KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,

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A STUDY INTO THE IMPACT OF THE ARCHITECT‘S SITE INSTRUCTIONS ON CONSTRUCTION PROJECT DELIVERY IN GHANA - PERSPECTIVE OF THE CONTRACTOR

BY

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CERTIFICATION

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

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ABSTRACT

Deficiencies in construction drawings, unexpected site conditions, client requests etc. enable the architect to sometimes make modifications during the construction process through Architect‘s Site Instructions (ASI) based on authority he derives from the contract. However, this existing practice of delivering instructions to contractors appears to often fall short of effectively communicating the information necessary to get works executed. This research was a study into how such instructions impacted on the delivery of construction projects based on the following objectives namely; to identify the prevalence of the architect‘s site instructions (ASI) on construction projects in Ghana, to identify the factors that determine the effectiveness of ASI when issued to contractors, to find out the various bottlenecks that may hinder the administration of ASI, to find out how ASI affect construction project delivery in Ghana and to suggest recommendations to improve its effectiveness. Purposive sampling method was used to identify participants for the study based on extensive literature review resulting in 128 questionnaires being sent out and a response rate of 54.7% obtained. The instruction to vary works was the most common, complexity of works was the most predominant factor which influenced its administration, verbal instruction was the most predominant medium and the strongest bottleneck was found to be the clarity of instructions. The ASI in its present form adversely impacted on construction project delivery and led to cost and time overruns as was established by the findings. Simplification and greater detailing of designs and contract documents, regular organization of pre-construction training / orientation of contractors, uniformity in instructions, introduction of instruction tracking mechanism and fast tracking of approval processes for change orders were among some of the recommendations suggested.

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LIST OF ABBREVIATIONS

AIA: American Institute of Architects

ASI: Architect's Site Instructions

BRE: Building Research Establishment

CII: Construction Industry Institute

CVI: Confirmation of Verbal Instruction

DBIA: Design-Build Institute of America

DLP: Defects Liability Period

EIC: European International Contractors

EU: European Union

IMF: International Monetary Fund

FIDIC: International Federation of Consulting Engineers

GDP: Gross Domestic Product

GETFUND: Ghana Educational Trust Fund

GIA: Ghana Institute of Architects

ICE: Institution of Civil Engineers

IGF: Internally Generated Funds

JBCC: Joint Building Contracts Committee

JCT: Joint Contracts Tribunal

KNUST: Kwame Nkrumah University of Science and Technology in Kumasi

PPA: Public Procurement Act

SPSS: Statistical Package for Social Sciences

SSBC: Small Scale Building Contractors

DEDICATION

This research work is dedicated to the love of my life, Mariam and my kids; Fauzi Nyamekye, Ramadan Suhuyini and Iyaad Wunnam.

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I wish to express my profound gratitude to all those who helped me in diverse ways and forms towards ensuring that this report became a success.

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CHAPTER ONE

INTRODUCTION

1.1 Background

The entire staff of building construction could be divided into two categories namely; supervisors (architects, engineers, quantity surveyors, etc.) and contractors (main contractor, subcontractors, artisans, laborers etc.). The first category develops the architectural detailed drawings for implementation by the second category. These drawings therefore represent the first set of written documented instructions to the contractor and his team. Ideally, the drawings are supposed to provide sufficient information and should not occasion any extra or supplementary instructions by the architect especially during construction. In this case, the architect or the engineer would only visit the site and conduct inspections. In reality however, this is far from what actually happens on the ground. According to Lewis (1985), architects for example spend ―most of their time doing things such as visiting the job site

periodically to make inspections and issue architect‘s site instructions (ASI) or attend on-site progress meetings with the contractor, user, owner/client, subcontractors, engineers etc.‖ Depending on the form of contractual arrangement, architect‘s site instructions (ASI) may be issued in writing or verbally to the contractor for onward transmission to the artisans and laborers (Chappell, 2006). The necessity for the architect‘s site instructions (ASI) could be due to variety of reasons.

Gao et al., (2006); Makulsawatudom and Emsley, (2003); argue that the complicated nature of construction drawings which stems from the need for the content to address multiple disciplines (plumbing, air-conditioning, carpentry, etc.) makes the extraction of the needed information for specific disciplines complicated. This therefore necessitates the issuance of supplementary information which comes as architect‘s site instructions (ASI) to aid in the information extraction process.

Additionally, long after actual construction of the project has started, drawings and specifications for the project are sometimes changed or revised by the architect based on the authority reposed in him by the contract. According to Mourgues and Fischer (2008), the necessity for these modifications may be the result of requests for changes by the client to the architect, gaps in the drawings/specifications, unexpected physical site conditions, difficulty in obtaining the needed materials etc. They also argue that the existing practice of delivering instructions to contractors often falls short of effectively communicating the design and construction information necessary to get works executed because poor quality construction drawings (e.g., irrelevant, verbose and ambiguous information) plus inadequate verbal communication skills of the actors in the field (field management and contractors) apparently result in numerous mistakes and deficiencies. Emmitt and Gorse (2003) state that for effective communication to be achieved there is the need for instructions to be free of errors, unambiguous, straightforward, complete and delivered in time. These characteristics appear to be absent when work instructions are being issued (combination of design and specifications information) to contractors.

1.2 Problem Statement

Despite the presence of consultants (especially architects), the construction industry in Ghana is still saddled with inefficiencies especially regarding contract management practices e.g. undue delays in honouring payment certificates, cost and time overruns, project abandonment and bad project implementation (Agyakwah-Baah and Chileshe, 2010). Additionally, budget (cost), schedule (time) and specification (quality) results of targets set by players themselves on most construction projects executed in developing countries such as Ghana also often fall short (Ofori, 1993).

These problems may lead one to wonder whether the qualifications and backgrounds of contractors and consultants (architects) are properly assessed as dictated by the Public Procurement Law (Act 663) of Ghana before their services are procured or is the case that architects do not make themselves relevant on construction projects they find themselves on. An architect can only be relevant on a project if he ensures that the dictates of the contract document are adhered to and where changes or clarifications are required; they are done quickly to avoid delays, disputes and deviations. This he does by issuing ASI during construction.

ASI is one of the systematic approaches and guidelines developed in the construction industry to manage projects towards a successful delivery. In Ghana however, this approach rather appears to be a source of misunderstandings, hindrance, conflicts, protracted delays, and sometimes project abandonment because ASI‘s are apparently not adhered to by contractors.

1.3 Research Questions

Based on the foregoing, this research seeks to find answers to the following;

1. What are the issues addressed by ASI?
2. What are the factors that influence the administration of ASI?
3. How are ASI administered to contractors?
4. What is the effect of ASI on construction projects?

1.4 Aim and Objectives

1.4.1 Research Aim

The main aim of the study is to identify the impact of the architect's site instruction on construction project delivery in Ghana.

1.4.2 Research Objectives

The specific objectives of this research are:

1. To determine the issues the ASI address on construction projects;
2. To find out the factors that determine the effectiveness of ASI;
3. To find out the bottlenecks in the administration of ASI and;
4. To determine the effect of ASI on construction projects.

1.5 Justification

Literature on construction communication has often focused on communication at the design and top management levels and language barriers (see for example, Bakos, 1997; Cory, 2001; Gilleard and Gilleard, 2002 Loosemore and Lee, 2002). Even though the procedure for issuing ASI is well established, there is no special format required for this very important activity on site (Chappell, 2006). The communication link between the people preparing these instructions and the intended users also appears missing and are therefore prepared without addressing their needs. This therefore calls for the information contained in the instructions to be formalized in order to allow field managers to more consistently deliver instructions to minimize any adverse impacts on project delivery.

1.6 Scope

This research seeks to use Kwame Nkrumah University Science and Technology

(KNUST) as a case study because of the presence of construction projects of varied sizes and contractual arrangements. Most of the construction projects on KNUST campus at present are either funded by Internally Generated Funds (IGF), under

Ghana Government subvention or private financiers e.g. Jubilee Mall, Law Faculty, Hall Seven etc. These projects by their nature rely on the traditional procedure of managing projects i.e. Pink Form (1988) and Public Procurement Act (PPA) Conditions of Contract (2003) and as such, the issuance of ASI by consultantarchitects is an integral feature. The target population consists of consultants, contractors, foremen and artisans/laborers involved in building.

1.7 Methodology

The objectives of this research will be achieved as follows:

- Literature and previous studies related to the area of research will be extensively reviewed.
- The research design is based on a purposive sampling selection process based on which a representative sample of stakeholders/participants in the construction firms will be surveyed and a selection of similar construction projects from which to derive further data on ASI. In particular, questionnaires will be administered on relevant parties such as head office management (directors), site officers (foremen and in-house construction professionals) which will then form the basis of the research methodology.
- Gathered data will be analyzed using appropriate statistical analysis tools. Quantitative method will be used.
- Conclusions will be drawn from the analyzed data and recommendations for improvement and future study will be formulated and the findings will be summarized.

1.8 Structure of the Report

The study is organized into five chapters, of which chapter one consists of the introduction and background of the study, problem statement, objectives, and justification of the study, methodology, scope of the study and its limitations as well as the organization of the study. Chapter two consists of critical review of relevant literature on the topic under consideration. Chapter three on the other hand entailed the methodology adopted in conducting the study. Chapter four contained the critical analysis and discussions of results obtained from the study whilst chapter five presents a summary of the major findings, conclusions and recommendations of the study.

1.9 Limitations

This study had a few shortcomings or limitations which if taken into account would enhance future studies in this or similar research studies in the future. Firstly, the level of sincerity and openness with which questions were answered was not possible to ascertain. This is because the quality of responses is always limited by the ability to recollect from experience and present conditions. Secondly, although the analysis of all responses was treated homogenously, it is critical to concede that differences might exist between them. Thirdly, the focus of the research was primarily on contractors and their staff. Future studies could also concentrate on clients as well. These limitations, however, do not undermine the validity of the research and its main findings.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The construction industry is one of the major backbones of the economy of every country due to a strong linkage between the industry and economic activity (Hillebrandt, 2000). Not only can about 10 percent of the Gross Domestic Product (GDP) of all countries be attributed to the construction industry, but a similar percentage of the active working population is found in this sector and also accounts for close to half of the Gross Fixed Capital Formation (Hughes and Hillebrandt, 2003). Ofori (1980) argues that the sole aim of the construction industry is to plan, design, construct, maintain and eventually demolish buildings/works in order to allow for socio-economic activities to be performed. He further argues that the industry makes a major contribution to human survival, financial success of people and countries, and even to stability, thereby heightening its prestige, viability, and worldwide impact.

The construction industry is basically a service industry fed from various sectors of the economy with which it is interconnected and interlinked in a complex manner (Ofori, 1980). It also covers different business activities and interests and it is composed of organizations, professionals and other representative bodies (e.g. clients, designers, suppliers, contractors etc.) playing different but important roles geared towards the survival of the industry (Hughes and Hildebrandt, 2003). The individual _agenda‛ and allegiances of the diverse range of players in the industry makes it complex and enormous. For instance, a contractor could be a sole proprietor or a large public company, a client could be an individual homeowner, private company or a government agency and the project _architect‛ could be an individual practitioner, a private firm, a local authority or a big public company. This scenario is applicable to all the players in the construction industry.

Owing to the complexity, enormity and importance of the construction industry to the economies of nations across the globe (Hillebrandt, 2000), rules and regulations (known globally as Conditions of Contract) intended to guide and monitor all transactions and activities in the industry have over the years been formulated by nations, governments, organizations, professionals and other representative bodies. These regulations are necessitated partly by the need to clearly spell out the rights and responsibilities of the various players (i.e. employers/clients, consultants, secondary consultants, contractors, subcontractors, suppliers etc.) in the industry (Cooke and Williams, 2012). The existence of wide gaps in standards and knowledge across the industry; a largely moderately-skilled and unstable workforce; and a largely poorly educated managers employed in construction (Laryea, 2010) have also informed the formulation of these regulations. The rules have also been formulated to ensure consistency, confidence and transparency towards the successful execution of construction projects (Ashworth, 2006).

The differences in _agenda‘ and allegiances of the various players have also led to a plethora of conditions of contracts being designed to suit the differences. These conditions of contract have vested in them the interests of the different players and institutions, who for a variety of reasons whilst incorporating good practices will at the same time wish to retain their separate identity (Ashworth, 2006). Latham (1994) notes that the most effective form of contract in modern conditions are those that spell out specifically the duty for each party to fairly relate to one another in an environment of mutual cooperation and takes all reasonable precautions to prevent modifications to pre-planned works and information. For instance, typically, the client pays for the works, the contractor executes the works according to agreed specifications and the consultant supervises the works through site visits, inspections, site and technical meetings and issues architect‘s site instructions (ASI) and certificates (Pink Form, 1988).

Fairer forms of contract are those that incorporate the views of the different interested groups within the construction industry. Some of the effective and best known main ‗families‘ of standard contracts adapted and used globally include International Federation of Consulting Engineers (FIDIC), Joint Contracts Tribunal (JCT), Institution of Civil Engineers (ICE), American Institute of Architects (AIA), DesignBuild Institute of America (DBIA), European International Contractors (EIC) etc. (Cooke and Williams, 2012). Embedded in these documents are established channels for dealing with a variety of contract management issues such as tendering, payments, compensations, determination, disputes, communication channels and procedures etc.

Formal contracts establish mechanisms for dealing with contract payments, delays, compensation, disputes, communication etc. and how administrative procedures and the serving of formal notices are to be conducted (Cooke and Williams, 2012). Communication between the various players in a construction project is one of the most important contract administration issues extensively mentioned in most conditions of contract with reference to specific clauses especially communication between the architect and the contractor. This research confines itself to these established communication channels and procedures between the architect and contractor with emphasis on architect‘s site instructions (ASI) as referred to in FIDIC, JCT and the Pink Form in Ghana.

2.1.1 The Construction Industry in Ghana

As a developing country located in Sub-Saharan Africa, Ghana has a great potential in the construction sector (Agyakwah-Baah and Chileshe, 2010) this is evident in the fact that it has been growing steadily over the last two decades with 1993-2011 period average contribution to gross domestic product (GDP) of 9.1 percent (Ghana Statistical Service, 2012). To some extent therefore, in Ghana, practical reasons abound to give some impetus to go along with the argument that the construction industry regulates the economy (Osei, 2013).

The various players in the construction industry are also interlinked with other sectors of Ghana‘s economy as identified by Osei (2013):

- The Client Community – includes both public and private sectors with government as the main client;
- The Design Community - includes professionals such as architects, engineers, quantity surveyors etc.;
- The Supply Chain – includes materials suppliers, machinery manufacturers, sub-assemblers etc.;
- Main Contractors and Sub-Contractors of every tier;
- Universities, technological institutions and professional associations;
- Economic drivers such as banks and other financial corporations and;
- Trade unions, including regulation and standards authorities.

Realising the importance of a viable local construction industry to the Ghanaian economy, successive governments have taken up direct responsibility for the management of the industry by formulating policy guidelines and by participating in various areas of construction itself in addition to being the biggest client (Eyiah and Cook, 2003). One of such policy guidelines is the introduction of the Articles of Agreement and Conditions of Contract for Building Works (1988), also known as the *“Pink Form‖* by Architectural and Engineering Services Corporation under the auspices of the Ministry of Works and Housing. It is the most common form of contract for building works in Ghana because it is one of the first comprehensive documents to assign specific roles and responsibilities to the various players in a construction project. The most recent of such guidelines is the Public Procurement Act (PPA, Act 663) of Ghana passed in 2003 to regulate and sanitize activities in the industry and ensures fairness, transparency and value for money for public projects. The FIDIC suite of documents is also in use in Ghana, especially with respect to foreign-funded projects e.g. EU, IMF, World Bank etc.

One of the key features of the PPA (2003) of Ghana is the fact that it guarantees the involvement of consultants and contractors on all public construction projects and also stipulates that backgrounds and qualifications of the players must be assessed especially of the consultant to enable projects to be successfully delivered according to the predetermined budget, schedule and the consultant‘s specifications**.** Samantha (2009) opines that the presence of consultants on construction projects ensure that projects are implemented strictly according to specifications because they have the power to issue instructions to the contractor intended to help in preventing deviations, delays, disputes etc. and to enable accurate performance of the Contract.

Despite the existence of these policy guidelines, Ghana‘s construction industry is still grappling with basic contract management inefficiencies that invariably lead to protracted delays, cost and time overruns etc. Construction projects in technological institutions and professional associations such as K NUST are also faced with such basic contract management problems as stated above.

2.1.2 Construction Activities in Kwame Nkrumah University of Science and Technology (KNUST)

The Kumasi College of Technology was the second public university to be established in Ghana in 1951 and started with a nucleus of barely 200 teacher training students transferred from Achimota to start the Faculty of Engineering. The College was affiliated to the University of London until when it was granted a full university status by an Act of Parliament in 1961 which renamed it Kwame Nkrumah University of Science and Technology (KNUST). The main university campus is situated on an approximate area of sixteen square kilometers and about thirteen kilometers east of Kumasi.

The school started in buildings constructed of prefabricated materials with timber as the framing and asbestos as the infilling and roof covering. Apart from the bell tower, all the buildings were single storey and were used as classrooms as well as to house both the students (Hall Six) and staff. These buildings are currently housing the

Faculty of Art, the Staff Club and previously the Technology Secondary School. These buildings are currently being gradually demolished to give way to new structures e.g. The KNUST Museum.

From its inception to date, the university has seen a massive growth in both its staff and student population necessitating the creation of new departments and faculties (now lumped together as Colleges). With a current student population of approximately 25000 and six colleges, the urgent need for more lecture and residential halls, staff residences, recreational facilities etc. has become more crucial than ever before. KNUST as an institution is a key player in the Ghanaian construction industry and has over its sixty years in existence been involved in massive infrastructural developments comprising structures of varied shapes, sizes and heights in response to the rapid population growth on the campus. Over the last two decades especially, and with the introduction of the Ghana Educational Trust Fund (GETFUND) 15 years ago to fund construction projects on public educational facilities across the country, the school has seen a dramatic boost in the development of infrastructure resulting in massive construction of classrooms, lecture theatres, new faculties and other related facilities.

KNUST campus is divided into broad areas with a very interesting layout namely:

- The Teaching Area; consists of classrooms, lecture halls, staff offices etc.;
- Administration Area; centrally located and consists of the administration block, library and the great hall;
- Residential Area (students); mainly consists of residential accommodation for students (currently made up of seven halls of residence);
- Residential Area (staff); mainly consists of residential accommodation for both teaching and non-teaching staff of the university and;
- Civic / Commercial Area; consists of banks, pharmacies, shops and mall.

The teaching, residential (students) and administration areas are connected by a recreational facility - Paa Joe Stadium

Figure 2.1 provides a snapshot of the general layout of the KNUST campus showing locations of various facilities, the state of infrastructural development and a highlight of construction projects undertaken over the last two decades.

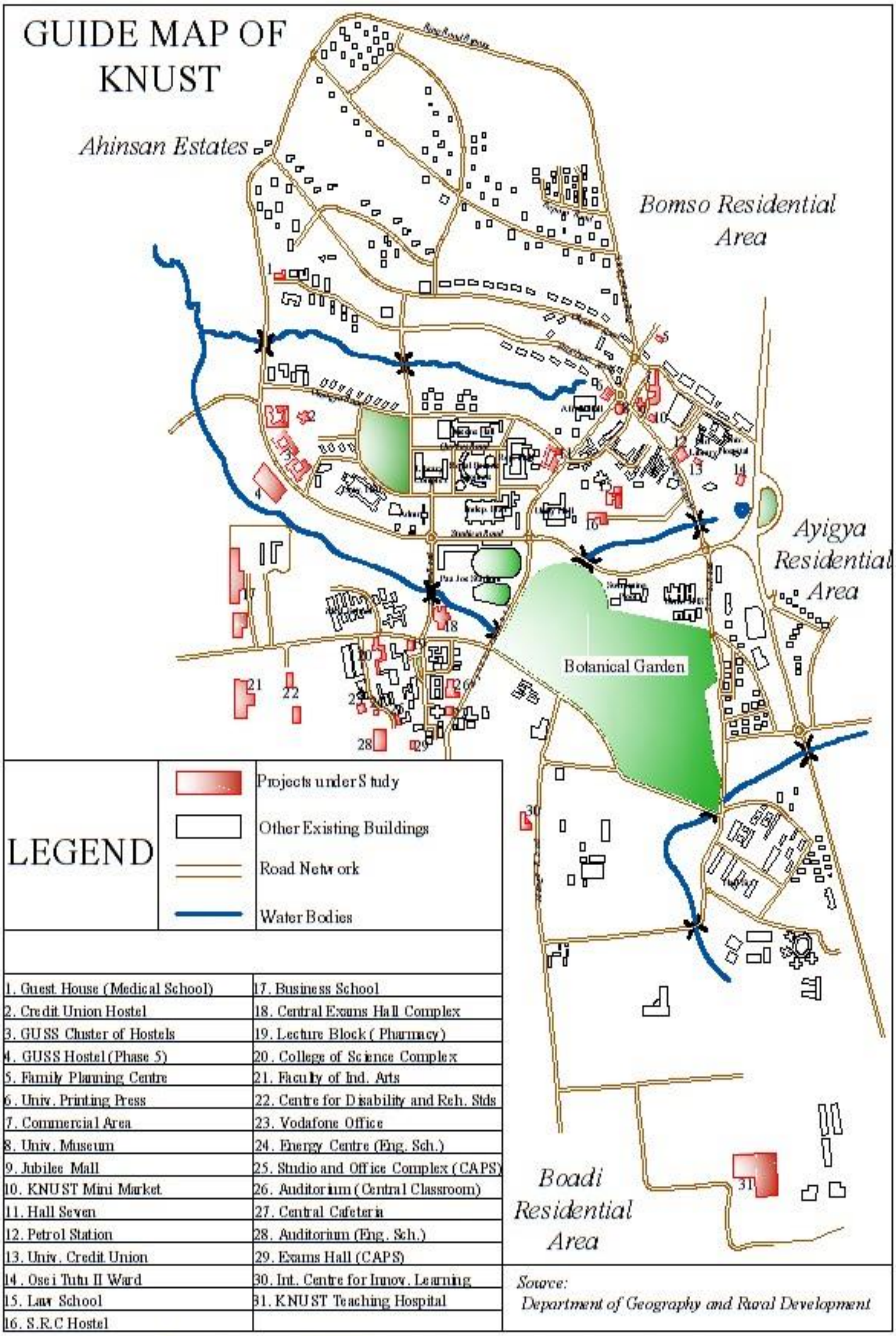

Figure 2.1: Map of KNUST showing the construction projects under study

To ensure that the construction projects undertaken on the campus are streamlined and controlled in line with the most effective contract management practices, some long standing entities were established to carry out this function. These entities include:

- Procurement Office; established upon the enactment of the Public Procurement Act (Act 663) to ensure that procurement of construction projects on campus strictly adhere to this Law;
- KNUST Construction Company; although now defunct, it was responsible for undertaking minor construction works and fabrication of minor construction components such as concrete curbs, culverts, blocks etc.;
- Estate Department; responsible for the allocation of the university's estate property e.g. staff bungalow allocation;
- Maintenance and Essential Services Organization; responsible for maintenance and renovation / rehabilitation of existing structures on campus;
- Parks and Gardens Department and;
- Development Office; traditionally responsible for the design and supervision of all construction projects on campus by acting as the consultant on behalf of the university. It is headed by the Director of Works who could be described as the 'Chief Consultant' for the university. Other staff of the office includes architects, quantity surveyors, civil and mechanical engineers.

Construction projects on the university campus are mainly funded through:

- Government of Ghana subventions through GETFUND;
- Internally Generated Funds (IGF) and;
- Private Individuals and Institutions.

Table 1.1 presents a summary of construction projects under study, sources of funding and year of completion.

Table 1.1: List of Construction Projects in KNUST under Study

No.	Project	Source of Funding	Year
1	Guest House (Medical School)	GETFUND	2007
2	Credit Union Hostel	Private	2009
3	GUSS Cluster of Hostels	Private	2003
4	GUSS Hostel (Phase 5)	Private	Under Construction
5	Family Planning Centre	Private	2006
6	Extension of KNUST Printing Press	IGF	2015
7	Commercial Area	Private	
8	KNUST Museum	GETFUND	2007
9	Jubilee Mall	Private	2014
10	KNUST Mini Market	IGF	2002
11	Hall Seven	Private	2007
12	Petrol Station	Private	Under Construction
13	KNUST Credit Union	Private	2009
14	Osei Tutu II Ward (KNUST Hospital)	IGF	2011
15	Law School	GETFUND	2007
16	SRC Hostel	Private	Under Construction
17	Business School	GETFUND	2007
18	Central Examination Hall Complex	GETFUND	Under Construction
19	Lecture Hall Complex (Faculty of Pharmacy)	IGF	Under Construction
20	College of Science Complex	GETFUND	2009
21	Faculty of Industrial Arts	IGF	2014
22	Centre for Disability and Rehabilitation Studies	IGF	2005
23	Vodafone Office	Private	2012
24	Energy Centre (Engineering School)	IGF	2012
25	Studio and Office Complex (CAPS)	GETFUND	2008
26	Auditorium (Central Classroom)	GETFUND	2006
27	Central Cafeteria	GETFUND	2004
28	Auditorium (Engineering School)	GETFUND	2007
29	Examination Hall (CAPS)	IGF	2007
30	International Centre for Innovative Learning	Private	2010

31	KNUST Teaching Hospital	GETFUND	Under Construction

Source: KNUST Development Office, 2015

The traditional function of the Development Office to design and supervise all construction projects on behalf of the university depends on the source of funding of the project which in extension determines the contractual arrangement. The office is fully and directly responsible for the management of construction projects financed through the GETFUND and IGF. However, where the project is funded privately, such projects are mostly managed by consultants from outside of the office even though it still plays an indirect role of vetting all construction drawings to ensure that they meet the set design and structural requirements of the university. The consultants brought from outside the office are also _supervised‘ to ensure that the set requirements are enforced and adhered to by the contractors.

Qualified construction professionals such as architects, engineers, quantity surveyors etc. are fully involved in all construction projects on campus because most of these construction projects executed by indigenous local contractors whose managerial inefficiencies affect their performance (Amoah et al., 2011). However, the involvement of these professionals on the projects appears not have stopped targets/goals from being missed e.g. budget, schedule and quality goals etc. In the more recent past, specifically within the past ten years, many people within and without the university community have expressed their misgivings about the trend of infrastructural development on the campus. This is because a new trend appears to have emerged where so much time is spent on projects and when they are finally delivered, they leave people wondering whether for example, architects were involved. For example, when a need was felt for the siting of an entrance gate at the

Ayeduase end of the campus, this rather _small' project was redone on two occasions because bigger vehicles had a hard time going under it. It would be revealing and educative to find out the impact of the consultants on such projects relative to the contribution they make in terms of the instructions they issue to the contractors.

2.2 Role of Stakeholders in a Construction Project

According to Kerzner (2001), stakeholders are individuals or groups whose very existence is directly or indirectly affected by an organization's or industry's performance and may sometimes even have a claim on its performance. One of the factors that influences the performance of a construction project is the way and manner by which information gets exchanged between these stakeholders i.e. communication (BRE, 2000). What makes the construction industry complex and different from other industries is the involvement different stakeholders (Sunday, 2010) and where these players consider and agree on what information to pass between them and the appropriate ways to make sure that this is done, performance is likely to be influenced positively (BRE, 2000). In order to ensure the successful delivery of performance goals (productivity, profitability etc.), the specific roles of the key players must be clearly spelt out and adhered to (Dainty et.al, 2006).

Consequently, as noted by Maslej (2006), for a better understanding of the concept of communication in the construction industry, the duties, responsibilities and the authority of various players on a typical construction project and how information gets exchanged must be recognized and appreciated. This is because the decisions they make especially at the inception and execution phases of the project have far reaching implications on the successful performance of the project (Bennett, 2003). Three major players and their roles in a construction project have been identified, namely; client/employer, consultant (architect) and contractor.

2.2.1 Client / Employer

One of the key parties to a contract is the client. According to Ashworth (2006), clients could be *public* (government/ agencies of government) or *private* (private companies/individuals) and have different priorities (developers, occupiers or investors) that are a combination of *performance* (quality, function and durability), *time* (completion by scheduled date) and *cost* (as determined by tender figure). A client‘s satisfaction with a product is contingent upon the extent to which these three priorities are realized based on the importance they place on them.

Clients are also entrusted with several duties, obligations and vested rights as outlined in many conditions of contract such as FIDIC (2006), Pink Form (1988). Some of the client‘s obligations and powers include;

- Powers relative to insurance;
- Duties relative to giving out site to the contractor;
- Powers relative to Liquidated Damages;
- Determination of employment of the contractor;
- Direct engagement of employees of the contractors;
- Duties relative to certificates and;
- Appointment of the architect who then appoints other members of the consulting team.

Other players in a construction project are the consultant (architect) and the contractor.

2.2.2 Consultant (Architect)

The consultant or the composition of a team of consultants depends on the type, nature and size of the project envisaged and may include an architect, quantity surveyor, civil and structural engineers, building services engineers project managers etc. (Ashworth, 2006). The complexity of the development process and the lack of the range of skills and expertise by most employers ensures that consultant(s)/advisers be employed to advise on funding, design, costs, construction, etc.

The consultant (for the purpose of this study is the architect) plays a vast range of roles during the construction process because of his involvement in the project from inception to completion. The early involvement of the architect at early stages of the construction project impacts positively on the project and eventually benefits the employer because he (employer) could be assisted in issues such as project costing and management, site location and selection, space organisation, and environmental impact studies (Samantha, 2009). The supervisory role of the architect as the lead consultant during the construction stage through site visits and inspections, site meetings and issuance of ASI are all meant to ensure that the set standards and specifications in the contract document are adhered to and failure in this regard may result in poor quality workmanship (Tembo and Blokhuis, 2004).

The duties and responsibilities of the architect in the administration of the contract includes arranging for technical and site meetings to an agreed agenda with all parties, issuance of all forms of certificates and ASI which may change the works; clarify design information or comment on quality, contract documentation, commissioning, facility management training, and post occupancy review (Mays, 2000, Samantha, 2009). However, if other consultants are involved in the process, they are required to issue instructions formally through the architect as the leader of the team and likewise, site directions issued by Clerks of Work must be confirmed by the architect (Mays, 2000). All of these instructions are targeted at just one of the players – the contractor (as the third player).

2.2.3 Contractor

The extensive reference to the contractor in many conditions of contract is generally because, along with the employer and the consultant, he is one of the players in a construction project. The role of the contractor is to directly take charge of all construction works as dictated by the provisions of the contract document by assembling and organizing the needed resources of labour, materials and plant and equipment (Tembo and Blokhuis, 2004). The contractor therefore agrees to abide by the guidelines of the conditions of the contract, specifications and any additional instructions from the architect in the execution of the works (Tembo and Blokhuis, 2004). There is also the agreement by the contractor to execute the works within an agreed time frame and at an agreed budget, comply with all state laws and regulations during construction and must also ensure that all employees on site abide by those laws. The contractor must also comply with the instructions of the architect, comply with the standards described in the contract document, duty to station on site a person in charge, requirement to give the architect access to the site at all times, necessity to proceed diligently with the works, responsibility to apply for certificates (payment, completion, etc.) within a reasonable time frame, responsibility for payment to nominated subcontractors, insurance and liability for injuries to persons and property etc. (Pink Form, 1988; JCT, 2005).

The contractor is perpetually and contractually responsible for any defect that may surface from the date of handing over of the project to an agreed time extending over a period known as Defects Liability Period (DLP) time as indicated in the conditions of contract. However, according to Ashworth (2006), the period within which the responsibility of the contractor ends depends on whether the contract was under hand or seal (6 years and 12 years respectively). This further imposes a great deal of responsibility, caution and tact on the contractor in the execution of such works.

The successful realization of these roles by the various players as enumerated above can only be achieved if they properly communicate with each other through the established means and channels as accepted and known to all of them. Hence the degree of success in the performance of a player‘s role depends on the level of understanding of the other player especially where he is directly linked to it. For instance, the architect provides the contractor with the raw materials in the form of instructions and the degree of success of that instruction greatly depends on the contractor and the manner in which it is communicated to him. As opined by Maslej (2006), the successful delivery of construction projects depends on the quality of communication between the various players.

2.3 Communication in Construction

Problems in construction often times emanate from communication problems (Latham, 1994) because of the fragmented, dynamic and project- based nature of the industry and this forms a complex communication environment because many of the players operate in frequently changing sets of relationships which are contractually driven (Dainty et.al, 2006). According to Maslej (2006), communication is critical to the construction industry and therefore successful project delivery depends on the quality of communication between the various players. He also asserts that effective communication depends on how a desired action or reaction is achieved after the information has been transmitted to the intended recipient. Therefore improved communication between players is necessary for successful project delivery. Improved communication within the building team and between the architect and the contractor could reduce failure, improve innovation and better technical solutions and improve quality and better decision making (Lenard and Eckersley, 1997; Emmitt and Gorse, 2003; Franks, 1998; Barrett, 1995).

According to Ashworth (2006), site communication includes gathering information to ascertain the needs of those involved with the project as a necessary tool of management to integrate the functions of departments and as a vital link between manager and subordinate in order to get the job completed. He further states that the effectiveness of performance will depend upon the ability to listen, read, speak and write. More importantly, effectiveness will be evident in being understood by others and to understand another person‘s point of view. For uninterrupted flow of instructions and information and effective communication, speed, clarity defined routes through which they are transmitted are a major requirement (Tembo and Blokhuis, 2004).

Communication on site comes in different forms and as such, the form chosen will depend on the individual, the intended recipient and the contractual provisions relative to that communication. Outlined below are forms and methods of communication in the construction industry according to (Mehra, 2009);

- **Written:** in matters of complicated nature, where future references are required or where probable legal consequences are anticipated, this method is pursued e.g. letters, reports, bills of quantities etc.

- **Visual:** This often results in a greater impact upon the recipient and it is more effective especially in cases of less complex subject matter e.g. films, slides, posters charts, project drawings and works schedules.
- **Oral:** this method is deemed appropriate for difficult or contentious subject matter because it allows for the observation of behaviour and attitudes and face-

to-face confrontation resulting in instant and immediate response. It can also be applied to simple, non-formal and less important messages.

The main channel of communication in construction which is of interest to this research is the one between the architect and the contractor. The architect communicates with the contractor through instructions issued as ASI. These instructions are communicated to the contractor through various media and vehicles such as site meetings, technical meetings, site diaries, certificates etc. Through these vehicles information is passed to the other players, consultations are done on how to tackle problems that have arisen, decisions are made and the other players are persuaded towards different ways of solving problems (Cooke and Williams, 2012). It is the responsibility of the architect to decide which, when and how a vehicle will be used to get messages and instructions across to the intended recipient(s) in order to ensure that the project is kept on track.

2.4 The Architect's Site Instructions (ASI)

Arguably, the ASI in a construction project is divine and sacrosanct. It has been reported that the first set of construction-related instructions issued to a contractor were those of God‘s instructions to Noah relative to the construction of the ark (Hodgin and McCutchen, 2004). It is said in the Bible that God gave precise and specific instructions to Noah concerning the construction of the Ark. The instructions included specifications about time, size, materials etc. as captured in Genesis 6-15 which reads in part:

"Make for yourself an ark of pitch trees; nests shall you make in the ark, and you will cover it inside and outside with a covering (pitch, bitumen. ………and this is the fashion which thou shalt make it of: the length of the ark shall be three hundred cubits, the breadth of it fifty cubits, and the height of it thirty cubits…….. " King

James Bible "Authorized Version", Cambridge Edition). This is referred to in the

Holy Qur'an as Safinat Nuh translated as Noah's Ark. Ashworth (2006) quotes Keith Waterhouse in *„The Lord Said unto Noah"* as: *"And God said unto Noah, the Ark shall be finished within seven days. And Noah saith, it shall be so. But it was not so. And the Lord saith, what seemeth to be the trouble this time? And Noah saith, mine subcontractor hath gone bankrupt. The pitch which thou commandest me to use has not arrived. The plumber hath gone on strike. And the glazier departeth on holiday to Majorca, even tho I did offer him double time."*

In ancient prehistoric days, the architect was described as the master builder who had training in all stages of design and construction. The architect's responsibility extended from design to overseer of the entire project from inception, design, costing through construction (Ashworth, 2006). This meant that the architect and the owner were the two main players in a construction project at that time and as a result architects issued instructions directly to their tradesmen. However, with the expansion of the construction industry and its growing complexity, the need for specialization became imminent and therefore other professionals and general contractors emerged. Consequent to this development, the architect relinquished the function of construction to the contractor but maintained the design and supervisory role (Hodgin and McCutchen, 2004). To ensure successful project delivery, the architect issued instructions to the contractor from time to time.

For construction projects to be effectively planned, controlled and successfully delivered there is the need for logical and systematic application of tried and tested techniques and an understanding of the culture and methodologies of the construction industry that organises and carries out the work as well as their impact (Cooke and Williams, 2012). Design and construction teams adhere to a number of interlinked procedures to communicate to one another and the conditions of contract guarantees an administrative strategy for ensuring that these procedures are followed (Murdoch and Hughes, 1992). It is these procedures that have been standardized throughout the industry and generally accepted as means of flagging, clarifying and resolving issues one of which is the issuance of ASI by the architect.

A review of many conditions of contract such as JCT, FIDIC, JBCC and the Pink Form show significant variations in the area of general conditions e.g. dispute resolution procedures, terms of payment etc. However, what remains same in many respects in all these contracts are the contents of the clauses that relate to instructions issued by the architect otherwise referred to as the _Architect‘s Site Instructions e.g. clause 2 of the Pink Form (1988), reads inter alia *"The Architect may in his absolute discretion and from time to time issue further drawings details and / or written instructions (all of which are in these Conditions collectively referred to as "Architect"s Instructions")".* The reference to the instructions as the _architect‘s site instruction‘ confirms the fact that not only is the architect the originator of the design and specifications and supervises the preparation of contract documents, he is also traditionally the leader of the construction team (Chappell, 2006). Even the introduction of the _Project Manager‘ as a construction industry professional has not displaced the architect from performing this function. Therefore the use of the term _consultant‘ with reference to the ASI actually refers to the architect and is used interchangeably to mean the same person i.e. the person delegated by the client with the authority to issue instructions to the contractor (Pink Form, 1988).

Literature is replete with studies on the ASI but critical review of this literature shows that many of these studies have often paid attention to just one component of the ASI i.e. variation orders (e.g. Mohamed, 2001; Ssegawa et al., 2002; Finsen, 2005; Arain and Pheng, 2006; Ndihokubwayo, 2008; Sunday, 2010). Notably, these studies have often focused on the definition and nature of variations, causes and influence from the pre-construction stage until the construction stage. Memon et al., (2014), studied the causes of variations and Ndihokubwayo and Haupt (2009) and they all found the client to be the biggest culprit in that regard. What appear missing in literature are detailed studies that look at the ASI as a whole unit and its overall impact on project delivery especially from the point of view of main players such as the contractor. Even if variation orders were to be accepted as the only instruction architects were allowed to issue, its impact on project delivery from the point of view of the contractor has not been well captured in literature so far.

It suffices to mention that, variation orders constitute part of the ASI and in practice are typically issued by the architect to effect additions, subtractions, modifications and swaps in relation to quality, quantity and work schedule (Ndihokubwayo, 2008). Not all instructions issued by the architect constitute variation orders e.g. an instruction to remove defective work (FIDIC, 2006). A closer look at the pink form for instance, reveals that out of the eight instructions the architect is empowered to issue, only one specifically and explicitly relates to variation orders. Admittedly, the handling of some of the other instructions could potentially cause changes to the project, especially if not handled well. The real effect of an instruction therefore lies in its handling i.e. delivery, reception and subsequent implementation.

ASI is a signed written order given by the architect or his appointed representative delegated to the contractor which is intended to amplify, correct, effect minor changes to the details of the work within the architect‘s delegated authority and also to order the use of provisional items (Chappell, 2006). The JBCC (2000) standard form of contract defined a contract instruction as a written instruction signed and issued by or under the authority of the principal agent to the employer. The contractual clauses relative to the ASI giving him the legal authority and mandate include; clause 2 of the Pink Form (1988), clause 17 of JBCC (2000), clause 3 of JCT (2005) and clause 3.3 of FIDIC (2006). It is generally acknowledged that the architect may exercise his discretionary powers from time to time by issuing new drawings, details and / or written instructions to the contractor in regard to:

1. The variation or change of the design quality or quantity of the works or the addition or subtraction or substitution of any work;
2. Any discrepancy in or divergence between the Contract Drawings and or Bills of Quantities;
3. The rejection from site, of any materials brought thereon by the Contractor and the substitution of any other material;
4. The removal and re-execution of any works executed by the Contractor;
5. The postponement of any work to be undertaken under the provisions of the Contract;
6. The dismissal from the site of any employee thereupon.
7. The exposure for inspection of any work covered up and;
8. The amending and making good of any defects after completion of works.

2.4.1 Classification of Architect's Site Instructions

Broadly speaking and as indicated in the previous discussion, the ASI is either a variation order or a mere instruction meant to reinforce a stated contract provision. In reviewing the JBCC (2000), Finsen (2005) categorized ASI into five main classes namely:

2.4.1.1 Instructions to vary the works

The architect is empowered to broach variations regarding changes to design, quality or quantity of the works. The instruction may come in the form of an addition, alteration or omission of a substantial chunk of construction works provided that they do not cause substantial changes the scope of the works or do not ultimately transform the building from one type to the other e.g. from a hotel to an office building.

2.4.1.2 Instructions to resolve discrepancies

The architect may issue instructions to rectify errors/discrepancies in description of certain facts in the contract document.

2.4.1.3 Instructions to reiterate or enforce contractual provisions

These instructions do not vary the contractual conditions but rather enforce or reiterate them especially where already executed works or materials already brought to site are found not to be in conformity to what has been stated in the contract document in terms of specifications. These instructions may include namely:

- Removal/substitution of any material deemed unsuitable for works;
- Demolition /re-works;
- Exposing works for inspection;
- Testing works/equipment installed and; Protection of the works.

However, instances where work is opened up and found not to be defective, the contractor is entitled to be appreciated financially for the effort. This could constitute a variation if the cost cannot be contained by contingencies. This goes to strengthen the point that when instructions are not carefully handled could create problems.

2.4.1.4 Instructions to deal with monetary allowance

This set of instructions does not alter the existing contractual arrangements but rather empowers the architect to direct how under prime cost sums budgeted for nominated subcontractors and suppliers should be dispensed. Such instructions, however, become variation orders where for instance, the prime cost sum allocated for materials supplied by a nominated supplier cannot cater for adjustments or changes made to the original quality or nature of such materials e.g. the supply of rustic clay tiles in-lieu of unpolished clay tiles.

2.4.1.5 Instructions to protect the client's interest

The existing contractual arrangements are not affected by this category of instructions. They are meant to rid the site of the presence of unwanted persons and employees of the contractor who may be engaged in illegal activities or may be bad influences on the morale of other employees. Such instructions include:

- Expulsion of any person or contractor‘s employees from site; and
- Expulsion from site any person not engaged or connected with the works

It is clear from above that the instructions to alter the quality and quantity of works or vary the design constitute variation orders. The other category of instructions such as instructions to reiterate the contractual provisions, protect the client's interest, resolve discrepancies in contract documents and to deal with monetary allowance are not considered as a variation orders.

2.4.2 Variation Orders

A degree of change should be expected in construction projects because, the complexity of operations involved makes accurate advance determination very difficult (Ssegawa *et al.* 2002) and therefore adequate provision must be made to cater for any possible changes (Finsen, 2005). Standard Forms of Building Contracts include a clause which allows the employer or his representative to be able to alter works by issuing instructions to the contractor to do same even though contrary to what has been specified in the contract (e.g. clause 13 of FIDIC, 2006). A change in form/shape of the scheme, the introduction of new materials, revised scheduling and sequencing are all usually catered for by the variations clause. It will also usually include a strategy for evaluating the financial implication of the variation and there is normally provision for adjustments e.g. completion date (Memon et al, 2014). These changes are achieved through the issuance of a variation orders by the architect.

A Variation Order is a written instruction by the architect to the contractor highlighting a modification required in a project (Oladapo, 2007). In as much as the instruction should contain a reference to the appropriate clause in the general conditions of contract from which the architect sources his authority to issue such an order, it is also the responsibility of the contractor to make a distinction between an instruction that amounts to a change in scope of work and that which is merely a reminder to carry out the original scope of work (Ndihokubwayo and Haupt, 2009). If the nature of works described in the instruction is considered substantially different from what is contained in the contract document, the contractor will then produce a quotation and forward to the architect for approval or otherwise. Upon receipt of approval from the architect, the contractor will then go ahead to execute the work as instructed.

A contractor may initiate a variation order through value engineering (FIDIC 2006, clause 13.2). Same procedure is followed as above except that this time it is initiated by the contractor. Much caution should however be exercised since according to Mohamed (2001), high incidences of variation orders on construction projects increase the likelihood of missed time and cost targets.

2.4.3 Necessity for the Architect's Site Instructions

Drawings and specifications are often not executed as designed because they are not cast in stone and as such, the further involvement of the architect in the administration of the contract especially during the construction phase is to ensure that necessary adjustments can be made in order to maintain design integrity, quality, and economy of the project (Mays, 2000). The architect can only see to the successful realization of these goals through regular site visits/inspections and holding meetings which would ultimately culminate in the issuance of further directions or instructions to the contractor. Several reasons account for this necessity and may include namely:

- The unpredictability in the behaviour of the parties involved in the contract (Alkarimi, 2013) and their unfamiliarity with the conditions of contract resulting in breaches (Fugar and Agyarkwah-baah,2010);
- Poor performance of Small Scale-Building Contractors (SSBCs) due to managerial inadequacies (Amoah et al.,2011);
- Incomplete and uncoordinated nature of construction drawings (Gao et al., 2006; Makulsawatudom and Emsley, 2003);
- The inevitability of changes during construction (Ssegawa *et al.* 2002; Mourgues and Fischer, 2008) and;
- The need for construction works to start alongside/ahead of design resulting in the necessity for regular supply of information (Skoyles and Skoyles, 1987).

2.4.4 Administration and Qualities of Architect's Site Instructions

In most conditions of contract, it is stipulated that instructions from the architect for the attention of the contractor must be issued in writing, signed and dated. Chappell (2006) agrees with many standard building contracts to the effect that a valid written instruction is one that is issued in accordance with the stipulated contract provisions and must fulfill certain conditions namely:

- Originate from the architect;
- In writing;
- Signed and dated;
- Not go beyond the power of the issuing officer i.e. the architect; Served properly on the contractor or his authorized representative and; May make reference to a clause allowing for the instruction.

According to Finsen (2005), "writing" includes drawings, faxes, e-mails, telegrams, magnetic tapes and computer disks in which words and drawings may have been electronically recorded and are capable of being converted to text and drawings on paper or other similar media. Verbal communication on the other hand refers to sending messages by using common spoken symbols and includes face-to-face, telephone, meetings, and presentations. Ashworth (2006), in commenting on the general conditions of contract with regard to verbal instructions, reinforces the procedure to be adopted as:

- Confirmation should be given in writing within seven days by the contractor to the architect.
- Unless the architect dissents in writing within a further seven days, the instruction shall be accepted as an ASI within the terms of the contract.
- Alternatively, if the architect confirms in writing the oral instruction within seven days, then the contractor needs only to accept this as an ASI.
- If neither the architect nor the contractor confirms the oral instruction, but the contractor executes the work accordingly, then it may be confirmed by the architect at any time prior to the issue of the final certificate.

- Confirmation of Verbal Instruction (CVI) sheets have been introduced to help contractors in curing the mischief resulting from verbal instructions (JCT, 2005) and it is desirable to send these notices via special/recorded delivery (in person or through post) or confirm receipt in minutes of the next meeting (Powell-Smith et.al. 2000).

ASI must at all times come from the architect only and served to the main contractor only or his appointed representative as shown in figure 2.2.

Figure 2.2: Established channel for routing ASI

Instructions meant for subcontractors must also be channeled through the main contractor and the architect is barred from issuing instructions directly to the site workers. Instruction must also be totally explicit, and where necessary should be attached with sketches or drawings uniquely cross referenced to it. Ashworth (2006) argues that an instruction can be of use in future if it is:

- *Precise:* clear, straightforward, as simple as possible and well thought out;
- *Accurate:* true and correct in all its details;
- *Definite:* future users should be left in no doubt as to what the message means;
- *Relevant:* to the particular situation and the people who will use it and;
- *Referenced:* linked wherever possible to other documents being used by the contractor.

Ideally, instructions should be prepared in triplicate using forms that may be issued to site staff in the form of books or blank forms printed in sets of three. The first copy is given to the contractor while the second is for the supervising architect‘s record and the last copy is retained in the ASI file and kept on site for ease of reference (Cooke and Williams, 2012). Instructions may also be recorded in a site diary under the heading of ASI. However, Chappell (2006) discourages this practice by asserting that sometimes further consultations may be required before an instruction can be concretized and that at any rate, the architect is not bound by any clause in the conditions to do that.

2.5 Contractors versus Architect's Site Instructions

The issuance of instructions by architects to contractors is not new in construction. It is quite understandable for a contractor to reasonably expect some amount of instructions from the architect at the construction stage of every project. It is equally reasonably expected that the contractor would study the existing contractual relationships and fully acquaint himself with the roles of parties involved in the contract and ensure that they only act upon instructions issued through one source — the authorized architect (Alkarimi, 2013). The contractor is also expected to rely on its own skill, care and judgment in the execution of the work and should not _blindly‘ follow all instructions provided by the architect without having first satisfied itself of the accuracy and completeness (Ndihokubwayo and Haupt, 2009).

One of the functions of the architect is to undertake regular inspections by visiting the site periodically to respond to any queries from the contractor and to check for obvious signs of bad practice and substandard workmanship (Lewis, 1985). These periodic inspections, however, will not make an incompetent contractor a competent one, nor will it shield him from his responsibilities to provide good quality workmanship as dictated by the requirements of the contract. It is important for the contractor to realize that the architect is not responsible for the daily activities of construction team – that role falls to the contractor. A diligent contractor is one who can be relied upon to pay attention to the architect‘s drawings/specifications and to ask for further clarifications when in doubt for instructions to be issued (Ndihokubwayo and Haupt, 2009).

Levy (2002) indicates that contractors or their representatives may come across n technical problems or discrepancies, gaps, errors, or conflicts in the contract document and may make requests of the architect for review of such discrepancies, or for approval of the contractor‘s interpretation of certain issues relative to the contract document, the works or an instruction. These requests are usually made through a written document issued by the contractor to the architect known as Request for Information (Tembo and Blokhuis, 2004). In other situations, contractors may also propose other methods of construction through Value Engineering especially where there is reasonable doubt (based on experience) that the proposed design and construction method by the architect is not capable of fulfilling the desired _fit for function‘ objective (Ndihokubwayo and Haupt 2009).

2.5.1 Compliance and Implementation

The contractor carries the contractual obligation to abide by all instructions issued by the architect unless a reasonable objection in writing is made regarding noncompliance e.g. an objection or refusal to accept the nomination of a subcontractor because of the existence of an unsatisfactory relationship on a previous job (JCT, 2005; FIDIC, 2006). The architect may issue a 'notice to comply' to the contractor in cases of noncompliance or may after seven days instruct others to carry out the work for the contractor to be surcharged (deducted from payments due the contractor, or they may be recoverable as a debt by the employer). In more severe cases, particularly where the contractor persistently fails to comply with a written instruction, the contractor‘s employment may be terminated.

The contractor has the right to ‗reasonably object‘ or query an instruction where he deems it is beyond the confines of the contract and request for clarifications from the architect on the relevant clauses from which they are empowered to issue such instructions (clause 4.2 of JCT 2005). However, a contractor‘s decision to query an instruction does not relieve him of the obligation to comply because should the instruction be found to be valid, the contractor would be liable for any delays caused by failing to comply. Where the contractor complies and the instruction turns out to be invalid, he may be entitled to any losses incurred through compliance (Cooke and Williams, 2012). The contractor would therefore have to make a commercial decision regarding whether to comply or await the outcome, but the architect would be wise to deal promptly with any such query (Lupton, 2008). When parties disagree on the validity of an instruction, it may lead to a dispute and the dispute resolution procedures enshrined in the contract will be activated.

2.6 Missteps in Issuance and Implementation of Architect’s Site Instructions The future course of any construction project is determined by the procedural foundations laid at the onset and the extent to which they adhered to by the various actors (Ashworth, 2006) and therefore the procedures established relative to ASI will obviously lure to the benefit of the project if strictly adhered to. Even though these procedures have been clearly established there exist serious practical missteps hampering the administration of ASI. Disputes and protracted litigations have arisen as a result of these missteps and have resulted in backbreaking document reviews, huge claims and counterclaims (Alkarimi, 2013). Literature reviewed has revealed inconsistent modes of communication, incomplete documentation, non-adherence to established communication protocols on site and major assumptions with respect to the various participants etc. as some of the missteps. Some of these missteps are discussed further below.

2.6.1 Clarity of Instruction

The level of detailing shown on an instruction is as important as the instruction itself. An instruction fraught with ambiguities, nuances and insinuations can only lead to disputes and litigations even though not all written instructions are clear as some are decidedly vague (Chappell, 2006). According to Charoenngam et al (2003), disputes between parties to a construction contract can occur if ASI (especially variation orders) is not managed carefully. Uff (2005) asserts that the main cause of disputes with regard to ASI has to do with the point where an instruction becomes a variation order because contracts do not contain a definite description of the content of a variation. It is, therefore, the responsibility of the issuer of the instruction to ensure that all ambiguities are eliminated by giving the information in great detail and also providing a reference to the specific item or issue in the contract document (Catherine, 1992) in order to forestall misunderstandings. Written instructions must be unmistakable in their intent to order something even though it may be deduced from what is written down. However, it is safer from the contractor‘s point of view to ensure that the words visibly are meant to instruct and actually instruct (Chappell, 2006).

2.6.2 Disinterest in Documentation

At the beginning of the project especially at the pre-contract stage, team members show genuine interest in following procedure e.g. adherence to communication protocols. However, as the project progresses and pressure begins to mount on them especially at the construction stage, coupled with their individual motivations to show tangible progress, adherence to protocols tend to take the back seat (Alkarimi, 2013).

They are seen by the ‗brick and mortar‘ field workers under the ‗gun‘ to show progress as distractions. Therefore, a very important function such as the adherence to established procedure for handling ASI to and fro is relegated to the periphery of the project.

Additionally, the initial interest in documentation is also lost and as a result it becomes obviously difficult to resolve issues when conflicts arise (Mays, 2000). It is also imperative to note that clearly recording and keeping records of instructions is of greater benefit to the contractor because they assume greater importance after the event than during it. On rare occasions, it has been known for a contractor to fabricate site diaries and other records if he is in a tight corner , rather than admit that he has no record at all (Powell-Smith et.al. 2000)**.**

2.6.3 Source and Target of Architect's Site Instructions

One of the most common areas of from which problems arise in construction contracts is when ‗instruction‘ are issued from other members of the supervising team, clerk of works or the employer himself (Powell-Smith et.al., 2000)**.** The source of an instruction determines whether its effect will be lost, diluted or misinterpreted.

Major problems continue to arise on construction sites when the contractor feels (rightly or wrongly) obligated to take directions from the client or other members of the consulting team. Individual members may not be involved in the project all the times and often times when they are all not present in one room or the same place while instructions are issued, conflicting instructions if entertained could lead to delayed schedules and additional costs (Lavender, 1996). The conditions of contract empower the client to delegate to the architect the authority to issue instructions on its behalf. However, some clients tend to bar the architect from issuing instructions that have time or cost implications (Alkarimi, 2013).

Mays (2000) suggests that in a site situation where the responsible contractor staff is unavailable and the work in progress will have to be rejected, the rule of thumb is to inform whoever is involved to stop and confirm it with the contractor, foreman or his appointed agent as soon as they can be contacted. This practice, however, carries with it the risk that these employees of the contractor may not be in any position to ascertain the effect of what they are being told to do particularly when, as often is the case, extra work, delay or other implications are the likely results of such an instruction.

2.6.4 Verbal Instructions

Even though Carlsson et. al., (2001) suggest that in a project environment, face-toface communication is the appropriate medium for ―timely exchange of information, rapid feedback, immediate synthesis of message, and timely closure,‖ it appears to sharply contradict the position in Standard Building Contracts that instructions must be in writing. The architect has the authority to issue instructions in *writing* to the contractor to ensure effective performance of the contract and to avoid delays (Chappell, 2006).

Various reasons may motivate architect to tend to issue verbal instructions on site with the promise to put them into writing later for onward delivery to the contractor (e.g. the cliché that ‗let‗s get things done quickly‗). These ‗promised‗ instructions are sometimes never written and when the contractor issues a claim it is contested. There is sometimes the temptation on the part of the architect to urge the contractor ―verbally‖ to carry out an instruction in the hope that the contractor will not have a record of it and will not be able to make a claim. Another factor that hampers the transmission of information from the architect to the contractor is the distance between the architect‗s head office and the site often leading to instructions being issued on phone, rather than more concise written instructions being issued.

For some architects, the reason behind giving a verbal instruction is sometimes more insidious – if the architect or engineer realizes that his initial design was an error he may not want to put a correction instruction to the contractor in writing and attract a claim from the employer when the contractor makes a claim to the employer. This rather evasive behavior on the part of some architects leads to protracted disputes that tend to impact negatively on the set project delivery goals. In such circumstances, contractors should certainly be wary of such architects and should also consider the intention behind the refusal to issue of an instruction and its subsequent effect on his right to payment

2.6.5 Inconsistent Format

Construction industry professionals and the various allied professional bodies in Ghana e.g. Ghana Institute of Architects, Ghana Institute of Engineers etc. have issued standard booklets and forms to their members for use on construction project sites. It is however not uncommon to find that in addition to these forms, an architect on a particular project will issue instructions using different formats/forms e.g. letters, filled out standard forms, telephone conversations, extra drawings and sketches, in site diaries etc. This array of formats/forms when not applied properly may be a source of confusion to the contractor and may impact negatively on the project.

2.6 .6 Globalization Challenges

New and different methodologies, practices and expectations are being constantly imported into projects by the various project stakeholders/participants due to globalization (Alkarimi, 2013). Another product of globalization is the tendency for project drawings and specifications to be wholly _imported‘ from other countries for implementation in other countries e.g. The Flagstaff House of Ghana was _imported‘ from India in 2009. With this complex mix come the natural differences in approach, priorities, interpretation, prior experiences and the understanding of responsibilities. In such increasingly common situations, communication between parties tends to be negatively affected.

2.6 .7 Instruction Time

When errors and omissions in designs or discrepancies/conflict between contract documents are discovered, it is the duty of the architect to provide corrective measures. Gao et al., (2006) mention that contractors are rarely aware of problems until works have progressed substantially due to the accepted norm of issuing detailed drawings long after the project has commenced. A contractor faced with the problem of interpreting ambiguous design details or inadequate working drawings is expected to notify the architect as soon as possible because they cannot proceed with work when these ambiguities emerge. Therefore when architects delay in issuing instructions to clarify situations such as these, losses in terms of idle labour and plant are encountered while waiting for the architect's decision (Ndihokubwayo and Haupt, 2009). Contractors consider this trend as a very crucial factor that contributes to delays in construction projects (Fugar and Agyakwah-Baah, 2010). The negative impact on productivity can only be eliminated if decisions are taken relatively quickly. Unfortunately, requests by contractors are seldom given the desired attention they deserve because consultants feel superior over contractors and this hinders the pace at which decisions are made (Ndihokubwayo and Haupt, 2009). Acharya *et al.* (2006) asserts that the combined interest of the client and the contractor are often dispensed with for the benefit of the architect's.

2.7 Factors that Determine the Effectiveness of the Architect's Site Instructions

Instructions are bound to occur in construction projects because not only is the behaviour of the various players unpredictable, the existence of unforeseen situations coupled with the fact that the advance and accurate determination of construction projects is very difficult due to the complex and unpredictable nature of the activities that lead to the realization of the final product (Ssegawa *et al.* 2002). However, the rate at which they occur vary from one project to the other. Many factors such as project complexity, client attitude and documentation problems influence the frequency, nature and level of detailing of instructions issued by architects.

2.7.1 Complexity of Project

Gidado (1996), asserts that project complexity is a direct product of constant demand for project success/efficiency (cost, time, quality, health and safety control measures and procedures; faster dispute prevention/resolution mechanisms; globalisation, liberalization and advanced technological environment within the construction industry). Whereas Baccarini (1996) insists that project complexity is made up of many interconnected parts, and Ireland (2007) identifies organisational/managerial complexity and technological/technical complexity as the two distinguishable types of project complexity. Organisational complexity refers to the decision making process relative to the allocation of authority, tasks, responsibilities; and the business and communication relationship between parties. Technical complexity refers to bottlenecks encountered in the process of transformation needed to successfully get construction projects executed (where materials, tools, skills, etc. are involved).

Words such as _low‘, _medium‘ and _high‘ could be used to classify the degree of project complexity. Complex projects are ones that require complex details about how they should be executed (Gidado, 1996) and as such works may be delayed on site because the desired effect of issued instructions resulting from project complexity take longer periods of time for contractors to fully comprehend (Ndihokubwayo and Haupt, 2009). Therefore the higher the complexity of the project, the higher the requirement for more details as the project progresses in order to avoid deviations.

2.7.2 Attitude of Client

The role of the client as the initiator of the project allows him the opportunity to play a major role in the project‘s lifecycle (inception to completion). At the the construction stage, clients tend to influence the frequency of changes because they envisage the needs and objectives of projects, establish the scope of works and the required quality standards (Ndihokubwayo and Haupt, 2009). Uyun (2007) remarked that change in requirements is one of the primary reasons why clients tend to initiate variation orders on construction projects. According to Cairer (2007) and Arain and Pheng (2006), needs of the owner may change at the design or construction stages or even the choice of the engineer.

Clients are mainly classified under two categories: knowledgeable and experienced clients in the construction industry and those without or with little experience and knowledge (Ndihokubwayo and Haupt, 2009). Clients with experience in construction are engaged during the design stage to provide professional guidance to the design team which may contribute to the avoidance of continuous modifications during the construction. For example, public entity clients and private development companies have in-house professional teams tasked either design or supervise a commissioned designer. The technical input into the design by clients or their appointed representatives hinders full dependence on the designer, thereby reducing the incidence of changes in their thinking during construction (Ndihokubwayo and Haupt, 2009).

Ignorant or less knowledgeable (in construction) clients tend to depend on the designer for guidelines even though they cannot determine ahead of time if their needs have been met. Uyun (2007) remarked that it is common for clients to tend to shift their requirements along the way partly because of the difficulty in defining their requirements resulting from poorly defined project objectives. Sudden and unexpected financial mishaps experienced by clients during construction force them to initiate (e.g. replacement of materials; changes in design scope and schedule of works) leading to lowered quality standards and increased maintenance cost.

2.7.3 Problematic Documentation

Where there are problems with a project‗s documentation, the smooth flow of construction activities will be adversely affected and therefore the regular provision of extra information/clarification and complete drawings by the architect should be valued as an important part of the construction process (Powell-Smith et.al. 2000)**.** Some documentation problems include changes in specifications by the architect (Arain and Pheng, 2006), conflict between contract documents (Arain, et al., 2004), errors and omissions (Arain and Low, 2005) and inadequate working drawing details (Emmitt and Gorse, 2003).

2.7.4 Complex Design Technology

A complex design requires details that will help the contractor in comprehension and interpretation (Arain et al., 2002). When a contractor is faced with a complex design for the first time, it eventually may affect the smooth flow of construction activities resulting in delays. In order to streamline and speed up the flow of construction activities, the architect must be on regular standby to clarify issues.

2.7.5 Situations beyond Control of Parties

Certain changes occur because situations beyond the control of the contractual parties do arise due to changes in statutory regulations, economic and socio-cultural conditions, unexpected difficulties, etc. (Arain & Pheng, 2006). Gidado (1996) identifies the unpredictability and unfamiliarity with the inputs and environment by management as some of the possible causes of project uncertainty. Adverse weather conditions can affect outside activities in construction projects and professionals in the construction industry are also usually faced by unforeseen conditions (Clough and Sears; 1994 O‘Brien, 1998).). While contractors may respond to these conditions by adjusting their schedules, architects may try to contain these conditions through reviews of designs and previous instructions, clarifications and further instructions.

2.7.6 Contractor Competence

The professionally inexperienced contractor is prone to commit mistakes during construction (Clough and Sears, 1994) resulting in low quality workmanship which also may lead to breakages and re-works in construction projects (O‘Brien, 1998; Arain et al., 2004). The level of competence of a contractor influences the frequency of the architect‘s instructions meant to correct or clarify issues on site. It is important to mention that even though the contractor bares the cost of the defective work, its effect on project delivery is not desirable e.g. reworks lead to delay.

2.8 Architect’s Site Instructions versus Project Delivery

Optimum project performance could be realized and works could flow uninterrupted within schedule and budget limits if the works programme is well-structured (Ndihokubwayo and Haupt, 2009). This fete is however almost impossible to achieve due to designs and business conditions, delivery gaps etc. (Al-Hakim, 2005). The nature of the impact (positive or negative) of an instruction is determined by the degree of adherence to the established procedure and its timing. The desired impact of ASI will be achieved if all laid down procedures for issuance and implementation of instructions are followed.

2.8.1 Desired Effect

A detailed review of many Standard Forms of Building Contracts (Pink Form, 1988; JBCC, 2000; JCT, 2005; FIDIC, 2006) reveal that the ASI, if properly administered, received and implemented could lead to some significant desired impact such as:

- The contractor may be protected from being burdened with works which were not originally covered in the contract document since such works can be catered for by change orders;
- The client is able to vary the works at any stage of construction without necessarily going into new contract with the contractor;
- Where discrepancies are noticed in time and instructions are issued to resolve them, the cost impact of future disputes and litigations are eliminated and the smooth flow of construction activities are not hampered especially where the resolution is done quickly;
- Quality standards set for the project are adhered to and the cost of reworks, reexecutions and demolitions will be eliminated because materials of doubtful quality will not be allowed onto the site or may be disapproved by the architect;
- The contractor is minded to seek clarification from the consultant for activities he is doubtful of thereby ensuring that quality standards set for the project are adhered to;
- Where materials are not readily available or where prevailing site conditions do not allow for the immediate execution of certain activities, the consultant could issue instructions to postpone such works thereby allowing for flexibility in the construction process and reduced delays;

- Persons suspected of theft and bad influences on the work force and materials are barred from stepping on the site;
- The tendency of the contractor to cover up shoddy works without notice is curtailed. This will impact positively on the quality of the project; and
- The client is assured of the security of his investment when the contractor is contractually duty-bound to correct any detected defects within the defects liability period based on the architect‘s site instructions.

2.8.2 Undesired Effect

The closest endeavor to the battlefield is the construction industry because of the similarity in their shared challenges such as bad inclement weather and ground terrain; manpower, equipment and materials supply issues; budget, schedule and health and safety conditions (Alkarimi, 2013). Therefore any activity that has the potential of causing disputes must be treated with great caution. Example of such an activity is the issuance of instructions by architects. It is imperative to understand that the time and cost consequences of architect‘s site instructions are potentially disruptive to execution of construction projects and should therefore be used with care. As noted earlier, the nature of the impact (positive or negative) of an instruction is determined by the degree of adherence to the established procedure and its timing. Disputes tend to arise when ASI is not managed carefully and the time and cost consequences are potentially disruptive to the execution of construction projects and should therefore be used with care (Charoenngam et. al., 2003). Time overruns, cost overruns, quality degradation etc. are some of the undesired impacts of ASI.

2.8.2.1 Time Overruns

The completion of projects within the minimum time limits is one of the major requirements of clients because they expect to make some amount of monetary savings in that regard (Ndihokubwayo and Haupt, 2009). This is the reason why contractors are heavily surcharged when they miss the set project schedule (Pink Form, 1988). The penalty imposed is intended to ameliorate for any damages that may be brought upon the client as a result of the missed schedule target. This however does not completely eliminate time overruns in the construction industry. Time overruns in construction is a worldwide phenomenon (Sambasivan and Soon, 2007) and does not only affect the construction industry but the entire economy of nations as well (Faradi and El-Sayegh, 2006).

One of the causes of delays in the construction industry is the issuance of instructions especially when not managed carefully. Kaming et al. (1997) identified bad instructions as the second cause of re-works in Indonesia. Progress of construction activities is obstructed if instructions especially those that cause changes occur, because they tend to affect the planned completion time of such activities (Memon et. al., 2014). When instructions are issued for constructed components of works to be reexecuted, opened up or demolished during the execution phase of any project, a significant amount of time and cost is spent to do this especially where in some cases such works have to be redone or reworked (Clough and Sears, 1994).

2.8.2.2 Cost Overrun

Construction projects undergo many established phases of which only a couple is of particular interest to this research, namely the *pre-construction* and *construction phases* (Bennett, 2003). Greater attention of cost planning is often centred on the *construction phase* because more resources are expended in this phase as compared to the *pre-*

construction phase (Ndihokubwayo and Haupt 2009). Clients prefer to have an idea in advance of the total estimated cost of finished construction projects they getting involved in and based on that knowledge would then prefer to have the final construction costs equate to the original forecast total estimated cost/tender figure. Unfortunately, cost overrun in construction projects is a common issue because many construction projects incur cost overruns (Rahman et. al. 2013; Memon et. al. 2014). Modification in design and execution, significant amount of demolition and rework of constructed project components result in project cost overruns (Clough and Sears, 1994; CII, 1990). Not all instructions increase the costs of construction projects because omissions in most cases are meant to lower costs while additions may increase costs (Ssegawa *et al.*, 2002).

2.8.2.3 Quality Degradation

Quality of a project is a very important component which adds ―value for money‖ (Arditi and Gunaydin, 1997). Instructions to re-execute, open up or demolish works already constructed impose huge cost and time burdens on contractors. If these orders are frequent, they may potentially comprise the quality of works because contractors may try to cater for losses they are not sure of recovering by cutting corners (Patrick and Toler, 2008; CII, 1990). Additionally, in administering contracts with substantial levels of risk and undetermined variables (where a significant amount of instructions are issued), contractors may try to employ shortcuts to go around quality and quantity in order to increase profits (Patrick and Toler, 2008).Instructions that are intended to effect changes in the project have very significant effect on the project quality (Fisk, 1997).

2.8.2.4 Health and Safety

Changes in construction technology, materials, plant etc. may require additional health and safety measures (Arain and Pheng, 2006). Consequently, if these measures are not put in place or adjusted, unsafe situations may develop on site. According to Mourgues et al. (2007), misunderstood instructions produce unsafe situations on site because the instructions are followed and implemented based on assumptions by contractors.

2.8.2.5 Professional Relations

Professional relationships are developed between parties to a contract and some of these relationships may outlast the project. The experience and reputation of the various participants shore up when they successfully execute projects (Ndihokubwayo and Haupt 2009). However, disputes may arise between the participants in the course of executing the project due to a variety of reasons. Some of these problems can be very telling on the professional relations between parties and their representatives (Bower, 2000). One of such sources of conflicts is in the area of instructions issued by architects to contractors. Ndihokubwayo and Haupt (2009) opine that the excessive occurrence of change orders as a result of design errors or omission may undermine the professional ethics of the designer. They further argue that the morale of workers are adversely affected when they have to open up works for inspection (especially due to the irregular site visits by the architect), re-execute works or demolish portions of completed works.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

The practical description of the organization of research project is explained by the methodology (Oliver, 2004). Walliman (2005) opines that in order to convincingly show how the problem identified will be investigated, which methods will be used to collect what data and how this data will then be analyzed to arrive at conclusions in order to develop recommendations, a plan of action must be developed. This chapter, therefore, outlines the research methodology used in the systematic collection of data that enabled the key questions raised in this research work to be answered. It also identifies the research strategy and design tools and techniques deemed appropriate for the achievement of the set research objectives. In an attempt to find an answer to a research question or provide novel insights, research projects synthesize and analyze existing theories, ideas and findings of other research works (Fellows & Liu, 1997). The formulation of the research problem determines the kind of data required and the most appropriate data analysis method required in order to analyze and solve it (Walliman, 2005). As mentioned earlier elsewhere in this work, this research is a study into the impact of ASI on project delivery in Ghana.

3.2 Methodological Strategy and Approach

There is a direct correlation between the data collection method and the analyses which may be deduced from it and subsequently the findings, conclusions and validity (Fellows & Liu, 1997; Muijs, 2010). To achieve an even more valid research finding, quantitative strategy was adopted for the gathering of primary data and further strengthened with the literature review.

The attention of quantitative research is centrally focused on measurements and amounts (e.g. more and less, larger and smaller, often and seldom etc.) of the characteristics exhibited by the people and events under study (Thomas, 2003). This method makes use of statistical techniques to identify facts and casual relationships. Some common quantitative research data collection techniques used includes questionnaires, tests and existing databases (Frechtling and Sharp, 1997). It also emphasizes on quantification because hard and dependable data are often gathered and results can be generalized to a bigger population within reasonable limits of error because samples collected are often large and representative.

Melville and Goddard (1996) proposed two distinct literature studies as a means of obtaining secondary data in the form of literary sources covering relevant areas of a particular subject area. These sources are preliminary and full literature studies.

For an initial feel of the research topic, a preliminary literature study was undertaken. This allowed for the understanding of the background, key concepts, issues, terminologies, etc., culminating in the formulation of the problem statement and questionnaire development.

Melville and Goddard (1996) assert that the most referenced literature sources in scientific reporting are the most reliable. A full literature study undertaken as a means of gathering information included sources such as textbooks, journals, conference proceedings, unpublished theses and dissertations. This exercise was carried out to enrich the knowledge of the researcher, investigate and critique previous works done in the research topic area and areas left behind in order to provide a basis for a new research work. This involved detail examination of the existing literature and reviewing other relevant literature on architect‘s site instructions. The KNUST library and the internet served as the main sources of published literature.

3.3 Purposive Sampling

Non-probability or non-random sampling even though perceived as creating a weak basis for generalisation (Walliman, 2005) was chosen as the most suitable research strategy for this study. The expected level of cooperation from the selected sample coupled with the nature of the expected data to be gathered from the field was basis enough for this decision. Key respondents such as contractors, foremen and their inhouse construction professionals e.g. architects, quantity surveyors etc. were identified using purposive sampling technique (an example of the non-probability sampling). This technique consists of handpicking cases that are considered from the point of view of the researcher as typical, interesting and know most about the subject matter (Blaxter *et al*, 2001). Non-random samples can reliably represent the populations provided the selection is done with the aim of representativeness in mind (O'Leary, 2004). This method was used to determine the construction companies to which questionnaires were sent. The companies were selected based on whether their contact details were readily available e.g. location addresses, e-mail addresses, phone numbers etc. An initial telephone inquiry was conducted to seek their indulgence in the survey in order to reduce to the minimum the number of non-responsive questionnaires.

3.4 Population Definition

The selection of respondents was limited to construction firms that have undertaken construction projects on KNUST campus over the past 15 years. A physical count undertaken by the researcher identified a total of 32 construction projects on campus.

Due to the limited time available to the researcher and coupled with the fact that the number of construction firms that have worked on the construction projects on campus could be easily identified, they were purposively selected and targeted for questionnaire responses. The addresses/locations of these construction firms were obtained from the KNUST Development Office. An average of three (3) respondents per construction project was selected to participate in this research work. The participants included the main contractor, the foreman (or any appointed representative of the contractor), and the in-house construction professional (employed by the contractor) who work in the offices of contractors. This brought the total population to ninety six (96). The thirty two (32) consultant-architects on the thirty two (32) construction projects (many were located in the KNUST Development Office) were added totaling one hundred and twenty eight (128).

3.5 Sample Size

Conducting census studies for small populations, imitating sample sizes of similar studies, using published tables, and the application of mathematical formulas in the calculation of sample sizes are some of the several approaches used in the determination of sample sizes in research (Israel, 1992). The mathematical formula propounded by Kish (1965) was used to obtain the sample size for this research study as follows:

$$\boldsymbol{n} = \frac{\boldsymbol{n^1}}{\boldsymbol{1 + \frac{n^1}{N}}}$$

Where n = sample size and

$n^1 = \frac{s^2}{v^2}$

$s^2 = p(1-p)$

N = Total population = 128 s = Maximum standard deviation in the population elements p = proportion of the population elements that belong to the defined category

i.e. p = 0.5 (95% confidence level) v = standard error of the sampling distribution i.e. v= 0.05

Hence solving for n^1

$$s^2 = p(1-p) \rightarrow s^2 = 0.5(1-0.5) = 0.25$$

$$v^2 = 0.05^2 = 0.0025$$

$$n^1 = \frac{s^2}{v^2}, n^1 = \frac{0.25}{0.0025} = 100$$

$$\boldsymbol{n = \frac{n^1}{1+\frac{n^1}{N}}}$$

$$n = \frac{100}{1+\frac{100}{128}}$$

$$\boldsymbol{n = 56}$$

Cochran (1963) and Israel (1992) suggest that in order to cater for respondents the researcher is unable to contact, 10% should be added to the sample size. to compensate for persons the researcher is not able to contact. Therefore, approximately 6 which represent 10% of 56 would be added to the sample size. This brings the total number to 62

i.e. $\boldsymbol{n = 62}$

3.6 Questionnaire Administration and Data Collection

Walliman (2005) asserts that questionnaires are meant to help researchers in the organization of their research questions in order to receive replies from respondents without actually having to talk to each of them. Same fixed set of questions are administered on every respondent. Based on the set objectives, a well-designed close and open-ended questionnaire which was set in line with the specific objectives of this research study was developed to elicit information from the targeted respondents.

Kumar (2005) indicated that open-ended question ensure that the researcher‘s bias is eliminated if respondents comfortably and freely respond to questions leading to information variety. The close-ended questions were restrictive in terms of the answers expected from the respondents because a category of 'ready-made' answers were suggested from which respondents were required to pick from.

Various means of delivery were employed in order to get the questionnaires to the respondents. These included hand delivery, postage and electronically by e-mails.

For purposes of this study, the questions were grouped under six sections. The first set of questions was in relation to respondents‘ profile aimed at establishing their backgrounds and experiences. The second group of questions related to the issues addressed and handling of ASI on construction sites in Ghana. The five categories of instruction as suggested by Finsen (2005) were presented to the respondents where they were then asked to rate them on a 5-point Likert frequency scale (where Never = 1; Seldom = 2; Sometimes =3; Often = 4 and; Always = 5) terms of how frequent they were encountered on construction sites. The third category of questions was related to the factors that determine the effectiveness of ASI. A 5-point Likert scale (where 1=Most important, 2= Very important, 3=Important, 4=Least important, 5=Not important) was formulated to rate the relative importance of the various factors determining the effectiveness of ASI. Respondents were asked to indicate from the list of factors identified in the literature reviewed. The fourth category of questions was in relation to the medium through which the architect issues instructions. The 5point Likert scale as mentioned above and a four-level frequency scale (1^{st} =Most frequent, 2^{nd} =Vey frequent, 3rd=Frequent, 4th=Least frequent) were utilized. The fifth category dealt with the common missteps in the administration of instructions making use of the 5-point Likert scale as mentioned earlier. The last category of questions zeroed in on the effects of ASI by utilizing the 5-point Likert frequency scale as above and a 3-point Likert scale (where Major impact = 1; Slight impact = 2; and No impact = 3).

3.7 Method of Analysis

Raw data from the closed-ended questions were analyzed using the data analysis tool SPSS18 (Statistical Package for Social Sciences) for windows for analysis, generation of descriptive frequencies and their subsequent interpretation. Frequency tables, tabulations and cross tabulations were done with results presentation in the chapter four.

CHAPTER 4

DATA RESULTS AND DISCUSSIONS

4.1 Introduction

For a construction project to be deemed successfully executed, it must be kept within estimated cost and prescribed schedule which largely depends on the methodology backed by the sound judgment employed by the engineer/architect (Ashley *et al*, 1987). Architects tend to make decisions on site in the form of instructions by employing various methodologies. These methods and their consequent impact on construction projects within the study area is what the survey results are expected to reveal.

According to Akintoye (2000), most questionnaire survey response rates in the construction industry fall within the 20-30 percent range. Out of 128 questionnaires sent out, 70 questionnaires were duly completed and returned representing a response rate of 54.7%.

This chapter presents a detailed analysis of the survey results and findings of the study based on collected data obtained from using questionnaires and also aim to detail the main objectives of data analysis (introduction, background etc.). The chapter is divided into seven sections. Section (1) examines the background of respondents in terms of nature of organization, position in organization, work experience, degree and nature of involvement with respect to ASI and most importantly if they have worked on any construction project within the study area (KNUST campus). Section (2) looks at the prevalence of ASI on construction sites in terms of their frequency of occurrence and how they are often handled. Section (3) assesses the various factors that influence the administration of ASI. Section (4) ranks the various media of administration of ASI based on the number of occurrences on construction project sites and degrees of importance. Section (5) assesses the various bottlenecks that hinder the successful administration of ASI. Section (6) examines the adverse impact on construction projects within the study area (i.e. KNUST campus) resulting from the administration of ASI. Finally, section (7) discusses the major findings of the undertaken research.

4.2 Profile of Respondents

The perspective of the contractor relative to ASI is the main focus of this research study. Thus, the survey results as depicted in Figure 4.1 revealing that an overwhelming majority of respondents covered were indeed within contractor organizations. Again, Figure 4.1 shows that 91 percent of respondents were with contracting firms while only 9 percent were found to be with consulting firms.

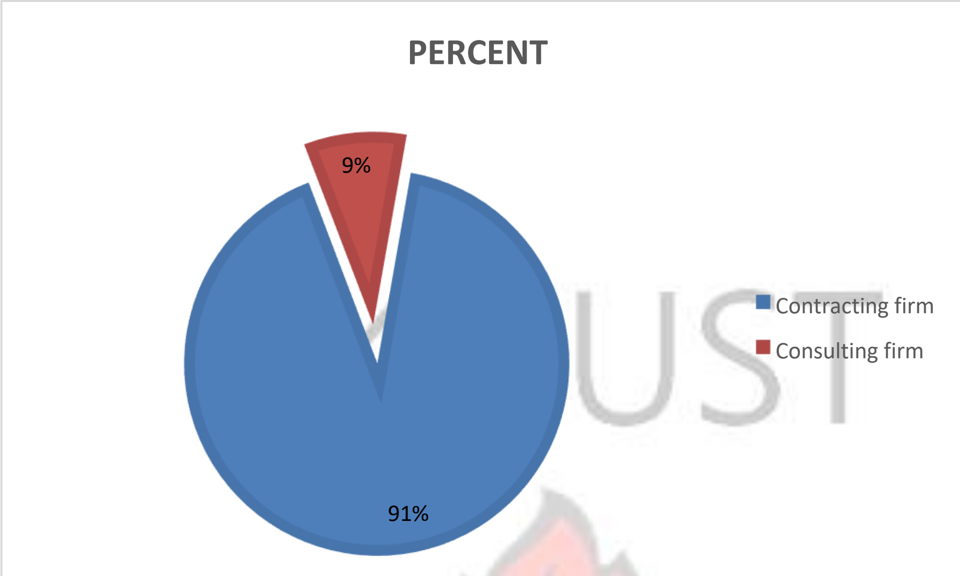

Figure 4.1: Type of organization of respondents

Architects are expected to issue instructions to only the contractor or his appointed representative on site. It was therefore necessary to establish from the questionnaire the positions held by the various respondents in order to ensure that they were within the ‗loop' to answer questions on instructions issued by the architect. In this regard it was revealed from Figure 4.2 that all respondents were at least within positions where they could reasonably be expected to have some knowledge about ASI. These positions included directors (53 percent), foremen (21 percent), construction professionals employed by contracting firms (17 percent) and architect (9 percent).

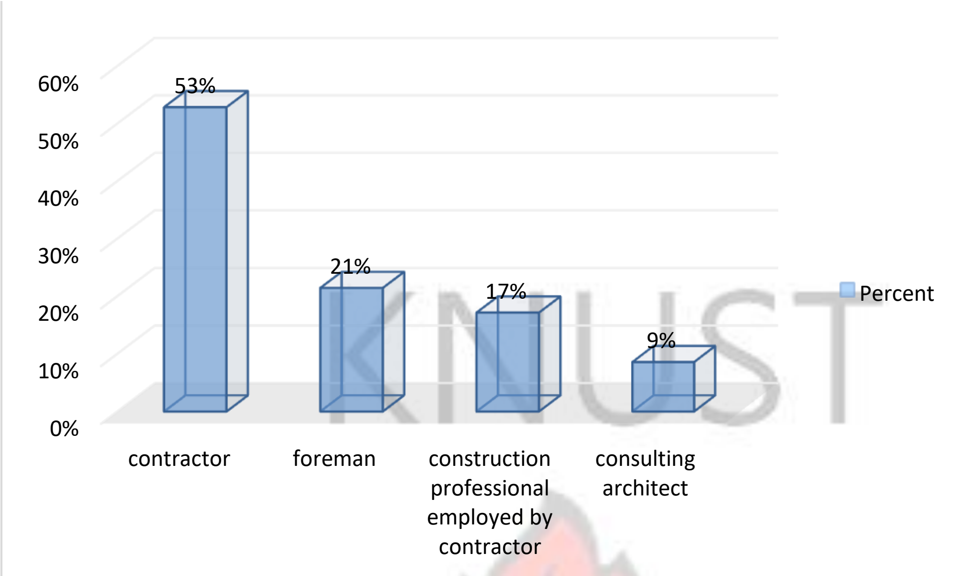

Figure 4.2: Respondents‘ position in the organization

The questionnaire required from respondents their various positions in their organizations and experience in the construction industry. This was deemed necessary so as to be able to obtain practical and convincing answers to the questions asked. Table 4.1 revealed that all the respondents had at least one year work experience in the construction industry. 44 percent of respondents had been in the industry for more than ten years and 40 percent were in their current positions for above same number of years. All respondents were also found to have worked on at least one construction project on KNUST campus.

Table 4.1: Respondents' experience in construction and designation

Experience	Category	Frequency	Percent
Years worked in the construction industry	1-5 years	18	26%
	5-10 years	21	30%

	above 10 years	31	44%
Years of working with current organization	1-5 years	30	43%
	5-10 years	12	17%
	above 10 years	28	40%
	Total	70	100%

Source: Author's Field Survey, 2015

To establish respondents' familiarity with ASI, they were required to indicate the extent of their involvement its administration. Table 4.2 showed that all respondents had been involved in the administration of ASI one way or the other.

Table 4.2: Extent of respondents' involvement in the administration of ASI

Extent of involvement	Category	Freq.	Aspect involved in			Total
			Issuance	Receipts	Implementation	
Administration of ASI	Yes	Count	6	30	34	70
		Percent	9%	43%	48%	100%
Total		Count	6	30	34	70
		Percent	9%	43%	48%	100%

Source: Author's Field Survey, 2015

Whereas 48 percent of respondents were found to be directly involved in the implementation of instructions, 43 percent were found to be recipients while 9 percent were issuers.

4.3 Issues Addressed by Architect's Site Instructions

The five classes of ASI as identified in the literature reviewed were examined using relative importance index to determine their frequency of occurrence on construction project sites as shown in Tale 4.3.

Table 4.3: Issues Addressed by ASI

Instruction	Degree of Importance (%)					Total
	Never	Seldom	Sometimes	Often	Always	
To vary work	_	_	14%	35%	51%	100%
To resolve discrepancies	_	_	19%	69%	12%	100%
To deal with monetary allowance	_	34%	49%	13%	4%	100%
To protect client's interest	13%	53%	21%	9%	4%	100%
To enforce contractual provisions	_	23%	43%	30%	4%	100%

Source: Author‘s Field Survey, 2015

51 percent of respondents suggested that the category of instruction by the architect to vary the works during construction always occurred. Even though 35 percent rated it as _often‘, 4 percent thought it was issued _sometimes‘. Responding to the frequency by which architects issued instructions to resolve discrepancies between contract documents, 69 percent of the respondents were of the opinion that architects often issued this instruction on construction project sites. However, 19 percent and 12 percent disagreed and rated it as _sometimes‘ and _always‘ respectively. On the category of ASI to deal with monetary allowances, 49 percent of respondents observed that _sometimes‘ this instruction was issued, 34 percent thought that this _seldom‘ happened. 13 percent were of the view that _often‘ times, instructions to deal with monetary allowances were issued as against 4 percent suggesting to the effect that it was _always‘ issued.

ASI to protect the client‘s interest was viewed by 53 percent of the respondents to be of _seldom‘ occurrence. While 21 percent reported that it was _sometimes‘ issued, 13 percent reported rated it was _never‘ issued. 4 percent reported that it was _always‘ issued. 43 percent and 23 percent of respondents were of the opinion that the instruction to enforce contractual provisions was of _sometimes‘ and _seldom‘ occurrence respectively. 30 percent and 4 percent of respondents also felt that this _often‘ and _always‘ occurred respectively.

In practice, ASI is expected to be recorded as it occurs and Table 4.4 was intended to find out the particular information that was recorded and whether the process of recording required any specialized skills.

Table 4.4: Handling of ASI

Activity	Category	Frequency	Percent	Total
All instructions by architects are recorded	TRUE	64	91%	100%
	FALSE	6	9%	
All instruction by architects are adhered to and implemented to the fullest	TRUE	37	21%	100%
	FALSE	15	53%	
	Unsure	18	26%	
There is a tracking mechanism for tracking ASI	TRUE	19	27%	100%
	FALSE	45	64%	
	Unsure	6	9%	
An individual with relevant skills is assigned to manage ASI	TRUE	16	23%	100%
	FALSE	42	60%	
	Unsure	12	17%	

On a 3- point Likert scale, the extent to which respondents agreed with the given statements was established. From Table 4.4, it is evident that 91 percent of respondents agreed with the assertion that their organizations recorded all instructions issued by architects during construction even though 9 percent disagreed. 53 percent of respondents reported that their companies did not implement instructions by architects. 26 percent of them were not sure if their companies did but 21% of respondents were fully aware that they did not. As to whether there is a tracking mechanism put in place by their companies in consultation with the architect to track instructions issued by architects, 64 percent reported the absence of such a tracking mechanism. Another 27 percent reported the existence of such a mechanism but 9 percent was unsure. A sizeable number of respondents (60 percent) suggested that no specific individual with the relevant skills and expertise was assigned to manage the architect's site instructions when issued. 23 percent of respondents however reported the presence of such an individual(s) in their respective companies and 17 percent were unsure of this fact.

4.4 Factors that Determine the Effectiveness of Architect's Site Instructions From the literature reviewed, several factors tend to influence the effectiveness (in issuance, receipt and implementation) of ASI. Table 4.5 displays six of such factors from which respondents were required to indicate the degree of importance using a 5point Likert scale.

Table 4.5: Factors that determine the effectiveness of ASI

Factor	Frequency	Percent (%)	Importance
Complexity of project	17	23.4%	Most Important
Contractor competence	15	21.7%	Very Important
Complex design technology	13	18.9%	Important
Problematic documentation	12	16.9%	Least Important

Attitude of client	8	11.3%	Not Important
Situation beyond control of parties	5	7.8%	Not Important
Total	70	100%	

Source: Author's Field Survey, 2015.

Complexity of project was rated by 23.4 percent of the respondents as the most important factor that influences the administration of ASI. The competence of the contractor was adjudged by 21.7 percent of respondents to be very important influencing factor while complex design technology was suggested by 18.9 percent as an important factor. Least important was the verdict of 16.9 percent of respondents on problematic documentation as an influencing factor on the administration of the architect's site instructions. 11.3 percent and 7.8 percent of respondents rated the as attitude of clients and situation beyond the control of parties as not important.

4.5 Medium of Administration of Architect's Site Instructions

Various media of transmitting ASI have been used interchangeably on construction projects as revealed from literature reviewed. It was therefore deemed necessary to find out from respondents the frequency of occurrence of these media of administration and also how relatively important they considered them to be. The rating frequency was calculated with their importance index on a 5-point Likert scale.

Table 4.6 shows that 39.9 percent of respondents reported that the most frequently used medium of issuing instructions by architects was through oral means but in terms of its importance to them, it was viewed as important. 33.1 percent of respondents reported that architects very frequently issued their instructions in writing which they also rated as very important.

Table 4.6: Medium of administration of ASI

Medium	Frequency	Percent (%)	Occurrence	Medium	Frequency	Percent (%)	Importance
Oral	28	39.9%	Most frequent	Oral	18	25.4%	Important
Written	23	33.1%	Very frequent	Written	21	30.5%	Very important
Oral and Written	19	27%	Least Frequent	Oral and Written	31	44.1%	Most important

Source: Author's Field Survey, 2015

When respondents were asked to report on the frequency of occurrence of both oral and written instructions, 27 percent reported that it was the least frequently used medium of issuing instructions by architects but sizeable number (44.1 percent) reported it as the most important medium of issuing instructions by architects.

4.6 Missteps in Administration of Architect's Site Instructions

There are missteps encountered when dealing with instructions on construction projects. These missteps were classified into five categories as shown in Table 4.7.

Using a 5-point Likert, 26.9 percent of respondents reported that the most important misstep in the administration of ASI is in relation to the clarity of the instruction. Verbal instruction was deemed by 22.2 percent of respondents to be very important while 21.3 percent considered inconsistent formatting of ASI as important. Instruction time was rated as least important by 19.5 percent of respondents while 10.1 percent suggested disinterest in documentation as not important.

Table 4.7: Missteps in administration of ASI

Factor	Frequency	Percent (%)	Importance
Clarity of instruction	20	26.9%	Most Important
Verbal instructions	16	22.2%	Very Important
Inconsistent format	14	21.3%	Important
Instruction time	13	19.5%	Least Important
Disinterest in documentation	7	10.1%	Not Important
Total	70	100%	

Source: Author's Field Survey, 2015.

4.7 Effects of Architect's Site Instructions on Construction Projects

Generally speaking, instructions issued by the architect are expected to lead to an anticipated result or effect on the construction project under consideration. These effects are naturally expected to be positive at all times although this is sometimes not the case in practice. These effects were classified under five categories in Table 4.8 and respondents were asked to rate the frequency of occurrence for each effect resulting from instructions issued by the architect by using a 5-point Likert scale in order to determine their frequency of occurrence on construction project sites. **Table 4.8: Effects of ASI on project delivery**

Impact	Frequency (%)					Total
	Never	Seldom	Sometimes	Often	Always	
Time overrun	_	_	4%	40%	56%	100%
Cost overrun	_	_	5%	44%	51%	100%

Professional relations	_	22%	44%	34%	_	100%
Health and safety	25%	47%	28%	_	_	100%
Quality degradation	26%	40%	26%	8%	_	100%

Source: Author‘s Field Survey, 2015

The respondents were then asked in Table 4.9 to establish if these effects had any negative impact on such construction projects by using a 3-point Likert scale.

Table 4.9: Adverse effects of ASI on project delivery

Impact	Category	Frequency	Percent
Time overrun	Major impact	70	100%
Cost overrun	Major impact	70	100%
Quality degradation	Slight impact	27	39%
	No impact	43	61%
Health and safety	Slight impact	28	40%
	No impact	42	60%
Professional relations	Major impact	12	17%
	Slight impact	46	66%
	No impact	12	17%
	Total	70	100%

Time overrun was suggested by 56 percent of respondents to always occur on construction projects although 40 percent were of the view that it often occurred and 4 percent suggested it sometimes occurred. Asked whether time overrun had any adverse impact on construction projects, all respondents (100 percent) agreed it had a very major impact on construction projects. 51 percent of respondents reported cost overrun as always, 44 percent as often and 5 percent as occurring sometimes. However, 100 percent of respondents suggested that cost overrun had a major adverse impact on construction projects.

As to how ASI affected professional relations between participants on construction projects, 44 percent said it affected it sometimes, 34 percent said it did often and 22 percent said seldom. Majority of the respondents (66 percent), however, suggested that this had a slight adverse impact on construction projects. They were also split (17 percent apiece) between whether it had a major adverse impact on construction projects or not at all.

The health and safety of workers on construction projects was of seldom frequency as reported by 47 percent of respondents. The remaining percentage of the respondents was almost slit between reporting it as occurring sometimes or never (27 percent and 26 percent respectively). Majority of respondents (60 percent) thought that it had no adverse impact on construction projects but 40 percent disagreed by suggesting that it had a slight impact.

In considering the effect of degradation of quality in construction projects resulting from architect‘s site instructions, 46 percent of respondents considered that to be of seldom occurrence. 26 percent said it never occurred on projects they handled and same percentage of respondents thought it sometimes happened but 8 percent rated it as often. However, on the question of whether this impacted adversely on such projects, 61 percent reported that quality degradation had no adverse impact at all on construction projects and 39 percent were of the opinion that it had a slight adverse impact.

4.8 Discussion of Findings

4.8.1 Profile of Respondents

To a very large extent, it is anticipated that the data collected from respondents in this research study will be generally representative of the general perspective and opinion of the contractor in relation to ASI hence a good start for the study. Many reasons account for this conviction of certainty in the eligibility of respondents and reliability of elicited information. An overwhelming majority of respondents (91 percent) surveyed belonged to contractor organizations and could therefore be reasonably expected to have some knowledge about their activities. Emmitt and Gorse (2003) assert that when instructions are issued by consultants on construction project sites, they tend to be restricted to the top level management of the contractor organization. In this study however, about 85 percent of the respondents consisted of people in managerial positions and professionals in the contracting firms (directors, construction professionals etc.) and therefore their familiarity with ASI is not in doubt. Over 80 percent of the respondents have over 5 years working experiences in the construction industry. This is expected to further enhance the quality of responses from these respondents.

4.8.2 Issues Addressed by the Architect's Site Instructions

All the five categories of ASI registered various degrees of frequency or occurrence on construction project sites as revealed responses from the survey. This confirms the assertion by Mays (2000) about the necessity for architects to issue instructions during construction. He argues that no set of drawings and specifications can be said to be so tightly written that everything will be built exactly as designed, and as such, the further involvement of the architect in the administration of the contract through instructions especially during the construction phase cannot be overemphasized. He further indicates that this is to ensure that appropriate adjustments can be made in order to maintain design integrity, quality, and economy of the project.

The instruction *to vary works* was rated by 51 percent of respondents as the most frequently issued instruction by architects during construction. It is important to note that the need to make changes in a construction project is a matter of practical reality and therefore it is not common for a project not to experience variation during construction (Arain and Pheng, 2006).

Instruction *to resolve discrepancies* between contract documents was rated by 69 percent of respondents as second in terms of occurrence on site. This could be due to the fact that most projects within the study area are executed under very limited time periods and contract documents are prepared under pressure thereby giving room to these discrepancies. Ideally, contract documents are supposed to be discrepancy-free even though Emmitt and Gorse (2003) think this is not achievable. Whether a discrepancy impacts negatively or positively on a construction project depends on the nature of the discrepancy and time of discovery. For instance where a discrepancy is discovered before it is practicalized or implemented; a very minimal impact could be anticipated.

53 percent of respondents considered the instruction *to protect client's interest* to be of seldom occurrence during the construction process. This could be attributed to the fact that KNUST as a client represents a well informed and educated client that requires very little protection from the architect.

In terms of how instructions were handled on site, it was found out that issued instructions were poorly handled. 91 percent of respondents suggested that architects wrote their instructions site diaries kept by contractors on site. This is not wrong but

Chappell (2006) thinks this is not the best of practices because architects should always try to have copies of instructions they issue for future reference.

Another striking revelation in the handling of ASI was to the effect that there was a 53 percent non-adherence to instructions 64 percent indicated that there was no tracking mechanism put in place to ensure that they are adhered to the fullest. The lack of the requisite qualified construction professionals within contractor organizations (Amoah *et. al*, 2011) coupled with irregular site visits and supervision by architects in the University Development Office have also added in compounding this problem. This was also confirmed by a majority of the respondents to the effect that no individual(s) with the relevant skills was specifically assigned the task of ensuring that instructions issued by architects are implemented.

4.8.3 Factors that Determine the Effectiveness of Architect's Site Instructions The advance and accurate determination of construction projects is very difficult due to the complex and unpredictable nature of the activities that lead to the realization of the final product (Ssegawa et al. 2002). There is a widespread feeling among project managers that a ―complex‖ project is more than just a ―big‖ project (Williams, 1999) but its main components are structural complexity and uncertainty (Baccarini, 1996).

Most construction projects on the KNUST campus fit this bill and can therefore be safely described as complex mega projects. About 85 percent of the structures covered within the study area multi-storey built on the very rugged terrain of the school and covering an average one acre of land. The KNUST Museum, the newly commissioned Jubilee Mall, the Lecture Hall Complex at the Pharmacy Department under construction etc. are a few of such complex structures dotted around campus. It was therefore not surprising when respondents ranked project complexity as the most important factor that influences the administration of the architect‘s site instructions. Ranked second most important influencing factor was the competence of the contractor. The competence of the Ghanaian contractor has been brought into question by various researchers e.g. Amoah *et. al* (2011). Poor finance and recruitment regimes are some of the causes of this problem.

Following in descending order of rank was complex design technology, problematic documentation and attitude of client. It is important to mention that the excessive use of new design technologies such as curtain walls, pre-stressed slabs, sweeping walls etc. on the KNUST campus account for the position of complex design technology.

4.8.4 Medium of Administration of Architect's Site Instructions

Architects are required to issue all instructions in writing to the contractor or his appointed representative on construction project sites (Chappell, 2006). Where instructions are issued verbally, they are supposed to be confirmed later in writing within a specified period of time.

It was found out that contractors preferred situations where written instructions were preceded with thorough practical explanations and demonstrations by architects. That is why they considered this approach as the most important even though it was the least frequently applied medium of instruction. Gorse et.al, (1999) and Carlsson et.al.
(2001) lend credence to the reliability first part of this approach (i.e. the practical explanations). They argue that informal approaches such as face-to-face interactions between designers and contractors are regarded as the most effective medium of communication within the industry. The second part (i.e. the writing) satisfies the limits within which an instruction could be deemed to be valid.

Even though verbal instruction was the most frequently applied medium of issuing instructions followed by written instructions (in site diaries), respondents suggested it (oral instructions) was the least preferred because it was seen as one of the major sources of disputes between architects and contractors. As stated earlier, the lackadaisical attitude of the supervising architects and their lack of interest in documentation, coupled with the fact that some of the contractors are ignorant of the right procedure has allowed this problem to fester.

4.8.5 Missteps in Administration of Architect's Site Instructions

According to Juholin (1999), in an organizational context parts of information disappear, change or misunderstood significantly as they move from the top of line to the bottom. Considering the hectic working environment within which construction projects are executed, architects issue instructions under a great deal of pressure and this invariably renders the instructions susceptible to missteps. These missteps unfortunately have cost, time, quality etc. implications on the overall success of construction projects.

Clarity of instructions was ranked (26.9 percent of respondents) as the most important misstep that hindered the successful administration of the architect‘s site instruction during construction. As revealed in an earlier discussion, this partly could be attributable to the lack of interest in documentation by the architect in particular. Apparently also, it appears that there have been instances where less qualified people e.g. draughtsman, have had the unfortunate opportunity of issuing instructions because they are in one way or the other associated with the University Development Office.

As already established, oral instructions was considered the most frequently employed medium of issuing instructions although it was the least preferred. Hence, it was therefore not surprising to find out that verbally issued instruction was the second most important misstep that hindered the successful administration of the architect‘s site instruction during construction.

It has been stated earlier as well that most instructions were found to be recorded in site diaries (that had no standardized format) provided by contractors and kept on construction project sites. Therefore to find out that inconsistent format of instructions was the ranked the third most important misstep was expected.

Bad timing of instructions although ranked fourth has led to demolitions, reworks, opening up of works already covered etc. The inconsistency in site visits and supervision by architects have also led to in some cases very bad timing of instructions. As Arain and Low (2005) assert, to identify and analyze potential changes and that could happen in a project as early as possible can enhance the management of project leading to desired results.

4.8.6 Effects of Architect's Site Instructions on Construction Projects

Considering all the findings above in terms of the prevalence, influencing factors, medium of administration, and bottlenecks to the successful handling of ASI, it is imperative to establish how all these have impacted on the successful delivery construction projects within the study area over the years. Ashley *et al* (1987) suggests that in the project environment, successful delivery is ―achieving results much better than expected or normally observed in terms of cost, schedule, quality, safety, and participant satisfaction.‖

Despite the stringent provisions and guidelines made in the contract documents to streamline communication between the various stakeholders, the architect‘s site instructions still resulted in undesirable situations. Time and cost overruns and soured professional relations leading to disputes between parties to the contracts were the most predominant adverse impacts of ASI on successful project delivery.

This could be said to be the true reflection of events within the study area because there is 51 percent chance that architects will issue instructions to vary works, that instructions will not be adhered to (53 percent) and tracked (64 percent), construction projects will be complicated (23.4 percent), dominance of verbal instructions and inconsistent formatting when written etc.

CHAPTER 5

RESEARCH CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter discusses the summary of the findings, the conclusions of the study and suggests appropriate recommendations which seek to direct future research. The recommendation section also throws more light into the practical implications of the study and makes suggestions for further research studies. The aim of this study was to identify the impact of the architect‘s site instruction on construction project delivery in order to take proactive measures geared towards its enhancement. The conclusions drawn are based on the major findings which are then linked to the objectives of the research study.

5.2 Summary of Findings

5.2.1 Issues Addressed by the Architect's Site Instructions on Construction Projects

An analysis of the findings confirmed the prevalence of ASI on construction projects in KNUST. There was evidence to the effect that all projects (100 percent) of which respondents were involved had the input of the architect during construction in one way or the other by way of instructions. Further analysis however revealed that most of these instructions resulted in changes to design, quality and quantity of works.

It is evident that instructions by the architect are almost a certainty in construction projects and therefore, there exists the need for adequate preparation by both the issuers and recipients for its successful administration. In conclusion, the occurrence of ASI was found to be prevalent on construction projects.

5.2.2 Factors that Determine the Effectiveness of Architect's Site Instructions

Analysis of the findings revealed that factors influencing the administration of the ASI included project complexity, contractor competence, complex design technology, problematic documentation and situations beyond control of parties. However, project complexity had the greatest influence on the instructions issued by the architect.

The factors identified above attest to the fact that the successful administration of the ASI is definitely not within the exclusive control of the architect only but also depends greatly on other factors (some of which are even beyond the control of all parties involved).

5.2.3 Missteps in the Administration of the Architect's Site Instructions The results of the findings showed that most of the missteps associated with the administration of ASI were directly human-related (i.e. factors related to the architect, contractor, etc.). The predominant misstep to the smooth administration of instructions was found to be resident in the clarity of the instruction itself. Other missteps included the issuance of instructions by verbal means, inconsistency in instruction format, instruction time and disinterest in documentation.

The idea in the developed world that human-related problems/factors are the major cause of construction failures/disasters is supported by this finding. In sum, this finding suggests that the degree of effectiveness in the administration of the ASI depends on the degree of suppression of these human-related factors.

5.2.4 The Effect of the Architect's Site Instructions on Project Delivery

Construction cost and time have always been seen as major benchmarks applied in assessing the extent to which construction projects are said to be successfully delivered. A successful project is one that has been completed within the cost, time and quality constraints specified in the contract document. This study also revealed that ASI had an impact on the overall project performance. All projects captured within the study area experienced various levels of cost and time overruns resulting from deficiencies in the administration of instructions issued by the architect during construction.

It was also revealed that the administration of ASI was problematic especially where it involved changes to design quality and quantity because the processes used to determine the cost and time consequences of these changes is quite lengthy. The major adverse impact of ASI was found to be time and cost overruns, disputes between parties to the contract. This was as a result of late instructions, discrepancies in contract documents, excessive instructions, etc. resulting in disruptions in the programme of works and set budget limits.

5.3 Conclusion

ASI is very prevalent on all construction project sites and as such should be considered as part of the construction process. It is therefore expected that adequate preparations will be made by all parties in its anticipation so that it will be effectively administered (issued, received and implemented). Where ASI are issued clearly in writing, in a consistent format and at the right time, , negative effects such as time overruns, cost overruns and soured professional relations will be minimized. Additionally, where construction projects are simplified by architects and executed by very competent contractors, the incidence of ASI on such projects will be greatly reduced.

5.4 Recommendations

In order to reduce the undesired impact of ASI, it is recommended that:

- Since the design of the building eventually influences its overall construction time and cost, architects should pay greater attention to the detailing and simplification of designs and contract documents to minimize errors and omissions;
- Pre-construction orientation/training programmes should be organized for contractors to further clarify contentious design details especially where new/complex design technologies have been utilized;
- Stricter and tighter qualification requirements should be applied in the selection of contractors to ensure that only qualified and competent contractors are eventually selected to execute works;
- Employers should ensure that architects intensify/increase regular site visits and supervision in order to detect errors, deviations, poor workmanship, etc., at early stages for rectification so that extra time/cost incurred in demolitions, re-works, etc., will be eliminated;

- Architects should restrict their instructions to a more uniform and consistent format e.g. GIA (Ghana Institute of Architects) site instruction template throughout the entire duration of works in order to eliminate confusions in the minds of contractors relative to the instructions;
- Architects should precede their instructions by verbal explanations demonstrations of concepts, procedures, etc., to contractors before putting them into writing in order to enhance understanding;
- A mechanism to track instructions issued by the architect should be established in order to keep track of all instructions issued and their levels of adherence or implementation and;
- Where instructions so issued result in modifications/changes to quantity of works (variations), the request for approval process should be fast tracked in order to avoid extra time/cost incurred due to delays

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APPENDIX

SURVEY QUESTIONNAIRE

This research study titled "**The Impact of Architect's Site Instructions on Construction Project Delivery in Ghana – Perspective of the Contractor**" is being undertaken by a final year MSc Construction Management student from the Building Technology Department of KNUST. It is aimed at studying the impact of the architect's site instructions on construction project delivery in Ghana. Please kindly answer **all** the questions below and thank you in advance for your contribution to this research study.

SECTION A: RESPONDENT'S PROFILE

1. What type of organization do you belong?

a) Contracting firm b) Consulting firm c) Others

(specify)..................................

2. Which of the following best describes your position?

No	Organization description	Tick only one box
2.1	Contractor	
2.2	Foreman	
2.3	Construction professional employed by contractor (specify)	
2.4	Consulting Architect	
2.5	Other	

3. If your answer above is other, specify: ……………………………………………

4. How long have you worked in the construction industry?

   a) 0-1 year b) 1-5 years c) 5-10 years d) above 10 years

5. How long have you worked for your present organization?

   ……...years……..months

   a) 0-1 year b) 1-5 years c) 5-10 years d) above 10 years

6. What is your current position in your organization?

   a) Director b) Construction professional c) Foreman d) Other (specify)

   ………..………...

7. How long have you been in your present position?

   a) 0-1 year b) 1-5 years c) 5-10 years d) above 10 years

8. Have you ever worked on any construction project for KNUST over the last 15 years?

   Yes □ No □

9. If yes, on how many projects have you worked on?

   a) One b) Two c) Three d) Four and

above……….......................

10. Have you ever been involved in the administration of the architect‘s site instructions?

Yes □ No □

11. If yes, what was your specific involvement?

a) Issuance b) Receipt c) Implementation d) Other

(specify)……….............

SECTION B: ISSUES ADDRESSED AND HANDLING OF THE ARCHITECT'S SITE INSTRUCTIONS

12. From your personal experience, how frequent are the following types of architect‘s site instructions encountered on construction projects?

No.	Instruction	Never	Seldom	Sometimes	Often	Always
12.1	To vary the works					
12.2	To resolve discrepancies *(e.g. correct errors, omissions)*					
12.3	To reiterate or enforce contractual provisions *(e.g. to remove from site goods that do not conform to specifications)*					
12.4	To deal with monetary allowance *(e.g. instruction indicating how to spend money budgeted under prime costs)*					
12.5	To protect the client's interest*(e.g. instruction to dismiss from site camp a worker who constitutes a bad influence)*					
12.6	Other					

13. If your answer above was _other‘, specify………………………………………..

14. Indicate which of the following is true of your organization.

No	Activity	True	False	Unsure

14.1	We record all instructions issued by the architect			
14.2	All instructions issued by the architect are adhered to and implemented to the fullest			
14.3	There is a tracking mechanism to monitor the progress of all instructions issued by the architect			
14.4	A specific person with the relevant skills is specifically assigned handle and manage all instructions issued by the architect before implementation e.g. cost implication			

If you answered **"False"** or **"Unsure"** to any of the above, please explain your response below.

14.1 We record all instructions issued by the architect:

....

14.2 All instructions issued by the architect are adhered to and implemented to the fullest:

……………………………………………………………………………………………

14.3 There is a tracking mechanism to monitor the progress of all instructions issued by the architect:

……………………………………………………………………………………………

14.4 A specific person with the relevant skills is specifically assigned handle and manage all instructions issued by the architect before implementation e.g. cost implication:

……………………………………………………………………………………………

SECTION C: FACTORS THAT DETERMINE THE ADMINISTRATION OF THE ARCHITECT'S SITE INSTRUCTIONS

15. Below are potential factors that influence the administration of the architect's site instructions on construction projects in Ghana. From your experience, please tick

the appropriate cell by indicating how important each factor is in influencing the frequency of the administration of the architect‘s site instructions on Ghanaian construction projects.

Degree importance: 1=Not important, 2= Least important, 3=Important, 4=Very important, 5=Most important.

Factors that Influence the Administration of the Architect’s Site Instructions		**Relative importance**				
		1	**2**	**3**	**4**	**5**
15.1	Complexity of Project					
15.2	Attitude of Client					
15.3	Problematic Documentation					
15.4	Complex Design Technology					
15.5	Situations beyond Control of Parties					
15.6	Contractor Competence					

SECTION D: MEDIUM OF ADMINISTRATION OF ARCHITECT’S SITE INSTRUCTIONS

16. From your experience, please indicate by ticking the appropriate cell to **rank** in terms of the frequency and importance of the following media of administration of the architect‘s site instructions.

Degree importance: 1=Not important, 2= Least important, 3=Important, 4=Very important, 5=Most important.

Frequency: 1st =Most frequent, 2nd =Vey frequent, 3rd=Frequent, 4th=Least frequent

Medium of Administration of the Architect’s Site Instructions		**Frequency**				**Degree of importance**			
		1st	**2nd**	**3rd**	**4th**	**1**	**2**	**3**	**4**
16.1	Written								
16.2	Oral								
16.3	Oral and Written								
16.4	Other								

17. If your answer above was _other‘, specify: ……………………………………

SECTION E: MISSTEPS IN THE ADMINISTRATION OF ARCHITECT'S SITE INSTRUCTIONS

18. Below are potential missteps/ barriers in the administration of architect‘s site instructions in Ghanaian construction projects. From your experience, please indicate by ticking the appropriate cell to show how important each misstep/ barrier is in preventing effective administration of architect‘s site instructions on Ghanaian construction projects.

Degree importance: 1=Not important, 2= Least important, 3=Important, 4=Very important, 5=Most important.

Missteps in the Administration of Architect's site instructions		**Degree of importance**				
		1	**2**	**3**	**4**	**5**
18.1	Clarity of instruction					
18.2	Disinterest in documentation					
18.3	Verbal instructions					
18.4	Inconsistent format					
18.5	Instruction time					

SECTION F: EFFECTS OF ARCHITECT'S SITE INSTRUCTIONS ON PROJECT DELIVERY

19. From your experience with architect‘s site instructions, please indicate how frequently architect‘s site instructions have resulted in the following:

No	**Outcome**	**Never**	**Seldom**	**Sometimes**	**Often**	**Always**
19.1	Time overrun					
19.2	Cost overrun					
19.3	Quality degradation					
19.4	Health and safety					
19.5	Professional relations					

20. From your experience, what was the effect of architect‘s site instructions on construction projects?

No	Outcome	Major impact	Slight impact	No impact
20.1	Time overrun			
20.2	Cost overrun			
20.3	Quality degradation			
20.4	Health and safety			
20.5	Professional relations			

21. Please add any other comments

…………………………………………………………………………………………………

…………………………………………………………………………………………………

22. If you wish to be contacted please provide the following

Name…………..…………………………………………………………………………

Place of Work…………………………………………………………………………

Telephone Number……………………………………………………………………