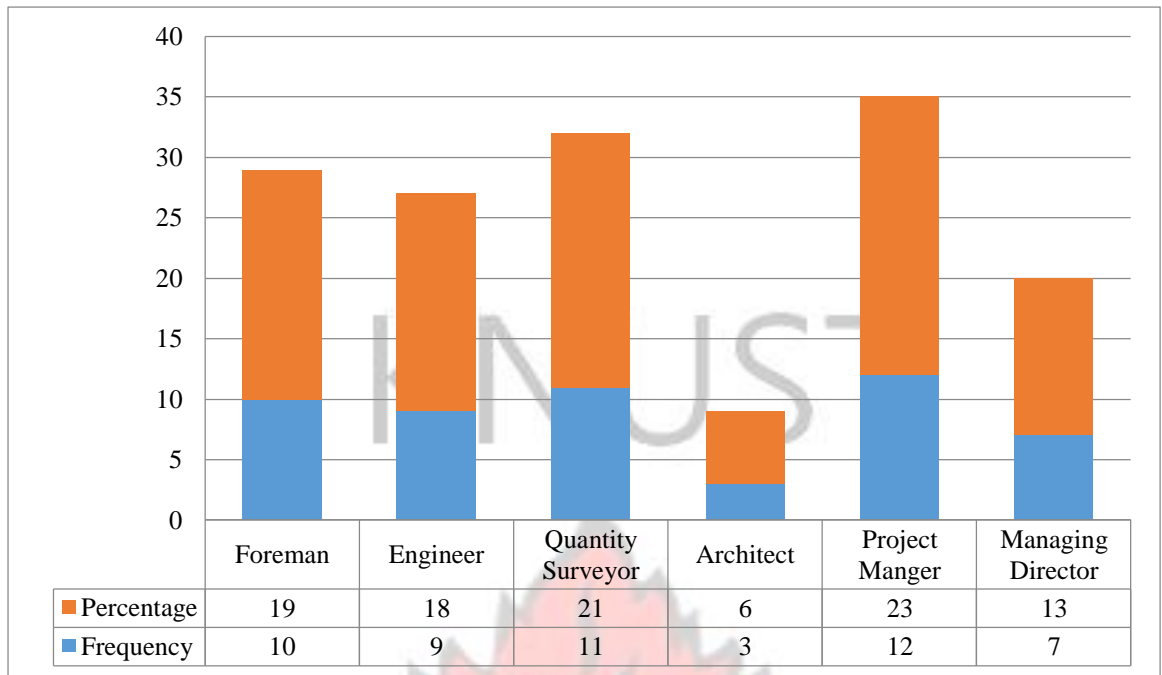
*Table 4.1 Questionnaire Distribution*

QUESTIONNAIRES	FREQUENCY	PERCENTAGE
Questionnaires Distributed	57	100
Questionnaires Collected	52	91
Questionnaires not Collected	5	9

*Source: Field work (2015)*

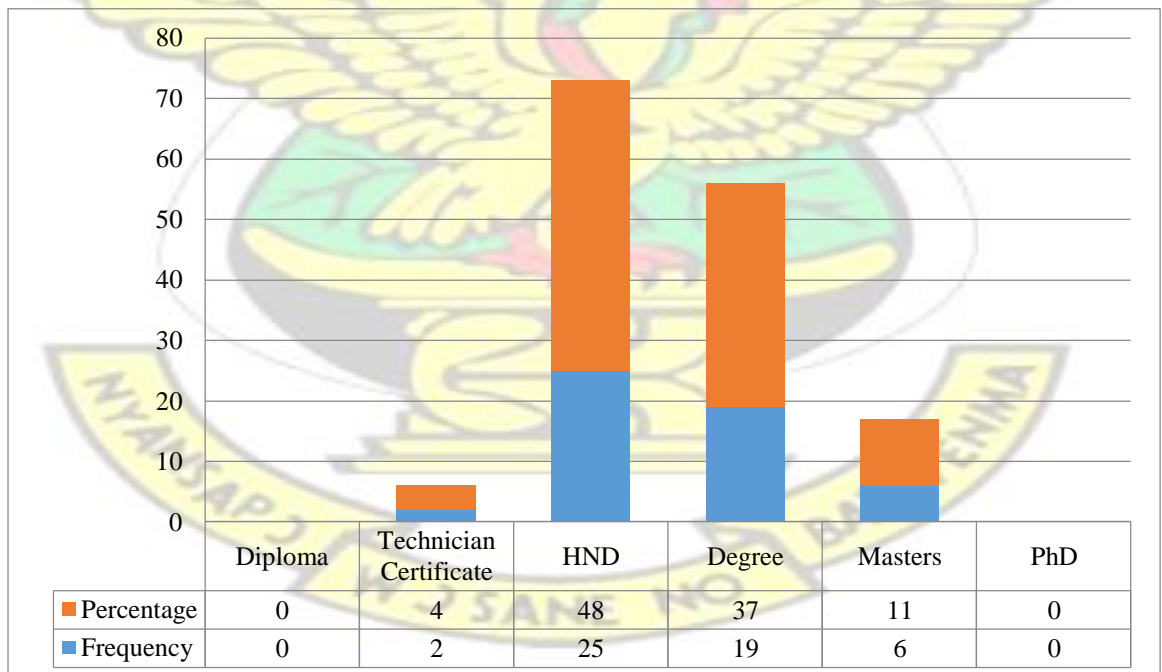
#### 4.3 DEMOGRAPHIC INFORMATION

It was deemed necessary to gather background information on the respondents. Although, little use had been made of the background data in analyzing responses to the research questions, the data had a purpose. It provided an understanding of the respondents who participated in the study. The demographic data were limited to the position of respondent in the construction sector, level of education, and years of experience in the construction sector.



**Figure 4.1 Position of Respondent**

Source: Field work (2015)



**Figure 4.2 Highest Level of Education**

Source: Field work (2015)



From Figure 4.1; Position of respondents, a majority of twelve (12) respondents representing twenty three percent (23%) were Project Managers, Eleven (11) representing twenty one (21%) were Quantity Surveyors, Nineteen percent (19%) were Foremen, Eighteen percent (18%) were Engineers, Thirteen percent (13%) were Managing Directors and Six percent (6%) as Architects.

On the highest level of education as presented in Figure 4.2, Forty eight percent (48%) representing the majority were HND graduates, Thirty seven percent (37%) were BSc. Graduates and Eleven percent (11%) were Master's Degree Holders with Four percent (4%) Technician Certificate holders.

From figures 4.1 and 4.2 above, it is clear that the respondents cut across the various professional. They are educated in the construction industry with their vast experiences and expertise in construction project delivery which impact greatly on the outcome of this study.

*Table 4.2 Experience of respondents*

VARIABLES	OPTIONS	FREQUENCY	PERCENTAGES
Years of Experience	1yr – 5yrs	18	35
	6yrs – 10yrs	23	44
	11yrs – 20yrs	8	15
	21yrs – 30 yrs	3	6
	31yrs – 40yrs	0	0
Total		52	100

*Source: Field work (2015)*

It could be deduced from Table 4.2 that, Forty four percent (44%) of the respondents has working experience between six to ten years (6 – 10 years) while Thirty five percent (35%) are between one to five years (1 – 5 years) and Fifteen percent (15%) between

eleven to twenty years (11 – 20 years). Which means that majority of the respondents have over five years working experience when it comes to project delivery hence their ability to bring their vast experience to bare in this study.

#### 4.4 RELEVANT DOCUMENTS AVAILABLE ON INFORMATION MANAGEMENT TO PROJECT TEAM MEMBERS

The relevant documents available on information management were identified during literature review and tabulated for respective respondents to measure for their degree of relevance to the performance of project team members in construction project delivery.

The Relative Importance Indices (RII) was calculated by using the formula (Aibinu & Jagboro, 2002, Olawale & Sun, 2010) for each variable to determine the ranks of each of the variables as perceived by the respondents in terms of importance. The scale of one to five (1-5) has been used to calculate the Relative Importance

Indices using the formular  $RII = [(5n_1 + 4n_2 + 3n_3 + 2n_4 + 1n_5) / 5N]$  and it ranges from point two (0.2) to one (1), where point two denotes minimum strength and one the maximum strength. However,  $n_5$ = number of respondent for Highly Important;  $n_4$ = Very Important;  $n_3$ = Not very Important;  $n_2$ = Important and  $n_1$ = Not Important;  $N$ = Sample size and the highest attainable score being five (5). Respondents responded on five-point scale of which Highly Important scored five points (5), Very Important scored four (4), Not very Important scored three (3), Important scored two (2), and Not Important scored one point (1). The scorings were converted into a quantitative variable.

The various documents available to project team members on information management in construction project delivery were selected from literature review as the first objective of the study which was to identify the kind of information available to project team members. The various documents were presented to respondents to determine the

relevance of them which was the second objective of the study. The mean score and the Relative importance index (RII) of the various documents were determined. The documents were ranked according to their RII.

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*Table 4.3 Ranking of Relevant documents on information management*

RELEVANT DOCUMENTS	MEAN	RII	RANKING
Master Construction programme	4.96	0.992	1
Progress reports	4.94	0.988	2
Bill of quantities	4.87	0.973	3
Architectural and Engineering drawings	4.73	0.946	4
Minutes of meetings	4.54	0.908	5
Specifications	4.46	0.892	6
Material Schedule	4.38	0.877	7
Method Statement	4.31	0.862	8
Cash flow forecast	4.13	0.827	9
Risk, health and Safety plan	4.10	0.819	10
Plant and Equipment schedule	3.54	0.715	11

*Source: Field work (2015)*

Based on the ranking with the relative importance indices (RII) for the relevance of the documents available which provide the necessary information to project team members on construction project delivery in table 4.3, it was observed that the highly important documents were ranked above 0.9 RII were Master Construction programme (RII= 0.992), Progress reports (RII= 0.988), Bill of quantities (RII= 0.973), Architectural and Engineering drawings (RII= 0.946), Minute of meetings (RII= 0.908). These documents were considered to be highly important in managing information effectively by project team members. However, the other documents that were considered very important but had RII above 0.8 but less than 0.9 includes; Specification (RII= 0.892), Material Schedule (RII= 0.877), Method Statement (RII= 0.862), Cash flow forecast (RII= 0.827), Risk, Health and Safety plan (RII= 0.819). Plant and Equipment schedule with RII less than 0.8 was considered not very important in information management.

It was however realised that the performance of construction project team members is highly influenced by the kind of information that is available, and how effectively the information is communicated and managed. To ensure good project information management, project team members must identify the relevance of the various information's available to them as ranked in Table 4.3, organised and shared it in a manner that would give the project team members a better usage. This finding supports Gyampoh-Vidogah, *et al.* (2003) who found in a related study that master construction programme provides the whole sequence of interrelated activities that guide the project success. That is to say, the project team is able to make comparisons on the progress of project by measuring against stated target at each level of work done. This may be due to the fact that project team members want to be within budget and time to avoid overruns. Even though, Architectural and Engineering drawings was ranked fourth (4<sup>th</sup>),



according to Brook (2004) and Yuan & John (2008) it is the most common means of communication for all types and sizes of projects which is depicted graphically on what is to be built and how it is to be built and also for the basis for the determination of cost, time, quality and safety requirements of a project. Progress report was ranked second (2<sup>nd</sup>) a good signal according to respondents it is highly important to project delivery, this implies that it keeps project team members informed of their progress and also motivates them to put in much effort in achieving project success. Minutes of meeting ranked fifth (5<sup>th</sup>) highlights discussion that transpired at meetings and issues that were addressed. Bill of quantities according to Jaggar, *et al.* (2001) is a unifier on which work done is valued and a control tool for monitoring by project team members. Cashflow forecast was ranked ninth (9<sup>th</sup>) but according to Ashworth (2010) the outcome of construction project which is delivered within financial plan and time depends on the inflow and outflow of available funds.

#### 4.5 CHALLENGES ASSOCIATED WITH INFORMATION MANAGEMENT IN CONSTRUCTION PROJECT DELIVERY

The challenges associated with information management in construction project delivery were identified during literature review and tabulated for respective respondents to agree or disagree on their importance in construction project delivery. Respondents were requested to respond on five-point scale of which Strongly Agree scored five points (5), Agree scored four points (4), Neutral scored three points (3), Disagree scored two points (2), and finally Strongly Disagree scored one point (1). The scorings were converted into quantitative variables. The mean score, standard deviation and Relative Importance Index (RII) of the various challenges associated with information management were determined. The challenges were ranked according to their RII and it ranges from point two (0.2) to one (1), where point two denotes

minimum strength and one the maximum strength. In cases where the mean score as well as the RII were the same the standard deviation (SD) was used to rank the variables.

*Table 4.4 Ranking of Challenges associated with information management*

CHALLENGES	MEAN	SD	RII	RANKING
Discrepancies in project documents	4.60	0.495	0.919	1
Lack of information management policy guide lines	4.56	0.574	0.912	2
Unclear definition of roles and functions	4.56	0.777	0.912	3
Resistance to Change	4.54	0.541	0.908	4
Lack of access to project information	4.54	0.670	0.908	5
Uncompromising attitude among project team members	4.50	0.505	0.900	6

*Table 4.4 Continued*

Inadequate training on information management	4.48	0.610	0.896	7
Lack of storage space for project information	4.48	0.611	0.896	8
Incompetent project team members	4.48	0.754	0.896	9
Lack of success story	4.46	0.779	0.892	10
Late delivery of project information to project teams members	4.35	0.528	0.869	11
Poor communication	4.33	0.585	0.865	12
Improper project information storage	4.33	0.617	0.865	13
Inaccurate project information	4.29	0.536	0.858	14
In security of project information	4.29	0.977	0.858	15
Complexity of the project	4.27	0.630	0.854	16
Lack of project information sharing by management and among project team members	4.17	0.648	0.835	17
Unsupportive management	4.17	0.810	0.835	18
Disputes	4.15	0.894	0.831	19
Lack of motivation	4.10	0.934	0.819	20
Loss of important documents	4.02	0.641	0.804	21
Resistance to information technology take-up	4.02	0.671	0.804	22
Duplication of project information	4.00	0.929	0.800	23
Improper documentation of project information	3.98	0.874	0.796	24
Lack of collaboration from functional departments	3.92	1.100	0.785	25
Labour intensive use for information management	3.88	0.784	0.777	26
Inexperience project team members	3.88	1.078	0.777	27
Time taken in retrieving project information	3.77	1.165	0.754	28

Expensive maintenance of information management as demand for space grows	3.62	1.105	0.723	29
Lack of innovation	3.42	1.091	0.685	30

*Source: Field work (2015)*

From Table 4.4 the challenges associated with information management on construction project delivery were ranked as follows;

Interestingly the thirty (30) challenges associated with information management identified in table 4.4 had a high score of Relative Importance Index of not less than point six (RII=0.6). This implies that respondent have agreed to a level of degree that all the variables identified when it comes to construction project delivery in Ghana with relation to information management by project team members were significant enough to have an effect on the outcome of a project.

Discrepancies in project documents, Lack of information management policy guide lines, Unclear definition of roles and functions, Resistance to change, Lack of access to project information, uncompromising attitude among project team members were ranked very high with RII above 0.9. These variables were ranked very high as challenges associated with information management in construction project delivery. Discrepancies in project document which was ranked first (1<sup>st</sup>) puts project team members in fix or confused state in that additional time has to be taken to rectify or resolve project information before any decision could be arrived at. Care has to be taken to scrutinise documents so well such that it does not lead to rework in execution of project. This goes with it cost implication should it result into rework or when time overruns and this situation sometimes give birth to disputes which is ranked nineteenth (19<sup>th</sup>). This result is in agreement with a related study by Love et al. (2008) as cited by Tuuli & Maila (2015) which reveals that 70 per cent of rework executed in the

construction industry was as result of discrepancies in design documentation which could have been avoid to reduce the cost incurred in reworks.

Lack of information management policy guide lines which was ranked very high as the second (2<sup>nd</sup>) most significant challenge was confirmed in a related study what Gyampoh-Vidogah *et al.*( 2003) found out and cluster most of the challenges as a characteristic to the broad non comprehension of management policy and vision pertaining to information management. It is however clear looking at our Ghanaian construction industry that, there are not clear policy guideline for project informations handling let alone assigning a clear role for a person or persons to be responsible to manage project information or an information manager.

The next group of variables that were considered high and ranked accordingly scoring RII above 0.85 but less than 0.9 includes; Inadequate training on information management, lack of storage space for project information, incompetent project team members, lack of success story, late delivery of project information to project team members, poor communication, improper project information storage, inaccurate project information, insecurity of project information and complexity of the project. These variables were ranked high as challenges associated with information management in construction project delivery.

Lack of project information sharing by management and among project team members, unsupportive management, disputes, lack of motivation, loss of important documents, resistance to information technology take-up, duplication of project information were ranked with an RII above 0.80 but less than 0.85. These variables were ranked neutral as challenges associated with information management in construction project delivery.

The final group of variables with RII less than 0.8 includes; improper documentation of project information, lack of collaboration from functional departments, labour



intensive use for information management, inexperience project team members, time taken in retrieving project information, expensive maintenance of information management as demand for space grows, and lack of innovation. These variables were ranked not very prevalent as challenges associated with information management in construction project delivery.

According to McCabe (2001) in a related study culture is a social guide that holds people together in an organisation to adhere to the core values and accepted practices that are believe to exist. This assertion when not adhere to led to challenges such as management not committed and supportive, in adequate training of project team members, incompetency, lack of motivation etc. Jaggar, *et al.*(2001) in a related study reveals that, information opacity is a challenge in the industry which does not help team problem solving because of lack of collaboration from functional departments in accessing project information.

Poor communication, time taken in retrieving project information these challenges are in line with Jaggar, *et al.*(2001) who found out in a study of managing information flow in construction supply chain that the quality of information reveived ,the timeliness of its receipt determines the efficiency of project team members.

#### 4.6 SUMMARY OF CHAPTER

A total of fifty seven (57) questionnaires were distributed but fifty two (52) was retrieved which constitute the total valid questionnaire that was used for the analysis representing ninety one (91%) percent and this indicate a high response rate. The demographic information considered position of respondents, educational level and years of experience in the construction sector. Majority of respondents were educated and have over five years working experience in the construction industry. However,

with their vast experiences and expertise in construction project delivery has impacted greatly on the outcome of this study

However, five (5) questionnaires could not be retrieved. Data collected was analyzed by determining mean scores, standard deviations and Relative Importance Index (RII). The Relative Importance Indices (RII) was calculated by using the formula  $RII = [(5n_1 + 4n_2 + 3n_3 + 2n_4 + 1n_5) / 5N]$ . the RII was used in ranking the variables and it ranges from point two (0.2) to one (1), where point two denotes minimum strength and one the maximum strength The analysis and discussion focuses on the research objectives.

## **CHAPTER FIVE**

### **FINDINGS, CONCLUSION AND RECOMMENDATIONS**

#### **5.1 INTRODUCTION**

This chapter presents the main findings that emerged from the research. It draws out the salient deductions from the research and provides recommendations for the betterment of information management on project delivery in Ghana. The study aims to investigate the role of information management in the performance of project team members in construction project delivery and make recommendations based on the findings.

#### **5.2 KEY FINDINGS**

The key findings of the study are put under two main headings:

##### **5.2.1 RELEVANT DOCUMENTS**

The key findings are:

- ❖ Among the numerous relevant information available in construction project delivery, master construction programme was ranked first with Relative

Importance Index (RII) of 0.992 as highly important to the project team members.

- ❖ Progress report was the second ranked document and also considered as highly important.
- ❖ The analyses also revealed that bill of quantities and drawings are equally important in information management and were ranked third and fourth respectively.
- ❖ Minute of meeting, specifications, material schedules and method statement were ranked fifth, sixth, seventh and eighth respectively as very important documents in information management on project delivery by project team members.
- ❖ Even though cash flow forecast, risk, health and safety plans as well as plant and equipment schedules were ranked ninth, tenth and eleventh respectively, the findings reveals that they are important documents in information management on project delivery by project team members.

### 5.2.2 CHALLENGES ASSOCIATED WITH INFORMATION MANAGEMENT

The key findings are:

- ❖ The overall and highest ranked challenge associated with information management from the study is discrepancies in project documents with a Relative Importance Index (RII) of 0.992 and ranked as number one main challenge.
- ❖ Lack of information management policy guide lines ranked second, unclear definition of roles and functions ranked third, resistance to change ranked fourth, lack of access to project information ranked fifth, uncompromising attitude among project team members ranked sixth, inadequate training on

information management and lack of storage space for project information were ranked seventh and eighth respectively as challenges associated with information management.

- ❖ Incompetent project team members, lack of success story, late delivery of project information to project team members, poor communication, improper project information storage, inaccurate project information, in security of project information and complexity of the project were ranked ninth, tenth, eleventh, twelve, thirteenth, fourteenth, fifteenth and sixteenth respectively as challenges associated with information management.
- ❖ Lack of project information sharing by management and among project team members was ranked seventeenth, unsupportive management was ranked eighteenth, disputes ranked nineteenth, lack of motivation ranked twentieth, loss of important documents ranked twenty-first, resistance to information technology take-up was ranked twenty-second, duplication of project information and improper documentation of project information were ranked twenty-third, twenty-fourth respectively as challenges associated with information management.
- ❖ Lack of collaboration from functional departments, labour intensive use for information management, inexperience project team members, time taken in retrieving project information, expensive maintenance of information management as demand for space grows, and lack of innovation were ranked twenty-fifth, twenty-sixth, twenty-seventh, twenty-eighth, twenty-ninth and thirtieth respectively as challenges associated with information management.

### 5.3 CONCLUSION



The study was undertaken to investigate the role of information management in the performance of project team members in construction project delivery. A list of eleven (11) relevant documents that provides necessary information for project team's performance on construction project delivery was identified from international literature that set the basis of a questionnaire survey. Another set of thirty (30) challenges associated with information management on construction project delivery was also identified from international literature that set the basis for a questionnaire. The Relative importance index (RII) and mean score for each variable was calculated and RII used to rank the factors.

The most important documents available that provides information in information management on construction project delivery were found to be Master construction programme, Progress reports, Bills of Quantities and Architectural and Engineering drawings. The other documents such as specifications, material schedule, method statement etc. that were presented for analysis were discovered to be equally important. All these documents provide vital information that leads to project success and must be prepared by qualified professional, well documented and kept for easy referencing when there is the need to retrieve any information.

It was also discovered that the most important challenges associated with information management on construction project delivery are; discrepancies in project documents, lack of information management policy guidelines, unclear definition of roles and functions, resistance to change, lack of access to project information and many other challenges.

Since the research aims to investigate the role of information management in the performance of project team members in construction project delivery, project team members were the main respondents. These challenges are so interrelated such that the

occurrence of one gives birth to the other in delivery construction project. They impact so much on cost, time and quality of workmanship of the project and therefore in conclusion pragmatic action should be taken to arrest the situation quickly when one surfaced hence the need for an information manager who will be responsible for the coordination of relevant information to project team members.

#### 5.4 RECOMMENDATIONS

Several issues emerged from the summarized findings and conclusions. The following constitutes the recommendations for this study:

- ❖ Discrepancies in project documents as the most significant and ranked first among the lot would be better taken care of with proper information management and scrutiny. Project teams should make it a point to scrutinize every contract document to reduce and if possible eliminate discrepancies in project documents that have bedeviled the construction sector in information management and project delivery devoid of unnecessarily variations, delays, reworks and cost overruns.
- ❖ Lack of information management policy guidelines, inadequate training on information management and incompetent project team members these challenge in order to enhance the performance of project team members in construction project delivery, it is important for members to pay particular attention to the design of master construction programme. Management of various companies should put in place a clear policy guidelines, ensure its enforcement and be committed to ensuring that good master construction programme are always prepared before the start of every construction project by qualified professionals and appropriate training should be given to those who are not much experience.

- ❖ Progress reports should always and periodically be prepared on every construction project to ensure efficient delivery of construction projects. Bill of quantities and drawings should be well and accurately prepared by competent professionals to reduce errors and major anomalies during project delivery.
- ❖ Management of various companies should ensure that competent professionals are engaged in the preparation of all other construction project documents that are relevant to proper information management to reduce the high rate of anomalies and improve efficiency and quality.
- ❖ Information management policy guidelines should be prepared by management or project team members to ensure proper and efficient information management in construction project delivery. Roles and functions of members in a team should be well defined and communicated to every member in project delivery to avoid duplication of project information which as a result of lack of collaboration from functional departments.
- ❖ There should be easy and ready access to project information by all team members to enhance proper project delivery which needs an information manager to coordinate this to minimized the time spent on the retrieval and communicating of project information in an innovative way such as the use of appropriate information technology.
- ❖ Less experienced project team members should be given adequate training on information management to enhance their capacities.
- ❖ There should be cohesive collaboration between all functional departments to enhance information delivery for effective project delivery to minimized disputes, saves time , improve information sharing, lead to improved

productivity of team members , improves good working relationships among stakeholder and better quality product delivery to the satisfaction of clients.

- ❖ Trained and competent information managers should be employed with their roles and functions well defined for every project.

### 5.5 LIMITATION OF THE FINDINGS

The study focused attention on the role of information management in the performance of project team members in construction project delivery. Certain limitations have noticeable effects on the outcome of the study which must be highlighted so that the findings in the report can be read in the right perspective. The study used the snowball sampling technique which is an example of non- probability sampling due to the lack of accurate data on the respondents. As a result, the representativeness of the sample cannot be ascertained, limiting the extent to which the findings can be generalised.

### 5.6 FURTHER STUDY

It is recommended for further study into the impact of information management on project delivery in Ghana using probability method involving a larger population.



# KNUST

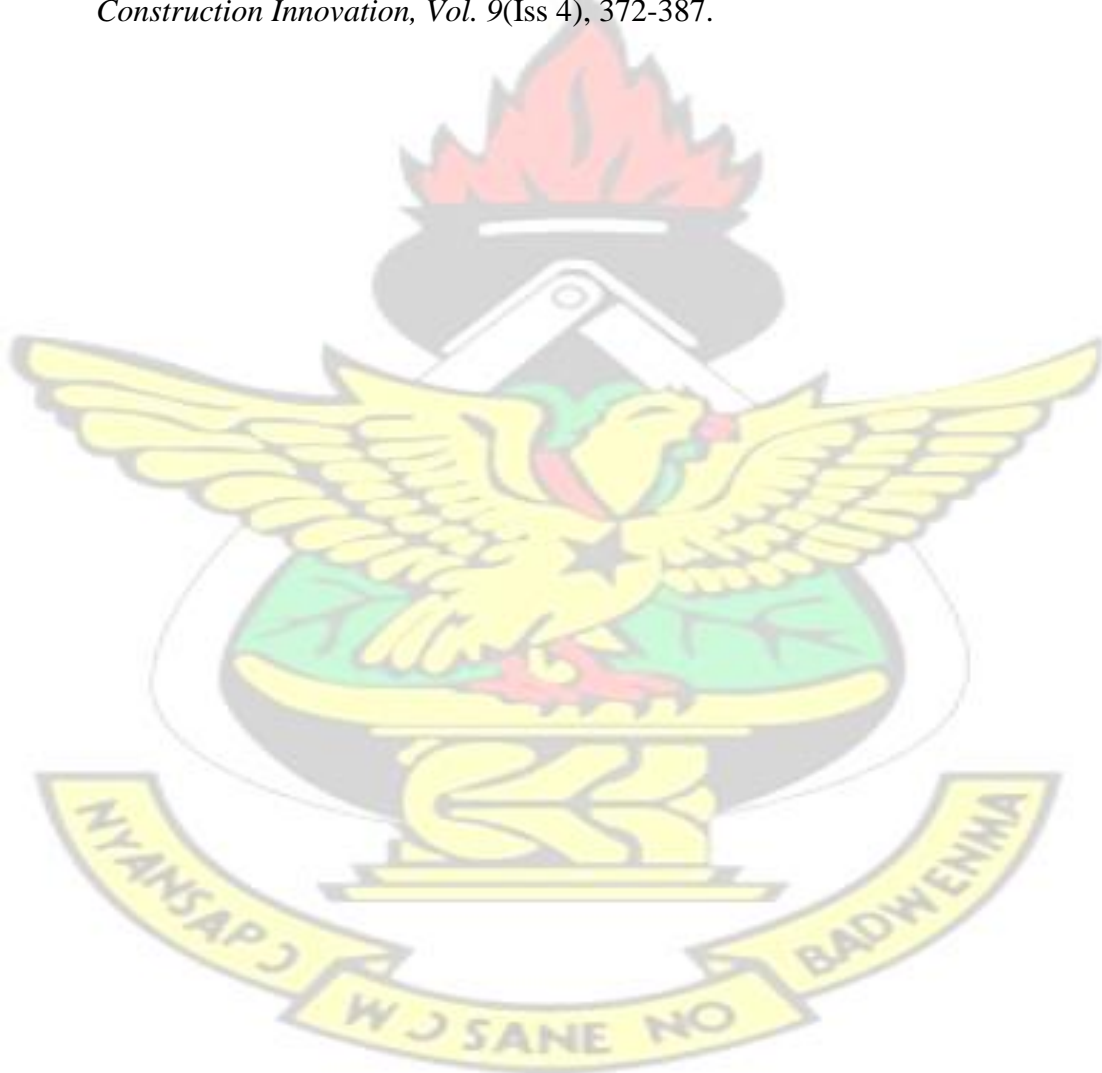
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## APPENDIX

### KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY COLLEGE OF ART AND BUILT ENVIRONMENT DEPARTMENT OF BUILDING TECHNOLOGY

#### QUESTIONNAIRE

This questionnaire is part of the research work in partial fulfilment of the award of MSc. in Construction management on the topic “**THE IMPACT OF INFORMATION MANAGEMENT ON PROJECT DELIVERY IN GHANA**”

The overall purpose of this study is to investigate the role of information management in the performance of project team members in construction project delivery.

All responses will be kept strictly confidential and exclusive for academic use. Further information can be obtained from the researcher on telephone number 0243717231, or the supervisor, Mr. J.C. Danku of KNUST ([jmcdanku@yahoo.com](mailto:jmcdanku@yahoo.com)).

The researcher wishes you will consider his request and cooperation.

*This questionnaire is in Three (3) sections; A, B and C.*

**SECTION A:** GENERAL OR PERSONAL INFORMATION

**SECTION B:** RELEVANT DOCUMENTS AVAILABLE ON INFORMATION  
MANAGEMENT TO PROJECT TEAM MEMBERS

**SECTION C:** CHALLENGES ASSOCIATED WITH INFORMATION  
MANAGEMENT IN PROJECT DELIVERY

## **SECTION A: GENERAL OR PERSONAL INFORMATION**

### **1. POSITION OF RESPONDENT**

- a. Foreman ☐ d. Architect ☐  
b. Engineer ☐ e. Project or Construction Manager ☐  
c. Quantity Surveyor ☐ f. Managing Director ☐  
g. Others; Specify: .....

### **2. HIGHEST LEVEL OF EDUCATION**

- a. Diploma ☐ d. Degree (BSc.) ☐  
d. Technician Certificate ☐ f. Masters or Postgraduate Diploma ☐  
c. HND ☐ g. PhD ☐  
i. Others; Specify: .....

### **3. NUMBER OF YEARS OF EXPERIENCE**

- a. 1yr – 5yrs ☐ d. 21yrs – 30yrs ☐  
b. 6yrs – 10yrs ☐ e. 31yrs – 40yrs ☐  
c. 11yrs – 20yrs ☐ f. Above 40yrs (Kindly State): .....

## **SECTION B: RELEVANT DOCUMENTS AVAILABLE ON INFORMATION**

## MANAGEMENT TO PROJECT TEAM MEMBERS

This list contains some relevant document that provides necessary information for project team's performance on construction project delivery. For each kindly select the appropriate answer by providing a tick [✓] under the appropriate scale provided. Please tick to indicate the level of importance you attach to each factor. *Please tick (✓) under the appropriate Scale.*

### **INTERPRETATION OF SCALE**

<b>HIGHLY IMPORTANT</b>	<b>5</b>
<b>VERY IMPORTANT</b>	<b>4</b>
<b>NOT VERY IMPORTANT</b>	<b>3</b>
<b>IMPORTANT</b>	<b>2</b>
<b>NOT IMPORTANT</b>	<b>1</b>

<b>How relevant are the following document to the performance of project team members in construction project delivery</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
1. Architectural and Engineering drawings					
2. Specifications					
3. Bills of quantities					
4. Master Construction programme					
5. Method Statement					
6. Material Schedule					
7. Plant and Equipment schedule					
8. Cash flow forecast					
9. Progress reports					
10. Minutes of meetings					
11. Risk, health and Safety plan					

### **SECTION C: CHALLENGES ASSOCIATED WITH INFORMATION MANAGEMENT IN CONSTRUCTION PROJECT DELIVERY**

This list contains some challenges associated with information management on project delivery. For each kindly select the appropriate answer by providing a tick [✓] under the appropriate scale provided. Please tick to indicate the degree of Agreement you attach to each factor. *Please tick (✓) under the appropriate Scale.*

**INTERPRETATION OF SCALE**

**STRONGLY AGREE** 5  
**AGREE** 4  
**NEUTRAL** 3  
**DISAGREE** 2  
**STRONGLY DISAGREE** 1

<b>How significant are the following challenges associated with information management on project delivery</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
1. Lack of information management policy guide-lines					
2. Inadequate training on information management					
3. Improper documentation of project information					
4. Improper project information storage					
5. Lack of access to project information					
6. Time taken in retrieving project information					
7. Unsupportive management					
8. Lack of project information sharing by management and among project team members					
9. Inaccurate project information					
10. Late delivery of project information to project team members					
11. Discrepancies in project documents					
12. Uncompromising attitude among project team members					
13. Poor communication					
14. Inexperience project team members					
15. Incompetent project team members					



16. In security of project information					
17. Labour intensive use for information management					
18. Lack of collaboration from functional departments					
19. Lack of storage space for project information					
20. Expensive maintenance of information management as demand for space grows					
21. Complexity of the project					
22. Loss of important documents					
23. Lack of innovation					
24. Resistance to information technology take-up					
25. Disputes					
26. Lack of success story					
27. Resistance to Change					
28. Unclear definition of roles and functions					
29. Lack of motivation					
30. Duplication of project information					