KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

COLLEGE OF ARCHITECTURE AND PLANNING

DEPARTMENT OF BUILDING TECHNOLOGY

MAPPING CAUSES OF DELAYS IN DISTRICT ASSEMBLY BUILDING PROJECTS TO SOURCES OF FUNDING: (A CASE STUDY OF ASSEMBLIES IN GREATER ACCRA REGION, GHANA)

By

DAVID AMEYAW (BSc Hons.)

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DECLARATION

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Signature ..... Date 29/10/13.

THE HEAD OF DEPARTMENT: PROF. JOSHUA AYARKWA

Signature ..... Date 30/10/13

ABSTRACT

Delay of a construction project can be defined as the late completion of works as compared to the planned schedule or contract schedule. The aim of this research was to establish the major or critical causes of building projects delays under the various funding sources by District Assemblies. To achieve this aim, a survey questionnaire was designed to elicit opinions from Contractors and Consultants. The developed survey questionnaire was distributed to One hundred and forty three (143) targeted respondents. One hundred and fifteen (115) sets were distributed to the contractors selected by stratified cluster sampling and twenty eight (28) sets were distributed purposively to the consultants working with MMDA'S in Greater Accra Region of Ghana. One hundred and seventeen (117) were received representing a response rate of 82%.There were two steps used in analyzing the data: calculating the mean scores i.e. to rank the delay factor variables in terms of their contributing factor to the various source of funding. Two sample t- Test Statistics was used to compare responses from the two groups. From the analysis the three most prevalent delay factors were Contractors financial difficulties, monthly payment difficulties and inadequate fund allocation all being financial related delay factor under DACF source of funding. For GETFund, the three most prevalent delay factors were Client interference, Poor site management and supervision, and Inflation/prices fluctuation being client, contractor and external related delay factors respectively. IGF had its three most prevalent delay factors being Monthly payment difficulties, Contractors financial difficulties and inadequate fund allocation and these are financial and contractor related delay factors. DDF also had its most prevalent delay factor as inadequate cost estimating being contractor related delay factors, inadequate project management assistance, Client interference and Incomplete drawing/details

design being consultant and client related delay factors respectively were the three most prevalent delay factors under DONOR source of funding. It is recommended that timely release of funds by the government would minimize the problem of funding and Assemblies awarding contracts only when they are sure their accounts have been credited by the government before engaging the services of contractors to avoid monthly payment difficulties when claims are raised under DACF funded projects. Also, when the bureaucracy associated with GETFUND and DONOR funding are reduced the delay of projects would be minimized. Decentralisation of DONOR funded projects would minimize the delay on projects. The engagement of professionals would best advice contractors on DDF funded projects. Assemblies should harness their potential areas in terms of revenue generation to contribute enough to help carry out projects earmarked under IGF source of funding to minimize the delay associated with the nonpayment of claims by contractors.

DEDICATION

This Dissertation is dedicated to my father WILLIAM ADU AMEYAW, my wife KESEWAA AMEYAW and my children NANA OPOKU AMEYAW, KWABENA NYARKO AMEYAW and OHENE OFORI AMEYAW.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND TO THE RESEACH

Delay may be defined as the "time overrun, either beyond the date for completion specified by the contract or beyond the extended contract period where an extension of time has been granted" (Fugar and Agyakwah-Baah, 2010, pg 104). Aibinu *et al*. (2002), in their research noted that delay is a situation where the contractor and the project owner jointly or severally contribute to the non-completion of the project within the agreed contract period. As indicated, delay could be defined as the time overrun either beyond completion date specified in a contract, or beyond the date that the parties agreed upon for delivery of a project.

Delays in construction are caused by several factors as confirmed in Ahmed et al. (2003), which grouped delays into two categories – internal causes and external causes. Internal causes arise from the parties to the contract (e.g. contractor, client, and consultant). External causes, on the other hand, arise from events beyond the control of the parties. These include the act of God, government action, and material suppliers. Bolton (1990), classifies delay as follows:

- Excusable but non-compensable delay -these are delays caused by occurrences which are not attributable to any of the parties.
- Compensable delay - these delays result from acts or omissions of the owner or someone for whose acts an owner is liable.
- Inexcusable delay - these delays result from a contractor's own fault or his subcontractors or material suppliers.

Construction delays are widespread in most projects around the world. Some delays may happen in the preconstruction phase which is defined as the period beginning from the initial conception of the project to the signing of the contract between the client and the contractor; however, some of them may happen in the construction phase that is the period when actual construction is under way. Clearly most of the definitions associate delays with extension of time to the project.

Ghana took a step towards Decentralization in 1988 and the 1992 Constitution reaffirmed its commitment with fully and clearly expressed statement on the new local government system. Several legal provisions were enacted to strengthen the decentralization programme. This includes:

- The Local Government Act 462
- The District Assemblies Common Act 455
- Financial Administration Act 654
- Public Procurement Act 663
- Internal Audit Act 658
- Local Government Service Act

In furtherance of this objective Metropolitan, Municipal and District Assemblies (MMDAs) were created and charged with the responsibilities under section 10(3) of the Local Government Act 462:

1. Ensure overall development of the MMDAs
2. Formulate and execute plans and programmes for effective mobilization of resources.
3. Promote productive activities.

4. Ensure social development.
5. Remove obstacles that retard development
6. Initiate programmes for basic infrastructure development
7. Provide works and services in their respective MMDAs

The Local Government Act 462 also identified 2 main sources of revenue to the MMDAs.

These are External and Internal sources of revenue;

External Sources:

- District Assembly Common Fund (DACF)
- District Development Facility (DDF)
- Donor and Counterpart funding e.g. HIPIC, SIF, CBRDP, CWSA
- Ghana Education Trust Fund (GETfund)

Internal Sources

- Internally Generated Fund (IGF)

In general, basic infrastructure in the field of education, health and water had been neglected, but these sources of Funds are seen as a suitable mechanism for providing resources to the district as indicated in Azeema *et al.* (2003). It is against this background that the researcher seeks to undertake a study to identify the factors causing delay in construction projects in the District Assemblies under the various sources of funding and what can be done to improve the current problems.

1.2 STATEMENT OF THE PROBLEM

Government through the District Assemblies is implementing numerous construction projects in all sectors of the economy in Ghana. But critical assessments of the District Assemblies in Ghana reveal a common phenomenal of delay in projects being executed. Hon. Paul Evans Aidoo, Western Regional Minister said over 100 GETfund and Ministry of Education projects in the region have delayed unduly by the contractors creating pressure on schools that dearly needed them to accommodate students GNA(2011). Frimpong *et al*. (2003), observed that "33(70%) out of 47 projects in Ghana were delayed". Also according to Seshie (2009) it was revealed that the mean time performance index (TPI) of public building projects in Ghana, were within the range 1.9035 to 2.7143. This suggests that on the average, public building projects takes between 1.9035 to 2.7143 times the original project duration to complete, an indication of poor project time performance. On time completion of project is an indicator of efficiency, but there are many unpredictable factors and variables emanating from various sources affecting construction projects. Some main sources are the involvement and performance of parties to the contract, contractual relations, environmental and site conditions, resources availability and socio-political factors. However, many projects experience extensive delays and thereby exceed initial time and cost estimates. The costs of delay are different for different parties. The general costs are the loss of wealth, time and capacity. For owner, delay means unavailability of facilities and the loss of income. For contractor, delay means the loss of money for extra spending on equipment and materials and hiring the labor and loss of time. From research, quite a lot of work has been done in the causes of delays but none provides information on the causes under various sources of funding hence this work.

1.3 RESEARCH QUESTION

The following research question was derived from the above problem statement:

1. What are the causes of delay in District Assemblies construction projects in relation to the various sources of funding?

1.4 AIM

The aim is to establish the major or critical causes of building projects delays under the various sources of funding by District Assemblies.

1.5 OBJECTIVES OF STUDY

The main objectives of this study include the following:

1. To identify the most critical causes of delay under the various sources of funding.
2. To determine if there is a significant difference from the views of Contractors and Consultants on the causes of delay.
3. To make appropriate recommendations on preventing delays specific to the various sources of funding.

1.6 SCOPE OF STUDY

The research was limited to Metropolitan, Municipal, and District Assemblies (MMDA's) in the Greater Accra Region of Ghana. The study was carried out on data from projects done over a period of three (3) years thus from 2008 - 2011.

1.7 RESEARCH METHODOLOGY

The methodology adopted involved Literature review of books, journal, conference proceedings, reports and internet. A well designed structured questionnaire to consultants and contractors was used. Statistical test such as the Mean score and Two sample t-test for hypothesis testing were used in analyzing the data.

1.8 EXPECTED OUTCOME AND BENEFIT

The outcome and benefit of this research are:

1. The project identifies the linkage between factors leading to delay in construction projects in the Districts Assemblies under the various source of funding.
2. The project benefits District Assemblies by helping them manage their construction projects by minimizing delays taking into consideration the sources of funding of the projects.

1.9 STRUCTURE OF THE REPORT

The format for the thesis follows the logical steps of establishing the research questions, developing the methodology, gathering and analyzing data and drawing conclusions. This thesis was organized into five chapters as follows:

Chapter One: Discusses the background of the research by highlighting the research problem, research purpose, research objective and proposed methodology.

Chapter Two: Presents a literature review on the decentralization concept and the various sources of funding in the MMDA'S. It also examined the literature review on the type of delays and the factors that contribute to the causes of delays in construction projects.

Chapter Three: Describes the Methodology and Data Collection used in the Research.

Chapter Four: It details the Survey Results, Analysis and Discussions on the causes of delay in District Assemblies construction projects in relation to the various sources of funding.

Chapter Five: Discusses the research Conclusions, limitations of the research, contribution to new knowledge and provides recommendations and implication for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Ghana has a unique decentralization system of government, which was introduced in 1988 with the creation of districts including metropolitan and municipal but hereafter simply called "District" Assembly System, the Local Government Act 1993 (Act 462). Six (6) years later the concept was greatly strengthened by the introduction of the funding mechanism known as the District Assembly Common Fund (DACF) and later in the years other sources of funding came on board. There has been increasing demand for infrastructure development in the districts but Government through the District Assemblies is implementing numerous construction projects in all sectors of the economy in Ghana. But a critical assessment in the District Assemblies in Ghana is a common phenomenal of projects executed, delayed and in some cases abandoned half way through, to the mercy of the weather. According to the Auditor General's Report (2001–2004), on District Assemblies, project inspection carried out disclosed that as a result of contract management lapses and other factors, various stages of development had been delayed and abandoned after substantial amount had been spent on them.

2.2 DECENTRALIZATION

The UN and UNDP provide a definition for decentralization in a working paper (1992). "Decentralizing governance refers to the restructuring or reorganization of authority so that there is a system of co-responsibility between institutions of governance at the central, regional and local level". This could either be by de-concentration (delegation) of authority to field units of the same department, or level of government, or by devolution of authority to local government

units or special statutory bodies. Decentralization refers to "the transfer of political power, decision making capacity and resources from central to sub-national levels of government" (Walker, 2002). Decentralization is a mechanism for bringing government closer to the people and thereby enhancing the capacity of government in achieving local participation which improves on public administration and the empowerment of the local authorities in planning as well as decision-making bodies as indicated in (Azeema *et al.* 2003). According to Maeregu (2011), decentralization has two main objectives namely promotion of popular participation in decision making and a more efficient locally based administration. These may result in making development plans more responsive to local conditions and resource mobilization for self-sustained local development.

2.2.1 Decentralization in Ghana

Between 1957 and 1988 efforts were made by successive Ghanaian governments to decentralize authority to the local level as indicated in Module A (2003). The present decentralization system is the most serious attempt so far in Ghana's history. It was introduced in 1988, when the Provisional National Defence Council (PNDC) initiated some reforms in local government. The Local Government Law, 1988 (PNDCL 207) was enacted to give legal backing to the new local government system. The 1992 Constitution of Ghana made decentralization mandatory and provided that Ghana put in place *"...a system of local government and administration which shall, as far as practicable, be decentralized"* (Section 240 (1) of the 1992 Constitution). The Constitution tasked Parliament with enacting appropriate laws to ensure that functions, powers, responsibilities and resources are at all times transferred from central to local government

authorities in a coordinated manner. Thus, in 1993, Parliament enacted a new law, the Local Government Act, 1993 (Act 642) to replace PNDCL 207, though basically the same in character.

The Local Government Act, 1993 (Act 462) retained the 110 Metropolitan (3), Municipal (4) and District (103) Assemblies that had been set up by PNDCL 207.There have been creation of additional Metropolitan, Municipal or District Assembly due to the population increase and the desire to have the decision-making at the local level that is assigned with deliberative, legislative and executive functions of government within the District Assembly is also the planning authority in the district. The Assembly is given the authority to prepare and implement development plans and to draw up budgets for implementing the development plans.

The Local Government Act, 1993 (Act 462) provides for the transfer of 86 statutory functions of state to local government bodies with jurisdiction over geographical areas. This Act also provides for the establishment of sub-district and unit committees and the resources to create access to political authority for the majority of Ghanaians. The District Assembly's substructures include the Sub-metropolitan, urban/town/zonal/area councils and unit committees. The 1992 Constitution also provides for the establishment of Regional Coordinating Councils (RCC) in the ten administrative regions as part of the arrangements for the decentralized system in Ghana. In principle, the RCC is a purely administrative and coordinating body rather than a political or policy-making body but the Regional Minister obviously wields a lot of power in the region.

The Greater Accra Region of Ghana as at 2011 had Ten (10) MMDA's, below are the names:

TABLE 2.1: List of Ten (10) MMDA's in Greater Accra Region

GREATER ACCRA REGION		
Metropolitan Assemblies	**Municipal Assemblies**	**District Assemblies**
1. Accra Metropolitan 2. Tema Metropolitan	1. Adentan Municipal 2. Legekuku- Krowor Municipal 3. Ashaiman Municipal 4. Ga East Municipal 5. Ga South Municipal	1. Dangme West District 2. Dangme East District 3. Ga West District

Source: Ghana Districts (2012)

Reference is made collectively to all the types of assemblies simply as "District Assemblies" because the nomenclature mainly denotes the population under the assembly's jurisdiction. A District has a minimum population of 75,000 people, a Municipality has a minimum of 95,000 people and a Metropolis has a minimum of 250,000 people.

2.2.2 Fiscal Decentralization

Achieving local development as a means of Fiscal decentralization is based on two main arguments namely economic efficiency and local revenue mobilization as indicated in the works of Bahl and Linn (1992) and Oates (1993).The district financial resources in many developing

countries might come from some main sources: independent revenue sources or own sources (if any) assigned to the district (receipts from these sources accrue directly to the district), central government financial transfers to the district which can have different forms according to Kroes (2008). Section 240 (2, c) of the Local Government Act, 1993 (Act 462) provides that each local government unit shall have a sound financial base with adequate and reliable sources of revenue. Despite this requirement the MMDA's have a limited number of sources of revenues for carrying out their activities, which include

- District Assembly Common Fund (DACF)
- District Development Facility (DDF)
- Donor and Counterpart funding e.g. HIPIC, SIF, CBRDP, CWSA
- Ghana Education Trust Fund (GETfund)
- Internally Generated Fund (IGF)

2.2.2.1 District Development Facility (DDF)

As part of the efforts to improve the performance of the Metropolitan, Municipal and District Assemblies (MMDA's) in terms of efficiency, transparency and accountability, the Government of Ghana through the Ministry of Local Government and Rural Development (MLGRD) has established the District Development Facility (DDF) in collaboration with its key Development Partners. Under the DDF, the government mobilizes financial resources as a discretionary funding incentive to those MMDA's which comply with rules, legal regulations and policies in the performance of their mandate. Compliance is confirmed through an assessment conducted on a yearly basis using the Functional Organizational Assessment Tool (FOAT).The overall objective is to ensure efficient provision of basic community infrastructure and services delivery

through judicious use of resources. At the moment, contributors to the fund are the Government of Ghana and four Development Partners namely Canadian International Development Agency (CIDA), Danish International Development Agency (DANIDA), Kreditanstallt fur Wiederaufbau(KfW) and Agence Française de Développement (AfD). Other Development Partners (DPs) have expressed interest to contribute to the funding facility (MLGRD DDF 2010). The objectives of the DDF are to:

- Mobilize additional financial resources for MMDA's.
- Provide incentive for performance for complying with Government of Ghana legal and regulatory framework.
- Establish a link between performance assessments and capacity building support.
- Ensure harmonized systems for investment funding and capacity building support to MMDA's.
- Under the DDF the government intends to establish a link between the performance of the MMDA's and the allocation of additional discretionary funding. MMDA's that fulfill all the Minimum Conditions under the FOAT are rewarded with additional resources through a Basic Grant and Performance Grant. Those who are unable to fulfill all the Minimum Conditions (MCs) are only allocated Capacity Building Grants to address the basic Capacity needs identified under the assessment.
- Resource allocation to the MMDA's is based on the results of the FOAT and allocated as follows:
- A Basic Grant (38% of the overall pool): allocated to all MMDA's that fulfill all the MCs. It is currently allocated on a simple formula as follows:

1. Equal Share (40%): shared equally to districts that fulfilled all the Minimum Conditions.

2. Population (50%): shared based on the proportion of a district's population to the total population of MMDA's that fulfilled all the Minimum Conditions.

3. Land Area (10%): shared based on the proportion of a district's land area to the total land area of districts that fulfilled all the Minimum Conditions.

- A Performance Grant (50% of the overall pool): allocated as an addition to the Basic Grant for districts which fulfilled all the Minimum Conditions. The amount allocated to each district is the ratio of a district's score to the total score of districts that met the Minimum Conditions.
- A Capacity Building Grant (12% of the overall pool): allocated equally to all MMDA's to address their capacity gaps as identified by the assessment.

Source: Ministry of Local Government and Rural Development Operational Manual for the Implementation and Administration of the District Development Facility (2010)

2.2.2.2 District Assembly Common Fund (DACF)

Decentralization can lead to severe imbalances in the regional distribution of wealth and development, as the resources of local authorities are often unequal. Azeem *et al.*, (2003) revealed that most of the District Assemblies face the problems in generating their own revenues to meet their financial commitments and there was the need to give effect to the Decentralization programme, hence the setting up of the DACF. The (Article 252) of Ghana's 1992 Constitution provided for the setting up of a DACF to serve as a mechanism for the transfers of resources

from the central government to the local authorities (the MMDA's). The Article provides that 7.5% of Ghana's total revenue should be paid into the Fund for distribution to these local level authorities, mainly to undertake development projects and some specific programmes. The District Assemblies Common Fund (DACF) (popularly called the Common Fund) was established under Act 455 (1993). This Act defines total revenue as *"all revenue collected by or accruing to the Central Government other than foreign loans, grants, non-tax revenue and revenues already collected by or for District Assemblies under any enactment in force"*. The DACF is a Development Facility granted to resource MMDA's to enable them "plan and implement Development Programmes and Projects in their respective areas of jurisdiction" Azeem et al (2003). DACF started operations in 1994, with Article 252 of the Constitution provided for its establishment. Allocation of not less than 5% of total national tax revenue is channeled into the fund .The Fund is to strengthen the financial base of the MMDA's in order to ensure effective discharge of their statutory functions. It is also a development endowment fund to be used for the benefit of all Ghanaians.

Guidelines for the use of the funds

In deciding the basis for the distribution of the DACF to the MMDA's, Parliament identified four basic factors as criteria as indicated in District Assembly Common Fund Act, 1993 (Act 255) as follows:

- The Need factor: This is to address the imbalance in development and infrastructure among the districts. The level of need is determined from the GDP per capita.
- The Equalizing Factor: This factor is aimed at ensuring that districts have a minimum allocation from the Fund.

- The Responsiveness Factor: This is a rewarding factor for assemblies that have done well in revenue collection in terms of per capita revenue collected.

- The Service Pressure Factor: This factor serves to compensate for population pressure on facilities.

As the formula is approved annually, there have been changes in the weights placed on these factors. This is also necessary as the circumstances of the districts can change over time.

2.2.2.3 Ghana Education Trust Fund (GETfund)

The Ghana Education Trust Fund (GETFund) was established by an Act of Parliament in 2000 (Act 581) with the object of providing finance to supplement the provision of Education at all levels by Government. The Fund began operations in the second half of 2001. It is, perhaps, instructive to indicate, briefly, the background and circumstances in which the concept of the Fund was conceived and subsequently evolved into an Act of Parliament. The object of the Fund is to provide finance to supplement the provision of education at all levels by the Government,

These include:

- Scaling up in enrolments at almost all cycles of the educational system;

- Escalating demands on Educational resources by users at all levels;

- Declining public sector spending on Education mainly on account of sluggish growth in the broader economy;

- Over-crowded and decrepit Educational infrastructure, including obsolete textbooks and equipment;

- Recurrent tensions between users and education service providers, arising from persistent mismatch between sectoral resources on one hand, and escalating costs of providing services and facilities on the other as indicated in the Act of Parliament, Act 581 (2000).

This is the backdrop against which the Mandate of the Fund has been set and role of the Board of Trustees designed, all expressly intended to ease these constraints whilst fostering greater access to quality Education and sustainable Human Capital development. Generally, the policies that the GETFund has followed include the following:

- To disburse funds on a timely basis.
- To pay only legitimate claims and certificates for approved projects and programs.
- To maximise returns on investment.
- To employ the best caliber of staff at the secretariat.

2.2.2.4 Internally Generated Fund (IGF)

Internally generated revenue as per the Sixth Schedule of the Local Government Act, 1993, Act (462) consists of funds collected exclusively by or for sub national governments. These revenues could be grouped broadly into tax and non-tax sources. Tax revenues are the compulsory payments and include taxes chargeable on the incomes of self-employed persons, businesses and property. The non-taxable revenues are voluntary payments or contributions paid by specific beneficiaries of the districts' services. These include user fees/charges, licenses, permits and royalties. Internally generated revenues of the sub-national governments are basically the own-sourced revenues of District Assemblies' according to Maeregu (2011). Key sources of internally

generated funds are composed of rent, licenses, land, rates, and fees and miscellaneous sources of funds. Revenue from rates is made up of such payments as development levies and property rates. Permits, application for building permits and renewals among others constitute revenue from land. For fees and fines, items include funds from court fines, market tolls and slaughter house fees as indicated in the work of (Osei-Akoto *et al*., 2007). According to a study by World Bank (2000) the legislative provisions, implementation strategies and designs, funding relationships as well as issues about economic efficiency and accountability which determine the magnitude of revenues to be generated in the District Assemblies' were the major concerns identified. Although adequate legislation has been instituted to enable DA's to harness Internally Generated revenues, there are problems still encountered by the districts (Inanga and Osei-Wusu 2004).

2.2.2.5 Donor and Counterpart funding

Over the past half-century rich nations have given about $1 trillion in external aid to poor nations. The massive inflows have been expected to boost the recipient countries' growth rates and thereby help millions to escape poverty. Since Ghana began its Economic Recovery Programme (ERP) in 1983, the external aid map of the country has seen dramatic transformation. Not only have the magnitude of aid in support of the reforms grown, its composition and origin have also shown greater diversity. At the initial stages of the programme (1983–1986), total aid inflows averaged about $200 million a year, representing about 4% of GDP. In 1987 -1990 the level of inflows then rose rapidly to reach about $600 million (11% of GDP) per year. Aid inflows were at an all time high of about $780 million (12% of GDP) per annum during the

period 1991–1994. Since then inflows have stabilized at around $550 million (9% of GDP) per annum (Barfour Osei 2003).

2.3 CONSTRUCTION DELAY

A construction project is commonly acknowledged as successful, when it is completed on time, within budget, in accordance with the specifications and to stakeholders' satisfaction (PMBOK 2008). Delay is a situation in which a project due to some causes related to the contractor, client, client's consultant or other causes has not been finished in contractual or agreed period. According to Sambasivan and Soon (2007) delays give rise to disruption of work and loss of productivity, late completion of project, increased time related cost, disputes, litigation and abandonment or termination of contract. It has been noticed that delay is one of the major problems in construction project. Delays occur in every construction project and the magnitude of these delays varies considerably from project to project. Some projects are delayed only few days behind schedule and some are delayed over a year. It is important to define the actual causes of delays in any construction projects in order to minimize and avoid the delays (Abass 2006).

The working definition of construction delay for this project is the late completion of work compared to the planned schedule or contract schedule.

2.3.1 Types of Delays

The works of Mohd (2010) and Abd Majid and McCaffer (1998) revealed that there are three basic ways to classify delays:

- Excusable delays with compensation;

• Excusable delays without compensation; and

• Non-excusable delays.

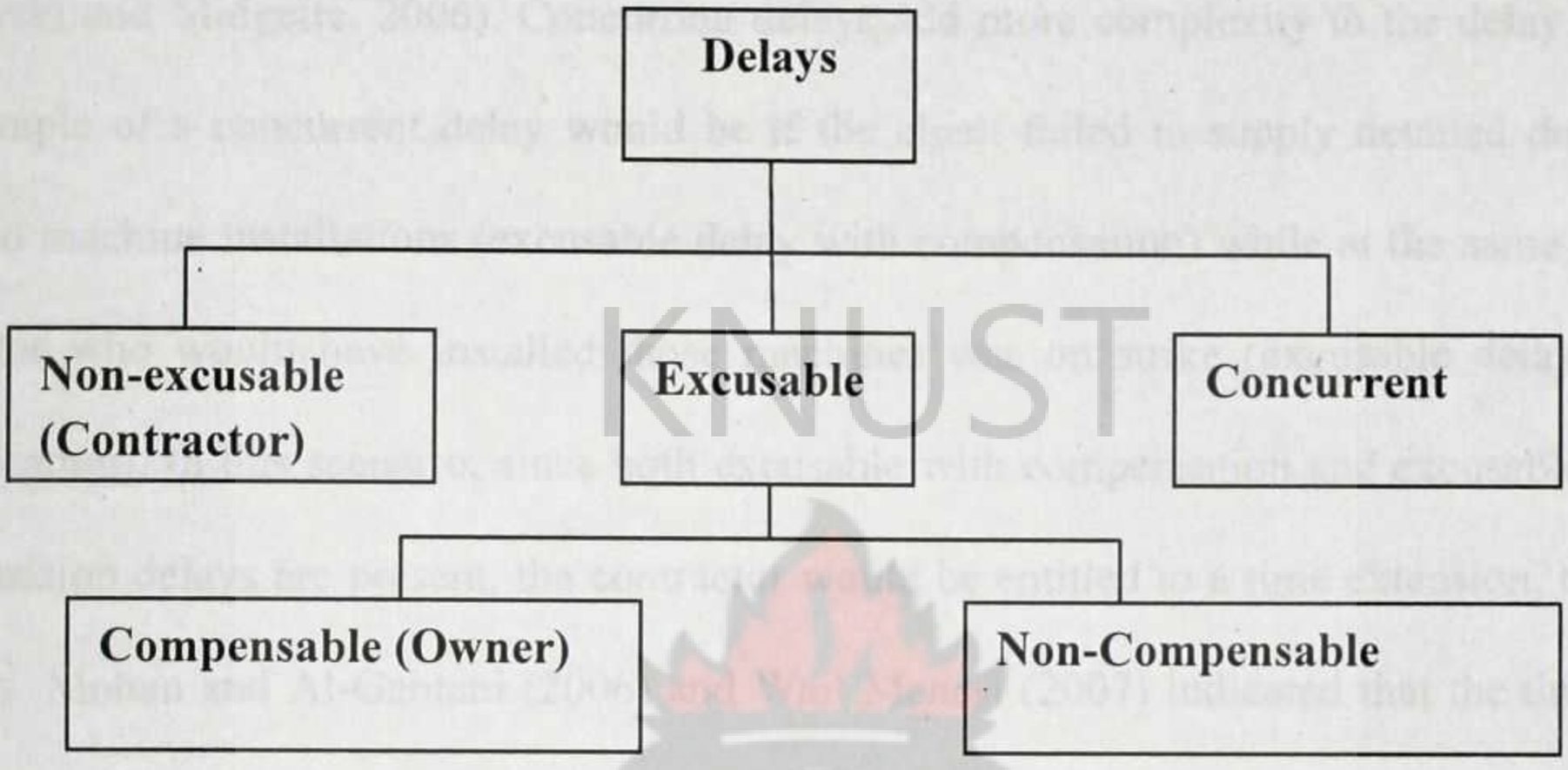

Fig. 2.1: Types of Delay, SOURCE: Wail Menesi (2007)

Delays are classified into two different types according to liability: Excusable and Non-excusable (Fig. 2.1). When the contractor is responsible for the cause of the delay, it is called Non-excusable delay. Examples include failure to coordinate work, too few workers, and low productivity. The contractor cannot obtain a time extension for Non-excusable delays. The contractor is also liable for damages incurred by the owner as a result of the Non-excusable delay. The second type of delays, Excusable delays, can be further broken down into Compensable and Non- compensable delays. Compensation is required when the owner is the major cause of the delay. Examples include changes in the scope of work and the owner's failure to grant site access. When neither the owner nor the contractor is responsible for the delay, it is

called Excusable-non-compensable delay. Examples include severe weather and acts of God. The contractor is entitled to a time extension if this type of delay increases the overall project duration. When more than one type of delay happens at the same time and both, either together or independently, impact the project's critical path, a concurrent delay occurs as confirmed in (Ostrowski and Midgette, 2006). Concurrent delays add more complexity to the delay analysis. An example of a concurrent delay would be if the client failed to supply detailed designs for specified machine installations (excusable delay with compensation) while at the same time, the contractor who would have installed those machines was on strike (excusable delay without compensation). In this scenario, since both excusable with compensation and excusable without compensation delays are present, the contractor would be entitled to a time extension, but not to damages. Mohan and Al-Gahtani (2006) and Wail Menesi (2007) indicated that the three major difficulties in calculating concurrent delay are as follows:

1. It is difficult to agree on the concurrency period of two or more delay events. The concurrent delay events may occur with respect to two or more concurrent activities which have different start and finish dates; thus only portions of these activities are concurrent.

2. New critical paths could be formed because of consuming the total floats for noncritical activities.

3. If the concurrent delays are on critical paths, and if the owner delays the critical path, the contractor can decelerate his work on the parallel critical paths in order to be critical.

While several authors like (Mubarak , 2005; Kelleher , 2005; Levy, 2006) categorize delays into three groups as Excusable and Non-excusable, Compensable and Non-compensable and Concurrent and Non-concurrent; certain authors also like Trauner *et al.*(2009) and Callahan et al.

(1992), add one more category to these three groups which is Critical and Non-critical delays. According to Trauner *et al.,* (2009) and Callahan *et al.,* (1992), the primary focus in any study of delays in a project is to see if the delay affects the progress of the entire project or the project completion date. The authors' further stated that delays which result in extended project completion are considered critical delays, and delays that do not affect the project completion date are known as non-critical delays. Trauner *et al. (*2009) further claim that the issue of critical delays emerges from the Critical Path Method (CPM) scheduling. All projects have a critical path and if these critical activities on the path are delayed then the completion date of the project will be extended. The criteria determining the project completion date are as follows as indicated in Trauner *et al.,* (2009):

- The project itself
- The contractor's plan and schedule (particularly the critical path)
- The requirements of the contract for sequence and phasing
- The physical constraints of the project- how to build the job from a practical perspective.

2.3.2 Causes of Delays

There are many factors that contributed to causes of delays in construction projects. These range from factors inherent in the technology and its management, to those resulting from the physical, social, and financial environment. Researchers have studied the many causes of delay in the construction industry Lo *et al.* (2006) summarized some of the studies as shown in (Table 2.2).

TABLE 2.2 Summaries of previous studies of the causes of Delays in Construction Projects

Researchers	Country	Major causes of delay
Baldwin *et al.*, (1971)	United States	- inclement weather - shortages of labour supply - subcontracting system
Arditi *et al.*, (1985)	Turkey	- shortages of resources - financial difficulties faced by public agencies and contractors - organizational deficiencies - delays in design work - frequent changes in orders/design - considerable additional work
Okpala and Aniekwu (1988)	Nigeria	- shortages of materials - failure to pay for completed work - poor contract management
Dlakwa and Culpin (1990)	Nigeria	- delays in payment by agencies to contractors - fluctuations in materials, labour and plant costs
Mansfield *et al.*, (1994)	Nigeria	- improper financial and payment arrangements - poor contract management - shortages of materials - inaccurate cost estimates - fluctuations in cost
Semple *et al.*, (1994)	Canada	- increases in the scope of the work - inclement weather - restricted access
Assaf *et al.*, (1995)	Saudi Arabia	- slow preparation and approval of shop drawings - delays in payments to contractors - changes in design/design error - shortages of labour supply - poor workmanship
Ogunlana *et al.*, (1996)	Thailand	- shortages of materials - changes of design - liaison problems among the contracting parties

TABLE 2.2 Continuation

Researchers	Country	Major causes of delay
Chan and Kumaraswamy (1996)	Hong Kong	- unforeseen ground conditions - poor site management and supervision - slow decision making by project teams - client-initiated variations
Al-Khal and Al-Ghafly (1999)	Saudi Arabia	- cash flow problems/financial difficulties - difficulties in obtaining permits -"lowest bid wins" system
Al-Momani (2000)	Jordan	- poor design - changes in orders/design - inclement weather - unforeseen site conditions - late deliveries
Lo *et al.*, (2006)	Hong Kong	- inadequate resources - unforeseen ground conditions - exceptionally low bids - inexperienced contractor - work in conflict with existing utilities - poor site management and supervision -unrealistic contract duration
Faridi and El-Sayeg (2006)	UAE	- slow preparation and approval of drawings - inadequate early planning of the project - slowness of owner's decision making - shortage of manpower - poor site management and supervision - low productivity of manpower
Assaf and Al-Hejji (2006)	Saudi Arabia	- change in orders by the owner during construction - delay in progress payment - ineffective planning and scheduling - shortage of labor - difficulties in financing on the part of the contractor

SOURCE : Lo *et al.*, (2006)

In summary, some of these factors were the top eleven (11) most important factors in the previous studies that contributed to the causes of delays which include:

1. Changes orders
2. Contractor's financial difficulties
3. Improper project planning and scheduling
4. Inaccurate cost estimate
5. Inaccurate time estimate
6. Inadequate modern equipment
7. Incompetent project team
8. Insufficient numbers of equipment
9. Monthly payment difficulties
10. Poor site management and supervision
11. Shortage of construction materials.

2.3.3 Factors that contribute to delay in construction

There are many factors that contributed to causes of delays in construction projects. According to Kang (2010), these range from factors inherent in the technology and its management, to those resulting from the physical, social, and financial environment. There are in total, eight (8) groups of factors which cause delay in construction project.

2.3.3.1 Factors of Material Related Delays

From Literature the major category of factors of delay being material related were identified as one of the groups of causes of delays in construction projects. Any cause that is related to

materials was categorized under this group factor. One of the sources used to identify the factors under materials group of causes was the literature review. Several studies identified the factors of material related delays. Odeh and Bataineh (2002) found that the factor of poor quality of materials had high influence on causes of delays. The work of Koushki *et al.* (2005) revealed that shortage of construction material, poor quality of material, and poor procurement of material were factors that contributed to the causes of delays. Also, Wiguna and Scoot (2005) identified the factor of escalation of material prices has one factor that contributed to causes of delays. The work of Abd Majid and McCaffer, (1998) revealed that shortage of material, poor quality of material, poor procurement of material, late delivery of material, and unreliable suppliers were factors that contributed to causes of delays. According to Chan and Kumaraswamy (1996), factors like shortage of material and poor procurement of material contributed to causes of delays. In Ogunlana *et al.* (1996), the result of their studies showed that shortage of material, poor quality of material, escalation of material prices and late delivery were identified as factors that caused delays in construction project. Frimpong *et al.* (2003) identified the factor of poor procurement of materials as the cause of delay. Based on these previous literature reviews, there are seven factors of material related delays that were identified as shown below:

1. Late delivery of materials
2. Escalation of material prices
3. Imported of construction materials
4. Poor procurement of construction materials
5. Poor quality of construction materials
6. Shortage of construction materials

7. Unreliable suppliers

2.3.3.2 Factors of Labour Related Delays

Labour related delays were commonly cited in the literature and were identified as one of the group factors that caused delays. Several causes that related to labour were categorized under the principle factor. The methodology of establishing the factors of this group of causes was similar to that of the material related delays. Chan and Kumaraswamy (1996) identified shortage of skill labour as the most important factor that contributed to causes of delays. Abd Majid and McCaffer (1998), revealed that low motivation and morale, slow mobilization of labour, labour supply, absenteeism and strike were the critical factors that contributed to causes of delays. Also in Odeh and Bataineh (2002) research they identified the factors of labour, productivity and labour supply were identified as factors contributing to the causes of delays. According to Ogunlana *et al*. (1996), shortage of skill labour and labour productivity had high influence to causes of delays. Based on this previous literature review, there are seven factors of labour related delays that were identified as shown below:

1. Strike
2. Absenteeism
3. Labour supply
4. Labour productivity
5. Shortage of skill labour
6. Slow mobilization of labour
7. Low motivation and morale

2.3.3.3 Factors of Equipment Related Delays

Equipment related delays were commonly cited in literature and was identified as one of the group factors that caused delays. Equipment related delays were similar to that of the material related delays and labor related delays. Literature review was one of the sources used in establishing the causes of equipment related group of delays. The work of Abd Majid and McCaffer (1998) revealed equipment breakdown, improper equipment, slow mobilization of equipment and equipment allocation problem as contributors to causes of delays , whiles Long *et al.*, (2004) identified inadequate modern equipment as factor of equipment related delays. Insufficient numbers of equipment, frequent equipment breakdown, and equipment allocation problem was the most significant factors that contributed to causes of delays according to (Ogunlana *et al.*, 1996). In Odeh and Bataineh (2002), equipment allocation was the cause of construction delays. Shortage of equipment and improper equipment were factors that contributed to the causes of delays as indicated in (Chan and Kumaraswamy, 1996). Based on this previous literature review, there are seven factors of equipment related delays that were identified as shown below:

1. Equipment allocation problem
2. Slow mobilization of equipment
3. Improper equipment
4. Shortage of equipment parts
5. Frequent equipment breakdown
6. Insufficient numbers of equipment
7. Inadequate modern equipment

2.3.3.4 Factors of Contractor Related Delays

The methodology of establishing the causes of Contractor related delays was similar to that of the material related delays, labor related delays, equipment related delays, and finance related delays. Literature review was one of the sources used in establishing the causes of contractor related group of delays. The work of Long *et al.* (2004) revealed that inadequate contractor experience, inappropriate construction methods, inaccurate time estimating, inaccurate cost estimating, improper project planning and scheduling, incompetent project team, unreliable subcontractor and obsolete technology contributed to the causes of delays in construction project. According to Odeh and Battaineh (2002), inadequate contractor experience, inappropriate construction methods, poor site management and supervision and unreliable subcontractor were contributors to causes of delays. Abd Majid and McCaffer (1998) identified the factors of inadequate contractor experience, inappropriate construction methods, improper project planning and scheduling, and unreliable subcontractor as contributor to causes of delays. Ogunlana *et al.* (1996) also identified improper project planning and scheduling as factors of contractor related delays. The work of Chan and Kumaraswamy (1996) revealed that poor site management and supervision and improper project planning and scheduling contributed to causes of delays. Based on these previous literature reviews, there are seven factors of contractor related delays that were identified as shown below:

1. Incompetent project team
2. Improper project planning and scheduling
3. Poor site management and supervision
4. Inaccurate cost estimate
5. Inaccurate time estimate

6. Inappropriate construction methods

7. Inadequate contractor experience

2.3.3.5 Factors of Client Related Delays

The methodology of establishing the factors of this group of causes was similar to that of the material related delays, labor related delays, equipment related delays, finance related delays and contractor related delays. Literature review was one of the sources used to identify the causes under client related delays. Based on literature review, there were several studies identified with the factors of client delays. Koushki *et al.* (2005) identified change orders and lack of experiences of client in construction project has high influence to the causes of delays. .The work of Long *et al.* (2004) revealed that client interference, lack of capable representative, lack of communication and co-ordination and improper project feasibility study contributed to causes of delays in construction project. Odeh and Battaineh (2002) also identified change orders, and slow decision making by client as causes of delays. According to Ogunlana *et al.* (1996), change orders and slow decision making by client were causes of delays. Based on this previous literature review, there are seven factors of client related delays that were identified as shown below:

1. Improper project feasibility study

2. Lack of communication and coordination

3. Lack of capable representative

4. Client interference

5. Change orders

6. Lack of experience of client in construction

7. Slow decision making by client

2.3.3.6 Factors of Consultant Related Delays

The methodology of establishing the factors of this group of causes was similar to that of the material related delays, labor related delays, equipment related delays, finance related delays, contractor related delays and client related delays. Several studies identified the factors of consultant related delay. In Odeh and Battaineh (2002), slow response and poor inspection were consultant related delays. Long *et al*., (2004) identified the factors of inadequate consultant experience, inadequate project management assistance, incomplete drawing and detail design, and inaccurate site investigation as contributors to causes of delays. According to Ogunlana *et al*. (1996) poor design and delay in design, slow response and poor inspection and incomplete drawing and detail design were causes of delays in construction project. Based on this previous literature review, there were seven factors of consultant related delays that were identified as shown in below:

1. Poor inspection

2. Incomplete drawing/detail design

3. Slow response and poor inspection

4. Inadequate project management assistance

5. Poor design and delays in design

6. Inadequate consultant experience

7. Inaccurate site investigation

2.3.3.7 Factors of External Related Delays

The methodology of establishing the factors of this group of causes was similar to that of the material related delays, labor related delays, equipment related delays, finance related delays, contractor related delays, and consultant related delays. Several studies by numerous researchers identified factors of external related delays. There are several studies which identified the factors that contributed to causes of delays. Al-Momani (2000) identified weather condition as causes of delays in construction project. The work of Long *et al*. (2004) revealed that, unforeseen ground condition, inflation/price fluctuation, slow site clearance, and weather condition were factors of external related delays. Wiguna and Scott (2005) identified the factor of inflation or prices fluctuation having high influence to causes of delays. Ogunlana *et al*. (1996) also identified problem with neighbours as causes of delays. Finally in Odeh and Battaineh (2002), unforeseen ground condition, problem with neighbours, and weather condition were causes of delays. Based on this previous literature review, there are seven factors of external related delays were identified as shown below:

1. Inflation/Prices fluctuation
2. Slow site clearance
3. Problem with neighbours
4. Unforeseen ground condition
5. Unexpected geological condition
6. Weather condition
7. Conflict, war, and ~~public~~ enemy

2.3.3.8 Factors of Finance Related Delays

The methodology of establishing the factors of this group of causes was similar to that of the material related delays, labor related delays, and equipment related delays. One of the sources used to identify the factors under finance group of causes was the literature review. According to Long *et al*. (2004), high interest rate contributed to causes of delays. In the work of Chan and Kumaraswamy (1996) client's financial difficulties and monthly payment difficulties were causes of delays. Koushki *et al*., (2005) revealed that the factor of unreasonable constraints to client have high influence to causes of delays. Frimpong *et al*., (2003) identified the factor of monthly payment difficulties as the most important factor that contributed to causes of delays. The work of Abd Majid and McCaffer (1998) revealed that inadequate fund allocation and delay payment to subcontractor or suppliers were causes of delays in construction project. Finally, in Ogunlana *et al*. (1996), contractor's financial difficulties were the cause of delays. Based on this previous literature review, there are seven factors of finance related delays that were identified as shown below:

1. Delay payment to suppliers/subcontractors
2. Unreasonable constraints to client
3. Client's financial difficulties
4. Contractor's financial difficulties
5. High interest rate
6. Inadequate fund allocation
7. Monthly payment difficulties

Table 2.3 below shows the Summary of the Eight (8) groups of factors from literature that contributed to the various causes of delay in construction.

TABLE 2.3 Lists of Causes of Delay Categorized Into Nine (9) Groups

No.	Causes of delay	Group of Factors
1	Delay in progress payments by owner	Owner
2	Delay to furnish and deliver the site to the contractor by the owner	Owner
3	Change orders by owner during construction	Owner
4	Late in revising and approving design documents by owner	Owner
5	Delay in approving shop drawings and sample materials	Owner
6	Poor communication and coordination by owner and other parties	Owner
7	Slowness in decision making process by owner	Owner
8	Conflicts between joint-ownership of the project	Owner
9	Unavailability of incentives for contractor for finishing ahead of schedule	Owner
10	Suspension of work by owner	Owner
11	Difficulties in financing project by contractor	Contractor
12	Conflicts in sub-contractors schedule in execution of project	Contractor
13	Rework due to errors during construction	Contractor
14	Conflicts b/w contractor and other parties (consultant and owner)	Contractor
15	Poor site management and supervision by contractor	Contractor
16	Poor communication and coordination by contractor with other parties	Contractor
17	Ineffective planning and scheduling of project by contractor	Contractor
18	Improper construction methods implemented by contractor	Contractor
19	Delays in sub-contractors work	Contractor
20	Inadequate contractor's work	Contractor
21	Frequent change of sub-contractors because of their inefficient work	Contractor
22	Poor qualification of the contractor's technical staff	Contractor
23	Delay in site mobilization	Contractor
24	Delay in performing inspection and testing by consultant	Consultant
25	Delay in approving major changes in the scope of work by consultant	Consultant
26	Inflexibility (rigidity) of consultant	Consultant
27	Poor communication/coordination between consultant and other parties	Consultant
28	Late in reviewing and approving design documents by consultant	Consultant
29	Conflicts between consultant and design engineer	Consultant
30	Inadequate experience of consultant	Consultant
31	Mistakes and discrepancies in design documents	Consultant
32	Delays in producing design documents	Consultant

TABLE 2.3 Continuation

No.	Causes of delay	Group of Factors
33	Unclear and inadequate details in drawings	Consultant
34	Complexity of project design	Consultant
35	Insufficient data collection and survey before design	Consultant
36	Misunderstanding of owner's requirements by design engineer	Consultant
37	Inadequate design-team experience	Consutant
38	Un-use of advanced engineering design software	Consultant
39	Shortage of construction materials in market	Materials
40	Changes in material types and specifications during construction	Materials
41	Delay in material delivery	Materials
42	Damage of sorted material while they are needed urgently	Materials
43	Delay in manufacturing special building materials	Materials
44	Late procurement of materials	Materials
45	Late in selection of finishing materials due to availability of many types in market	Materials
46	Equipment breakdowns	Equipment
47	Shortage of equipment	Equipment
48	Low level of equipment-operator's skill	Equipment
49	Low productivity and efficiency of equipment	Equipment
50	Lack of high-technology mechanical equipment	Equipment
51	Shortage of labours	Labour
52	Unqualified workforce	Labour
53	Nationality of labours	Labour
54	Low productivity level of labours	Labour
55	Personal conflicts among labours	Labour
56	Effects of subsurface conditions (e.g., soil, high water table, etc.)	External
57	Delay in obtaining permits from municipality	External
58	Hot weather effect on construction activities	External
59	Rain effect on construction activities	External
60	Unavailability of utilities in site (such as, water, electricity, telephone, etc.)	External
61	Effect of social and cultural factors	External
62	Traffic control and restriction at job site	External
63	Accident during construction	External
64	Differing site (ground) conditions	External
65	Changes in government regulations and laws	External

TABLE 2.3 Continuation

No.	Causes of delay	Group of factors
1.	Delay payment to suppliers/subcontractors	Finance
2.	Unreasonable constraints to client	Finance
3.	Client's financial difficulties	Finance
4.	Contractor's financial difficulties	Finance
5.	High interest rate	Finance
6.	Inadequate fund allocation	Finance
7.	Monthly payment difficulties	Finance

SOURCE Assaf and Al-Hejji (2006)

2.4 EFFECTS OF CONSTRUCTION DELAYS

A project delay is the accumulated effect of the delays in individual activities. The work Shi *et al*., (2001) revealed that, delays can occur in any and all activities and these delays can concurrently or simultaneously cause delays in the project completion. Several factors cause the overall delay in the construction project such as some within contractor's liability and some within owner's liability (Haseeb *et al*., (2011). Abbas (2006) confirmed that delays can give rise to disruption of work, loss of productivity, abandonment or termination of contract. The effect being late completion of project, increased time related costs and third party claims. According to Haseeb *et al*. (2011), the general consequences of delay are the loss of wealth, time and capacity. For owner, delay means the loss of income and unavailability of facilities. Also for contractor, delay means the loss of money for extra spending on equipment and materials and hiring the labour and loss of time.

Aibinu and Jagboro (2002) studied the effects of construction delays on project delivery in Nigerian construction industry. The six effects of delay identified were: time overrun, cost overrun, dispute, arbitration, total abandonment, and litigation as shown in Table 2.4. They evaluated the questionnaires and through empirical method assessed the effects of construction delays. The findings showed that time and cost overruns were the frequent effects of delay. Completion cost and time had significant effects out of the sixty one (61) building projects studied.

TABLE 2.4: The Effects of Delay

Effects of Delay	**Rank**
Time overrun	1
Cost overrun	2
Dispute	3
Arbitration	4
Litigation	5
Total Abandonment	6

Source: Aibinu and Jagboro (2002)

2.4.1 Effects of Cost overrun

The construction industry has a great impact on the economy of all countries and according to Chitkara (2004) cited by Fetene (2008), the construction industry in many countries accounts for 6-9% of the Gross Domestic Product (GDP). Al- Momani (1996) cited by Fetene (2008) states that, research's on construction projects in some developing countries indicate that by the time a project is completed, the actual cost exceeds the original contract price by 30%, In Ghana the

construction industry has been adjudged as one of the main determinants of the country's GDP as it contributes an average of 8.9% of Ghana's GDP (Ghana Statistical Service, 2010). Normally, when the projects are delayed, they are either extended or accelerated and therefore, incur additional cost. The overall lack of finance to complete a project, or delays in the payment for services by the project sponsor can lead to significant problems arising. If the costs of a project have increased significantly beyond the original estimate, then work on the project may have to stop or be delayed until additional funds can be found. Projects suffer excessive delay from cost overrun which subsequently lead to additional cost overrun as the duration of a project is extended, the price of materials will rise and this subsequently leads to additional costs not only to the project owner but also to the contractor and to the consultant which participate on that project until completion. The contractor will incur an additional cost due to idle man power and idle equipments.

According to Fetene (2008), the following are the main effects of cost overrun which were collected from the respondents of the questionnaire survey and desk study.

1. Delay
2. Supplementary agreement.
3. Additional cost, budget short fall.
4. Adversarial relationship between participants of the project.
5. Loss of reputation to the consultant, the consultant will be viewed as incompetent by project owners.
6. High cost of supervision and contract administration for consultants.
7. Delayed payments to contractors.
8. The contractor will suffer from budget short fall of the client.

9. Poor quality workmanship.

10. Dissatisfaction by project owners and consequently by end users.

11. Negative attitude towards the construction industry by the higher public authority and by the society as a whole.

12. The contribution of the construction industry to the growth of national economy of the country will be less.

13. Cost overruns in construction projects prevent the planned increase in property and service production from taking place, and this phenomenon in turn affects, in a negative way, the rate of national growth.

14. Weakens the growth of the construction industry by eroding mutual trust and respect.

15. Pours money unnecessarily to the project at hand at the expense of other new projects.

16. Distorts fair and equitable resource distribution.

17. Discourage investment, the investment on building construction by public clients will be less; hence the number of projects will decrease in the future.

18. Creates skeptical outlook on appraisal of other new construction projects.

19. Some project owners (clients) become reluctant to effect additional payments to contractors and they view the cost overrun as a fabricated thing. This will propel to delay the project and become a source of dispute among participants of the project.

20. Creates frustration on stakeholders.

Cost overrun will be a source of dispute among stakeholders and it will lead to adversarial relationship among project participants. Project owners will lose confidence on consultant and on professionals in general. To the industry as a whole, cost overruns could bring about a drop in building activities, bad reputation, and inability to secure project finance easily form public

authorities in the future. All these effects undermine the viability and sustainability of the construction industry.

2.4.2 Effects of Time overrun

The problem of project time overrun is of international concern Bramble and Callahan (1987) describe time overrun as the time during which some part of construction project is completed beyond the project completion date or not performed as planned due to an unanticipated circumstance. Elinwa and Joshua (2001) defined it as the time lapse between the agreed estimation or completion date and the actual date of completion. According to Kaming et al. (1997) and Trigunarsyah (2004), time overrun is the extension of time beyond planned completion dates usually traceable to contractors. Generally, the longer a project takes, the greater the project costs will be. Project timescales are dependent on the specification of a project. In Saudi Arabia, Assaf and Al-Hejji (2006) found that only 30% of construction projects were completed within the scheduled completion dates and that the average time overrun was between 10% and 30%. The inability of clients (building owners) to honour payments on time was determined as the first major factor that causes delays in building construction projects in Ghana (Fugar & Agyakwah-Baah, 2010). Time overrun affects the project owners, contractors and other project participants. Project owners may be affected through lost benefits that could have accrued from the completed facility, while contractors may have to spend more on labour and plant, pay penalties as per the contract or even lose other profitable contracts because resources for the next job are tied up on delayed projects.

2.4.3 Effect of Dispute

Most of the time the dispute or disagreement is between the contractor and the client where the dispute may involve claims for compensation, liquidated damages and extension of time. According to Aftab *et al.* (2011), project studies show that low speed of decision making by clients, escalation of material prices, changes in scope of work during construction works, frequent design changes and client interference may contribute to dispute. Sambasivan and Soon (2007) described factors such as delay in the payments for completed work, frequent owner interference, changing requirements, lack of communication between the various parties, problems with neighbors and unforeseen site conditions give rise to disputes between the various parties. The disputes, if not resolved amicably, can lead to arbitration or litigation.

2.4.4 Effect of Litigation

Litigation is the term used to describe dispute resolution in the courts. If provision for arbitration or other dispute process is absent, the disputants will seek the court for a forum to find relief. Parties use litigation as their last choice, as all parties try to avoid the high cost and long length of time during the litigation.

2.4.5 Effect of Arbitration

Arbitration is another method of dispute resolution. It is generally faster and less expensive than court trials or hearing before administrative boards. Even so, arbitration of large complicated cases can still be time consuming and expensive. Arbitration of a contract dispute cannot be compelled unless the contract expressly requires it. The right to arbitration is not an implied right. However, if the contract does require it, court will compel arbitration of the dispute on the demand of either party. The reasons arbitration is generally faster than court actions are because

the filing procedure, arbitrator selection process, and calendar arrangement can proceed in as little as a month, although few months to complete the process is more common.

2.4.6 Effect of Total Abandonment

Construction projects abandoned are projects that have not been completed successfully after the works have been executed on site and left unattended. Abandonment can be temporal, long term or permanent and each of these temporal dimensions has different consequences. In Oiboh (2010), project abandonment has both social and economic menace as most government projects are abandoned half way after commencement by contractors. Olusegun and Olumuyiwa (2011) acknowledged that, the issue of uncompleted and abandoned projects belonging to the Federal Government of Nigeria has been left without adequate attention for too long which is now having a multiplier effect on the construction industry in particular and the national economy as a whole. In Badu and Amoah (2010), it was indicated that the list of abandoned projects in the Ghana is endless and according to Ahadzie and Amoah-Mensah (2010) , the affordable housing project initiated in 2001 also appears to have been abandoned as progress of works has stalled since 2008 to date.

The cost implication of these abandoned projects have great effect on the nation's economy, since money invested in these abandoned projects would have been utilized in another area of the economy for the benefit of the society and the nation as a whole. This assertion is stated in Setterfied (1997), that more systematic studies of abandonment confirm the intuition that abandoned buildings are associated with a variety of social, economic and environmental ills.

The principal amongst these problems are:

1. Wasted resources and lost tax revenues

2. Declining property values
3. Effects on community and neighborhood aesthetics
4. Impact on public health and safety
5. Promotion of illegal activity
6. The encouragement of further abandonment.

2.5 MINIMIZING CONSTRUCTION DELAYS

Several researchers have conducted studies, recommended and identified the method of minimizing delay in construction project. Below are the details of their studies.

TABLE 2.5: Studies on Research conducted to recommend the Method of Minimizing Delay in Construction Projects.

Researcher	Topic	Method of Minimizing Construction Delays (RECOMMENDATIONS)
Nguyen *et al*., (2004)	A Study on Project Success Factors in Large Construction Projects in Vietnam.	1. Competent project manager 2. Multidisciplinary/competent project team 3. Availability of resources 4. Commitment to projects 5. Frequent progress meeting 6. Accurate initial cost estimates 7. Accurate initial time estimates 8. Awarding bids to the right/experience consultant and contractor 9. Proper emphasis on past experience 10. Community involvement 11. Systematic control mechanism 12. Comprehensive contract documentation 13. Effective strategic planning 14. Clear information and communication channels 15. Use up to date technology utilization 16. Absence of bureaucracy

TABLE 2.5: Continuation

Researcher	Topic	Method of Minimizing Construction Delays (RECOMMENDATIONS)
(Aibinu and Jagboro , 2002)	The effects of Construction Delays on Project Delivery in Nigerian Construction Industry	1. Acceleration of site activities 2. Contingency allowance
(Koushki *et al.*, 2005)	Delays and Cost increase in the Construction of Private Residential Projects in Kuwait	1. Ensure adequate and available source of finance until project completion 2. Allocation of sufficient time and money at the design phase 3. Select a competent consultant 4. Reliable contractor to carry out the work 5. Perform a preconstruction planning of project tasks and resource needs 6. Hire an independent supervising engineer to monitor the progress of the work 7. Ensure timely delivery of materials.

TABLE 2.5: Continuation

Researcher	Topic	Method of Minimizing Construction Delays (RECOMMENDATIONS)
(Odeh and Battaineh, 2002)	Causes of Construction Delay: Traditional Contracts	1.Enforcing liquidated damage clauses 2. Offering incentives for early completion 3. Developing human resources in the construction industry through proper training and classifying of craftsman 4. Adopting a new approach to contract award procedure by giving less weight to prices and more weight to the capabilities and past performance of contractors 5. Adopting new approaches to contracting such as design-build and construction management (CM) type of contracts.
(Long *et al*., 2008).	Delay and Cost Overruns in Vietnam Large Construction: A Comparison with Other Selected Countries	1. Site management and supervision 2. Compressing construction durations

TABLE 2.5: Continuation

Researcher	Topic	Method of Minimizing Construction Delays (RECOMMENDATIONS)
(Majid 2006).	Causes and Effects of Delays in Aceh Construction Industry	1. Frequent progress meeting 2. Use up-to-date technology utilization 3. Use proper and modern construction equipment 4. Use appropriate construction methods 5. Effective strategic planning 6. Proper material procurement 7. Accurate initial cost estimates 8. Clear information and communication channels 9. Frequent coordination between the parties involved 10. Proper emphasis on past experience 11. Proper project planning and scheduling 12. Adequate and available source of finance until project completion 13. Competent project manager 14.Availability of resources 15. Awarding bids to the right/experience consultant and contractor 16. Use of experienced subcontractors and suppliers 17.Multi disciplinary/competent project team 18.Perform a preconstruction planning of project task and resources needs

2.6 SUMMARY

Methods of minimizing construction delays can be established when causes of delays are identified. The owner suffers financially when a construction delay occurs; knowing the cause of any particular delay in a construction project would help avoid the same. Eight (8) factors that commonly contributed to delays and thirty five (35) methods of minimizing delays were identified based on literature review. These factors and methods were used to develop the questionnaire survey.

CHAPTER 3

RESEARCH METHODOLOGY AND DATA COLLECTION

3.1 INTRODUCTION

This chapter explains how the objective of this study was achieved. This study was carried out based on literature review and questionnaire survey. Subsequently, data collected from the questionnaire survey were analyzed using the statistical methods such as Mean scores and two sample t- test statistics.

3.2 LITERATURE REVIEW

In achieving the objectives of this study, the information regarding causes of delays, effects of delays, and methods of minimizing delays were obtained from various sources i.e., international conference, published books and international journal. Based on previous literature seventy two (72) factors contributed to the causes of delays, six (6) factors affect delays, and thirty five (35) methods of minimizing delays in construction project were identified. These factors and methods were used to develop the questionnaire survey in order to collect data from the targeted respondent.

3.3 DATA COLLECTION

Data collection is the most important part of the study since the accuracy of the data will determine the success or failure of the research. Data obtained through these questionnaires are

analyzed using Mean scores and two sample t- test statistics. Data collected from the different questions were gathered to answer the different objectives.

3.4 QUESTIONNAIRE DESIGN

The questionnaire was designed based on factors identified that contributed to the causes of delays in relation to the various sources of funding and the methods in minimizing delays in relation to the various sources of funding in the MMDA'S. A questionnaire survey was developed to assess the views of contractors and consultants on whether there were significant difference on the causes of delay and methods of minimizing construction delays in relation to the various sources of funding in the MMDA'S. The questionnaire was designed into three sections: section A; section B; and section C.

3.4.1 Section A: Company and Respondent Profile

This section is to obtain the information about the respondents. The questionnaire includes the following:

- The company in which the respondent represents;
- The position of the respondent in the company;
- The experience of the respondent in construction project;
- The experience of the company in construction industry; and
- The number of building projects delayed
- The type of building most frequently delayed and type of contract.

3.4.2 Section B: Causes of Delays

This section obtain the information on linkage between the factors that contribute to the causes of delays in building projects in the MMDA'S in relation to their various sources of funding from the viewpoint of contractors and consultants. There are eight (8) categories with twenty four (24) factors of causes of delays as identified by Odeh and Battaineh (2002). A pilot study on a survey was conducted among contractors and consultants, it was confirmed that they agreed on the causes of delay as identified. These were then constructed into structured question. The causes were categorized into these eight (8) major groups as follows:

1. Material related delay: Shortage of Construction Materials, Escalation of Material Prices and Late Delivery of Materials.
2. Labour related delay : Low Motivation/Morale, Slow Mobilization of Labor and Shortage of Skill Labor
3. Equipment related delay: Slow Mobilization of Equipment, Insufficient Numbers of Equipment and Inadequate Modern Equipment.
4. Financial related delay : Inadequate Fund Allocation, Monthly Payment Difficulties and Contractor's Financial Difficulties
5. Contractor related delay : Inaccurate Cost Estimating, Poor Site Management & Supervision and Inadequate Contractor Experience
6. Client related delay : Change Orders, Client's Interference and Slow Decision Making by Client
7. Consultant related delay : Poor Design & Delays in Design, Incomplete Drawing/Details Design and Inadequate Project Management Assistance
8. External related delay : Inflation/Prices Fluctuation, Weather Condition and Unforeseen Ground Condition

The questionnaire is mainly based on Linkert's scale of five ordinal measures from one (1) to five (5) according to level of contributing.

Each scale represents the following rating:

(5) = Very high contributing;

(4) = High contributing;

(3) = Medium contributing;

(2) = Low contributing; and

(1) = Very low contributing.

3.4.3 Section C: Methods of Minimizing Construction Delays

This section identifies the effective methods of minimizing construction delays in the MMDA'S in relation to the various sources of funding. There were nine (9) methods which were identified from several literature reviews which are used in the structured question. A pilot study on a survey was conducted among contractors and consultants, it was confirmed that they agreed on the methods of minimizing construction delays as identified:

1. Competent Project Manager

2. Ensure adequate and available source of finance until project completion

3. Availability of resources

4. Site management and supervision

5. Proper project planning and scheduling

6. Accurate initial cost estimates

7. Proper material procurement

8. Awarding bids to the right/experience consultant and contractor

9. Perform a preconstruction planning of project tasks and resources needs.

The questionnaire is mainly based on Linkert's scale of five ordinal measures from one (1) to five (5) according to level of effectiveness. Each scale represents the following rating:

(5) = Very high effective;

(4) = High effective;

(3) = Medium effective;

(2) = Low effective; and

(1) = Very low effective.

3.5 SURVEY PROCEDURE

A pilot survey was conducted using ten (10) contractors and five (5) consultants to rank the list of causes of delay and method of minimizing construction delays which were relevant to the research in the District Assemblies. All the respondents agreed that the questionnaire was sufficient to capture the causes of delay and method of minimizing construction delays.

3.6 QUESTIONNAIRE ADMINISTRATION

The developed survey questionnaire was distributed to One hundred and forty three (143) targeted respondents. One hundred and fifteen (115) sets were distributed to contractors by using probability sampling. Selection of contractors was done by stratified cluster sampling and census sampling from the list of registered contractors of the Assemblies in Greater Accra

Region of Ghana whiles twenty eight (28) sets were distributed to consultants using non-probability sampling. Purposive sampling was used in the selection of consultants being the MMDA'S in Greater Accra Region of Ghana and other consultants who have worked with the MMDA's.

3.6.1 Sampling Technique

Quantitative method was used in establishing the sample size for the consultants and building contractors for the study. The population size was determined using the Census and Purposive Sampling for contractors and consultants respectively:

- Greater Accra Region was used as the case study.
- There were Two (2) Metropolitan Assemblies, Six (6) Municipal Assemblies and Two (2) District Assemblies in Greater Accra Region as at the period of study.
- The Works Department of the MMDA's in Greater Accra Region were themselves consultants for the various Assemblies.
- A purposive sampling was used for the selection of consultants since few consultants are engaged in the works of the Assemblies because of the existence of the Works Department in every Assembly.

3.6.2 Sample size for consultants and Registered Contractors

Greater Accra Region was clustered into three (3) as follows:

METROPOLITAN

AMA (ACCRA METROPOLITAN ASSEMBLY)

TMA (TEMA METROPOLITAN ASSEMBLY)

MUNICIPAL

AdMA (ADENTAN MUNICIPAL ASSEMBLY)

GSMA (GA SOUTH MUNICIPAL ASSEMBLY)

GWMA (GA WEST MUNICIPAL ASSEMBLY)

ASMA (ASHAIMAN MUNICIPAL ASSEMBLY)

GEMA (GA EAST MUNICIPAL ASSEMBLY)

LEKMA (LEGEKUKU KROWOR MUNICIPAL ASSEMBLY)

DISTRICT

DEDA (DANGME EAST DISTRICT ASSEMBLY)

DWDA (DANGME WEST DISTRICT ASSEMBLY)

A random sampling was used to select three (3) Assemblies from the Metropolitan, Municipal and District. Census sampling technique was used in selecting the Registered Contractors from the three (3) Assemblies as shown in Table 3.1 below:

TABLE 3.1: Sample Size of contractors for each of the Selected Assemblies

Assemblies	**Sample Size of Registered Contractors with the Assemblies using Census Sampling**	**Number of Questionnaires Allotted**
TMA	54	54
AdMA	33	33
DWDA	28	28
TOTAL	**115**	**115**

Purposive sampling was used in selecting the consultants from the MMDA's as shown in Table 3.2 below:

TABLE 3.2: Sample Size of consultants

Assemblies	Works Department as consultants for the Assemblies	Sample Size of Registered Consultants with the Assemblies using Purposive sampling	Number of Questionnaires Allotted
AMA	1	0	1
TMA	1	0	1
AdMA	1	2	3
GSMA	1	2	3
GWMA	1	2	3
ASMA	1	1	2
GEMA	1	1	2
LEKMA	1	0	1
DEDA	1	4	5
DWDA	1	6	7
TOTAL	**10**	**18**	**28**

3.7 DATA ANALYSIS

The procedure used in analyzing the data was aimed at establishing the relation to the various factors that contribute to causes of building project delays and the sources of funding. There were two steps used in analyzing the data: calculating the mean scores and ranking of factors for each source of funding in relation to building projects delay based on the mean score at a test level of 3.0, and the use of two sample t-test to assess the significant difference of the contributing factor from the view point of consultants and contractors between the various sources of funding and building projects delay factors in the MMDA's. The Mean score was also used in analyzing the methods of minimizing building delays.

3.7.1 Method of Analysis

3.7.1.1 Mean Score

The Mean score was used to rank the delay factor variables in terms of their contributing factor to the various source of funding and also used to rank the effectiveness of the proposed methods of minimizing construction delays.

The mean score (MS) for each variable of the delay factor was computed by using the following formula;

$$\mathbf{MS} = \frac{\sum(\mathbf{f} \times \mathbf{S})}{\mathbf{N}}$$

Where:

MS – Mean Score

f – Frequency of responses for each score

S – Scores given to each factor (from 1 to 5)

N – Total number of responses concerning each factor

3.7.1.2 Two Sample t- test

The purpose of the Two sample t- Test Statistics was to compare responses from two groups, by testing the null hypothesis H_o: there is no linkage between sources of funding and building delay factors. The alternative hypothesis H_1: there is linkage between sources of funding and building delay factors. These two groups can come from different experimental treatments, or different natural "populations".

The assumption is that:

- each group is considered to be a sample from a distinct population
- the responses in each group are independent of those in the other group
- the distributions of the variable of interest are normal

The null hypothesis is that the two population means are equal to each other. To test the null hypothesis, you need to calculate the following values: $\bar{x}_1$, $\bar{x}_2$ (the means of the two samples), s_1^2, s_2^2 (the variances of the two samples), n_1, n_2 (the sample sizes of the two samples), and k (the degrees of freedom).

Where:

$\bar{x} = 1/n\ (x_1 + x_2 + x_3 ..... + x_n) = (1/n)\ \Sigma x_i$

n = sample size

$s^2 = 1/(n-1)\ [(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + ... + (x_n - \bar{x})^2]$ (long formula)

$s^2 = 1/(n-1)\ [\Sigma x_i^2 - (1/n)(\Sigma x_i)^2]$ (hand calculation formula)

$k = n_1 - 1$ or $n_2 - 1$, whichever is less (if $n_1 \neq n_2$)

$k = n_1 + n_2 - 2$ (if $n_1 = n_2$)

To compute the t-statistic.

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{(s_1^2 / n_1 + s_2^2 / n_2)}}$$

Compare the calculated t-value, with k degrees of freedom, to the critical t value from the t distribution table at the chosen confidence level and decide whether to accept or reject the null hypothesis.

Procedure for hypothesis testing:

1. Define the null hypothesis (H_0) and the alternative hypothesis (H_1)

2. Choose a value for t. (i.e. choose the significance level)

3. Calculate the value of the test statistic, t-test.

4. Compare the calculated value with a table of the critical values of the test statistic.

5. If the calculated value of the test statistic is less than the critical value from the table, accept the null hypothesis (H_0). If the absolute (calculated) value of the test

statistic is greater than or equal to the critical value from the table, reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1).

*Reject the null hypothesis when: calculated *t*-value > critical *t*-value

Note: This procedure can be used when the distribution variances from the two populations are not equal, and the sample sizes are not equal.

CHAPTER 4

SURVEY RESULTS, ANALYSIS AND DISCUSSIONS

4.1 INTRODUCTION

This chapter presents the survey results, data analysis and discussions based on the questionnaire survey.

4.2 RATE OF RESPONSE

One hundred and forty three (143) survey questionnaires were distributed to the targeted respondents in order to identify the most important factors that contribute to causes of delays and methods of minimizing building delays in relation to the various sources of funding. The survey questionnaires were distributed to both contractors and consultants who undertook building construction projects in the MMDA'S. The total number of questionnaire distributed and responses have been analyzed and shown in table 4.1 below.

TABLE 4.1 Questionnaire Distribution and Responses

Description	Number of Distributed Questionnaires	Number of Respondents	Number of Responses (Percentage)
Consultants	28	26	93
Contractors	115	91	79
Total	143	117	82

The responses received from the two groups indicate 82% as shown in Table 4.1 above. This indicates that the responses provided could be relied upon for this study.

4.3 DETAILS OF PROJECTS UNDERTAKEN

The following Tables below present projects undertaken in the various MMDA'S from (2008 – 2011)

TABLE 4.2: Details of Building Projects undertaken by MMDA's from (2008 – 2011)

Source of Funding	MMDA'S		
	TMA	AdMA	DWDA
IGF	8	3	0
GETFund	16	7	4
DACF	4	18	17
DDF	4	4	4
DONOR	20	10	11

SOURCE: Office of the Regional Planning Co-ordinating Unit (RPCU), Regional Co-ordinating Council (RCC), Greater Accra. (2012)

TABLE 4.3: Status of Building Projects under IGF

MMDA'S	IGF (2008 – 2011)				
	Abandoned Project	**Delayed Project**	Completed Project	Total	% age of Delayed Project
TMA	0	4	4	8	50
AdMA	0	1	2	3	34
DWDA	0	0	0	0	0

SOURCE: Office of the Regional Planning Co-ordinating Unit (RPCU), Regional Co-ordinating Council (RCC), Greater Accra. (2012)

From Table 4.3 above, the percentage of the status of Delayed building projects under IGF from the period (2008 – 2011) within the various MMDA'S were as follows: 50% delayed building projects for TMA, 34% delayed building projects for AdMA, and 0% for DWDA because there were no IGF building projects during the period.

TABLE 4.4: Status of Building Projects under DACF

MMDA'S	DACF (2008 – 2011)				
	Abandoned Project	**Delayed Project**	Completed Project	Total	% age of Delayed Project
TMA	0	2	2	4	50
AdMA	0	8	10	18	45
DWDA	0	17	0	17	100

SOURCE: Office of the Regional Planning Co-ordinating Unit (RPCU), Regional Co-ordinating Council (RCC), Greater Accra. (2012)

From Table 4.4 above, the percentage of the status of Delayed building projects under DACF from the period (2008 – 2011) with the various MMDA'S were as follows: 50% delayed building projects for TMA, 45% delayed building projects for AdMA, and 100% delayed building projects for DWDA .

TABLE 4.5: Status of Building Projects under DDF

MMDA'S	DDF (2008 – 2011)				
	Abandoned Project	**Delayed Project**	Completed Project	Total	% age of Delayed Project
TMA	0	3	1	4	75
AdMA	0	1	3	4	25
DWDA	0	4	0	4	100

SOURCE: Office of the Regional Planning Co-ordinating Unit (RPCU), Regional Co-ordinating Council (RCC), Greater Accra. (2012)

From Table 4.5 above, the percentage of the status of Delayed building projects under DDF from the period (2008 – 2011) with the various MMDA'S were as follows: 75% delayed building projects for TMA, 25% delayed building projects for AdMA, and 100% delayed building projects for DWDA .

TABLE 4.6: Status of Building Projects under GETFund

MMDA'S	GETFund (2008 - 2011)				
	Abandoned Project	Delayed Project	Completed Project	Total	% age of Delayed Project
AdMA	0	15	1	16	94
TMA	0	7	0	7	100
DWDA	0	4	0	4	100

SOURCE: Office of the Regional Planning Co-ordinating Unit (RPCU), Regional Co-ordinating Council (RCC), Greater Accra. (2012)

From Table 4.6 above, the percentage of the status of Delayed building projects under GETFund from the period (2008 – 2011) with the various MMDA'S were as follows: 94% delayed building projects for TMA, 100% delayed building projects for AdMA, and 100% delayed building projects for DWDA.

TABLE 4.7: Status of Building Projects under DONORS

MMDA'S	DONORS (2008 -2011)				
	Abandoned Project	**Delayed Project**	Completed Project	Total	% Age of Delayed Project
AdMA	0	16	7	23	70
TMA	0	4	6	10	40
DWDA	0 .	9	2	11	82

SOURCE: Office of the Regional Planning Co-ordinating Unit (RPCU), Regional Co-ordinating Council (RCC), Greater Accra. (2012)

From Table 4.7 above, the percentage of the status of Delayed building projects under DONORS from the period (2008 – 2011) with the various MMDA'S were as follows: 70% delayed building projects for TMA, 40% delayed building projects for AdMA, and 82% delayed building projects for DWDA.

From the analysis of all the data of the various MMDA'S (TMA, AdMA and DWDA) there were indications of percentage of delays in building projects under the various sources of funding hence the need to analyze the causes of delays to the various source of funding.

4.4 ANALYSIS OF RESULTS

4.4.1 Analysis of Respondents Profile

The responses received from the two groups indicated that 91 contractors representing 78% and 26 consultants representing 22% as shown in Fig 4.1 below completed the questionnaire. These indicate that majority of the respondents work with contractors and therefore their views form the basis of the outcome of the findings.

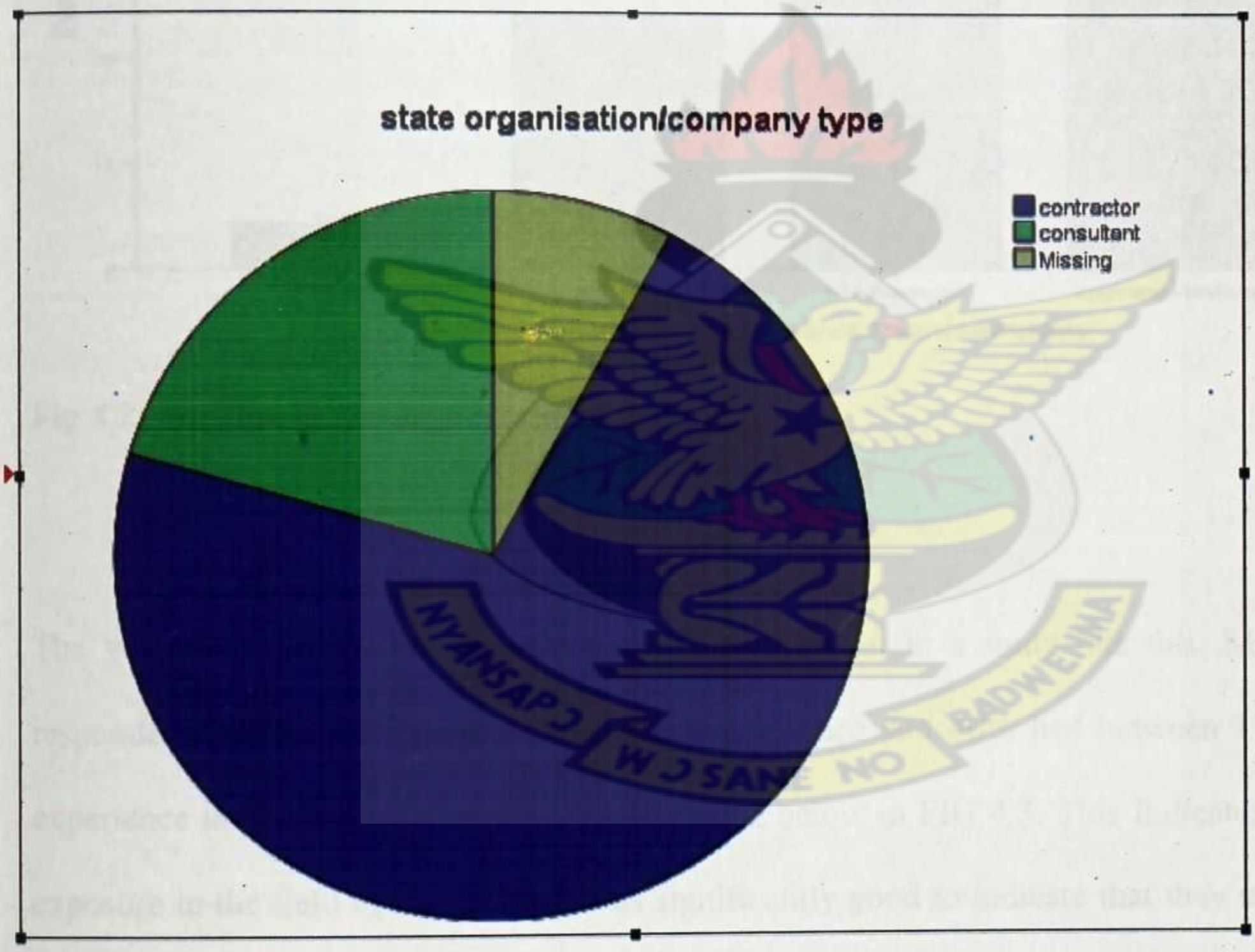

Fig 4.1: Organization / company type

From the responses received on the position in the organization from the two groups, 45% were Engineers/ Designers, whiles 27% were Site Managers, 24% were project managers and 4% were Directors as shown below in Fig 4.2 . These implies that majority of the respondents were professionals who have in-depth knowledge in the field of construction and its associated problems which informed their decision.

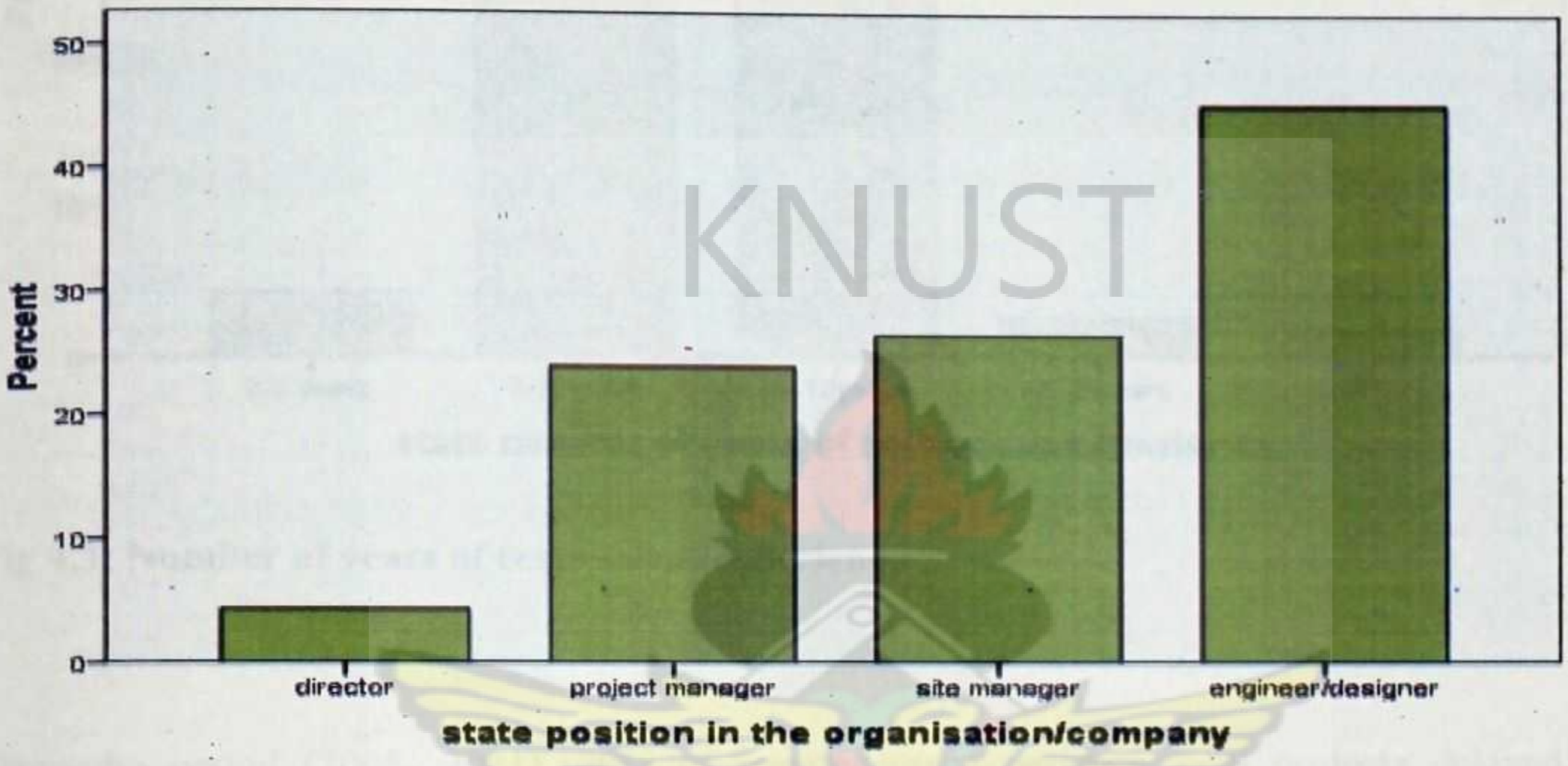

Fig 4.2: Position in the organization/company

The years of experience that respondents have are vital in a study like this. Majority of the respondents (42%) had between 6- 10years experience and 40% had between 11- 15years of experience in the construction industry as shown below in FIG 4.3. This Indicates that level of exposure in the field of construction was significantly good to indicate that they understood the main issues of the study. The rest were between 0 – 5years, being 13%, 3% have more than 20 years

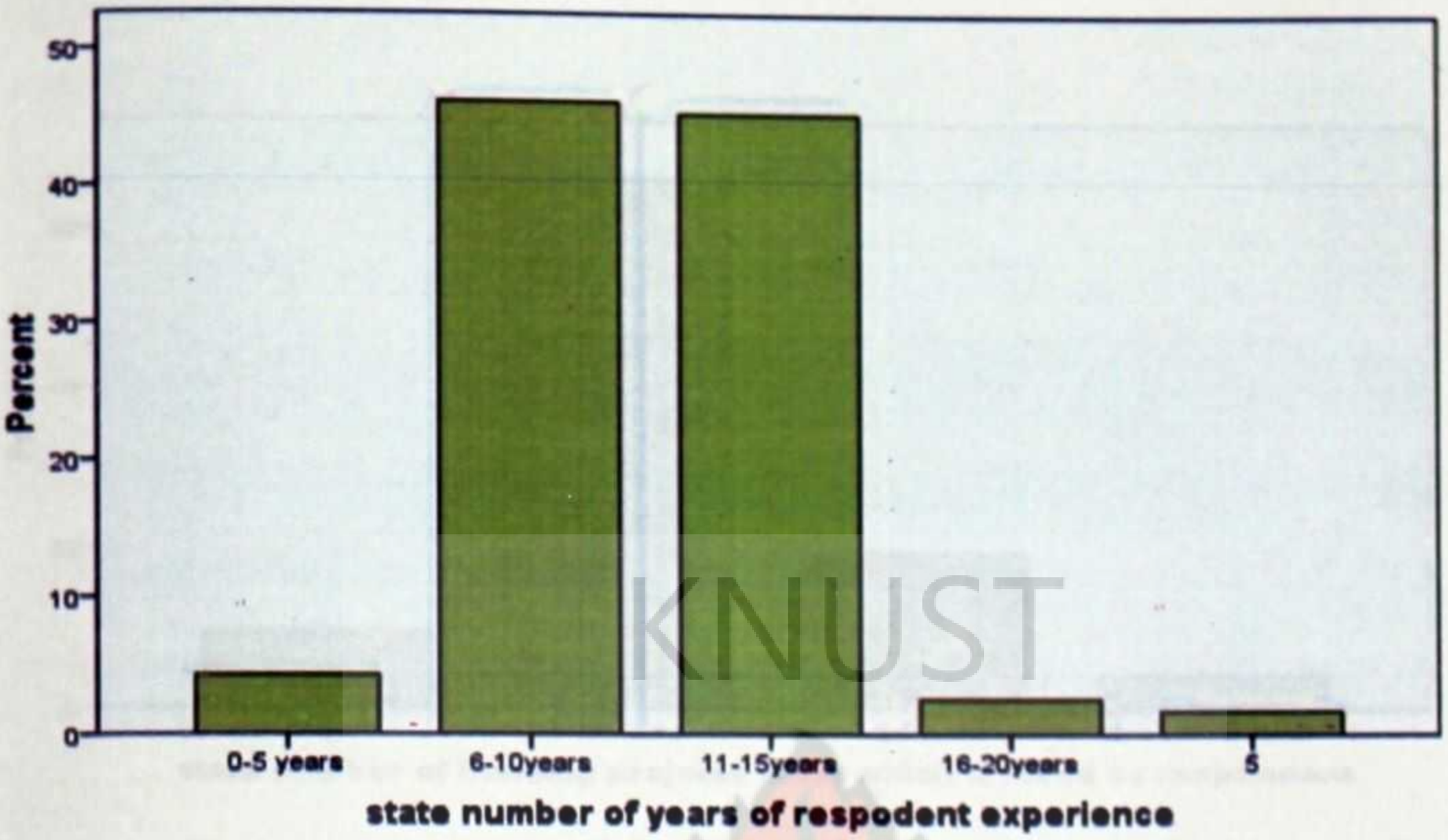

Fig 4.3: Number of years of respondent experience

From the period (2008- 2011), 20% of respondents experience 7- 9 projects delayed, 9% experience 1- 3 projects and 4% have more than 9 projects delayed as shown in Fig 4.4 below. But at least 67% of respondent's experienced 4- 6 projects delayed from the period (2008- 2011). Clearly all the respondents had experienced project delays at one point or the other in the work hence understood the issues presented to them in the questionnaire survey.

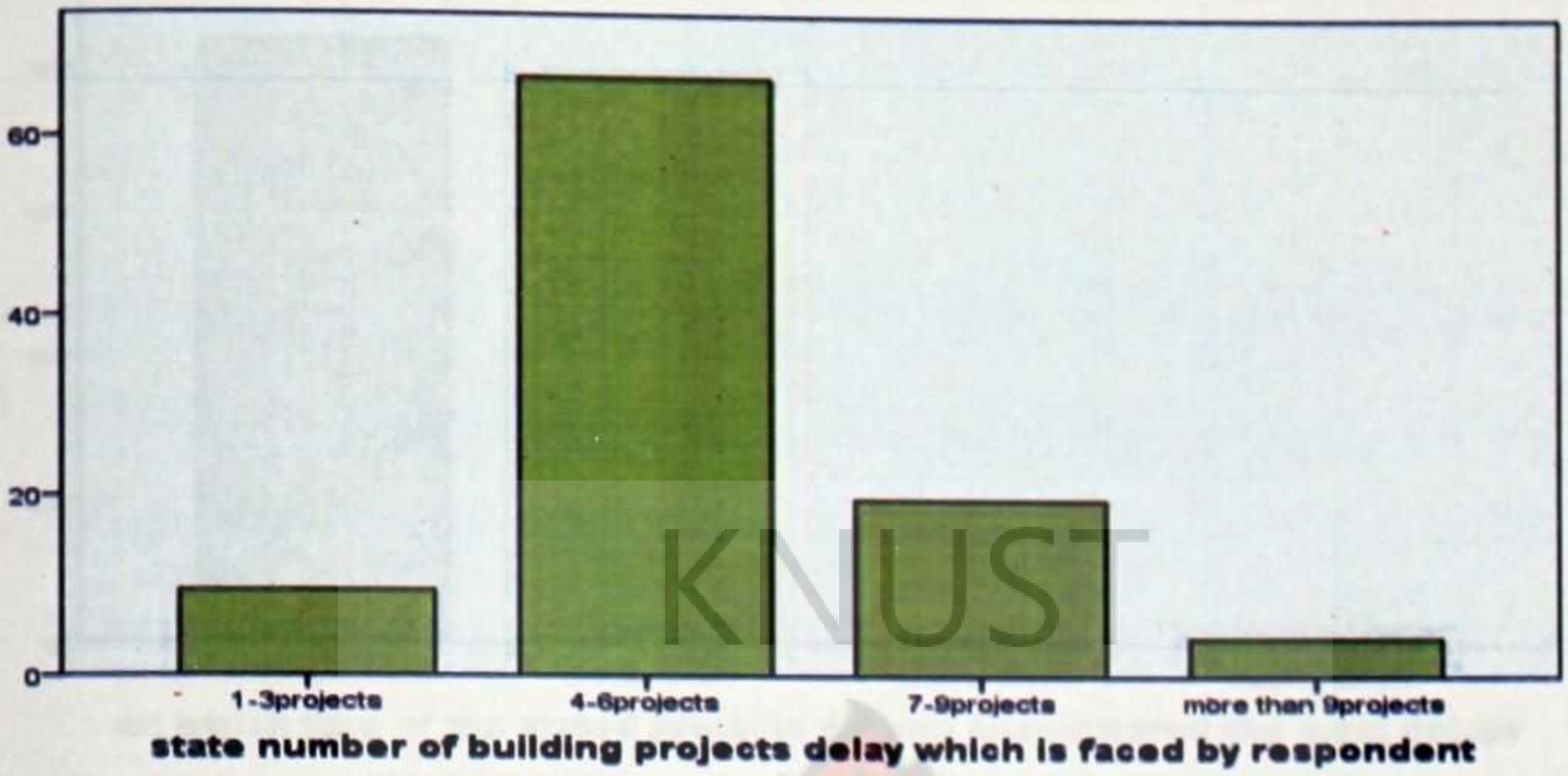

Fig 4.4: Number of building projects delay which is faced by respondent

The responses received from the two groups indicated that 84% have building school projects encountered as the most delayed projects in the Districts Assemblies, whiles 13% have public facility, 3% have housing facility and 1% have medical center as shown in Fig 4.5 below. This clearly indicates that Assemblies priorities are more into the construction of school building projects, but most of these projects are normally delayed.

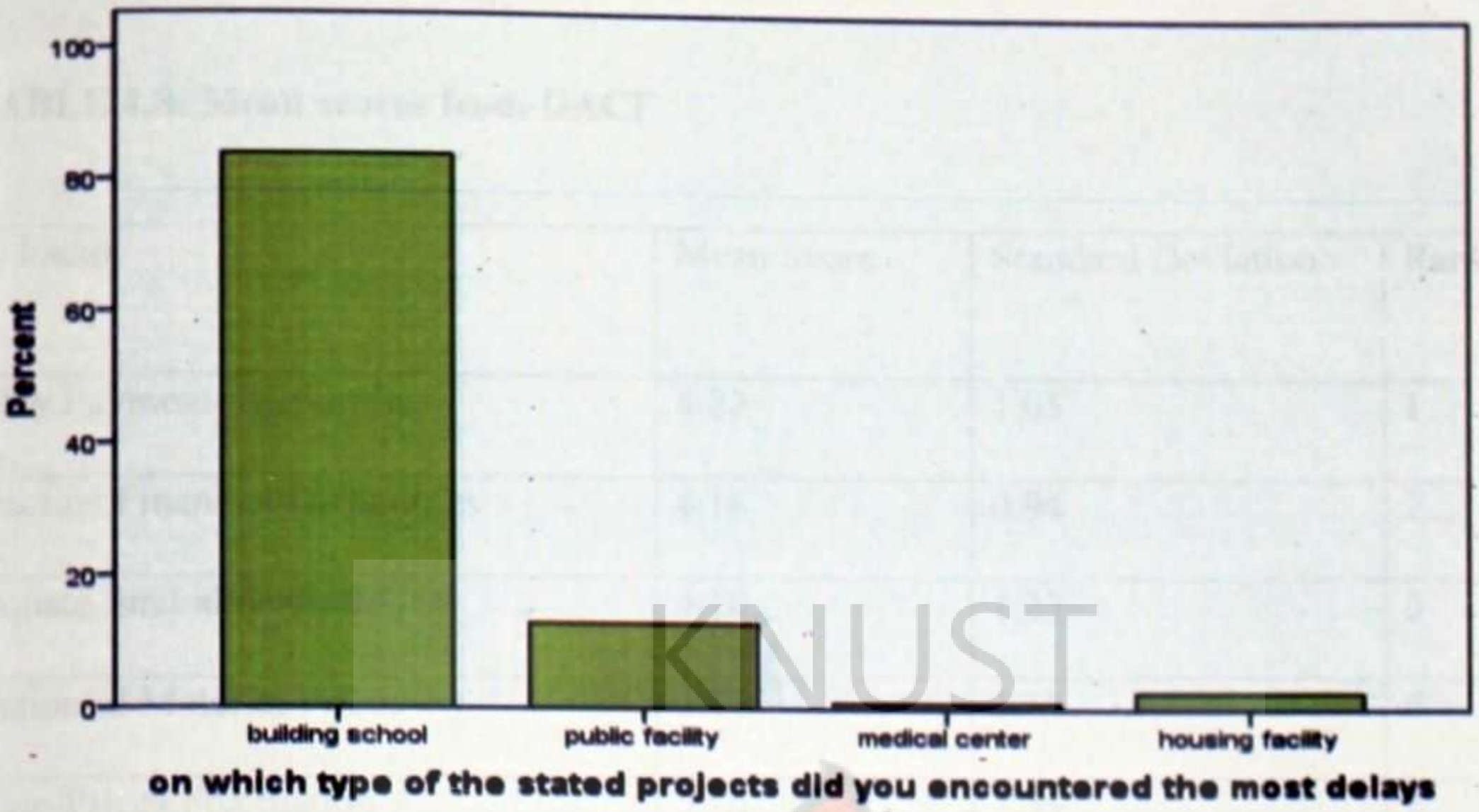

Fig 4.5: Building projects type encountered most delays

4.5 RELATIONSHIP BETWEEN THE VARIOUS SOURCES OF FUNDING AND DELAY FACTORS IN THE MMDA'S

TABLE 4.8: Mean scores from DACF

Delay Factor	Mean Score	Standard Deviation	Ranking
Monthly Payment Difficulties	4.27	1.05	1
Contractors Financial Difficulties	4.16	0.94	2
Inadequate fund allocation	4.10	1.23	3
Escalation of Material Prices	3.31	1.10	4
Inflation/Prices Fluctuation	3.26	1.39	5
Inadequate Cost Estimating	3.21	1.23	6
Poor Site Management And Supervision	3.10	1.00	7

A total of twenty four (24) major factors that contributed to causes of delays were identified. The twenty four (24) factors were grouped into eight major groups: material related; labor-related; equipment-related; finance-related; contractor-related; client related; consultant-related; and external related factors. The mean score was ranked based on the values of the results greater than 3.0 test level from the viewpoint of contractors and consultants, as shown in Table 4.8.

TABLE 4.9: Independent samples test for DACF

Delay Factors		Levente Test		t- test for Equality of means	
		F	Sig	t	Sig (2-tailed)
Monthly Payment Difficulties	Equal variance assumed	17.074	.000	-3.265	.001
	Equal variance not assumed			-5.308	.000
Contractors Financial Difficulties	Equal variance assumed	10.293	.002	0.526	.600
	Equal variance not assumed			0.677	.501
Inadequate fund allocation	Equal variance assumed	9.437	.003	-2.261	.026
	Equal variance not assumed			-3.542	.001
Escalation of Material Prices	Equal variance assumed	1.435	.233	-.201	.841
	Equal variance not assumed			-.225	.823
Inflation/Prices Fluctuation	Equal variance assumed	8.839	.004	-.053	.958
	Equal variance not assumed			-.067	.947
Inadequate Cost Estimating	Equal variance assumed	10.299	.002	-2.727	.007
	Equal variance not assumed			-3.870	.000
Poor Site Management And Supervision	Equal variance assumed	9.584	.002	2.895	.005
	Equal variance not assumed			4.223	.000

From Table 4.9, all the delay factors apart from Escalation of Material Prices had the sig. values < 0.005; hence values for equal variance assumed were used in analyzing their results. With the t-test results for Monthly Payment Difficulties, Contractors Financial difficulties, Inadequate fund allocation, Inflation/Price Fluctuation, Inadequate Cost Estimating, and Poor Site Management and Supervision we reject the null hypothesis at 5% significance level, then accept the alternative hypothesis which means that there are significance differences between the views of contractors and consultants.

From Table 4.9, the t-test result for Escalation of Material Prices is > 0.005, meaning we accept the null hypothesis at 5% significance level, which means that there are no significance difference between the views of contractors and consultants.

From Tables 4.8 and 4.9 based on the different groups of delay, the respondents generally agreed that the top three (3) factors of delay were all financial related delays namely (Monthly payment difficulties, Contractors financial difficulties and inadequate fund allocation) in the order of ranking were identified under the DACF. Financial difficulties have also been identified as the first major factor causing delay in construction projects in Malaysia Alaghbari *et al.,* (2007), Assaf *et al., (*1995). This result agrees with Frimpong and Oluwoye (2003) who found that financial problems are the main factors that cause delay in the construction of groundwater projects in Ghana. The reason being the allocation and release of District Assembly Common Fund (DACF) to Assemblies is always in arrears, so project funded by this source suffer some financial problems in terms of timely payment of certificate to contractors for work done resulting in contractors locking up their capitals, hence contractors financial difficulties. This assertion is buttressed by Fugar and Amankwah (2010) that, in Ghana, the long and bureaucratic processes involved in honouring payments to contractors, especially those working on government projects have been well documented. This is a major drawback on the district's development effort as most of the MMDA's depend on the Fund for development project.

TABLE 4.10: Mean scores from GETFund

Delay Factor	Mean Score	Standard Deviation	Ranking
Client Interference	3.18	1.01	1
Poor Site Management And Supervision	3.18	1.14	2
Inflation/Prices Fluctuation	3.01	1.33	3

A total of twenty four (24) major factors that contributed to causes of delays were identified. The twenty four (24) factors were grouped into eight major groups: material related; labor-related; equipment-related; finance-related; contractor-related; client related; consultant-related; and external related factors. The mean score was ranked based on the values of the results greater than 3.0 test level from the viewpoint of contractors and consultants, as shown in Table 4.10.

TABLE 4.11: Independent samples test for GETFund

Delay Factors		Levente Test		t- test for Equality of means	
		F	Sig	t	Sig (2-tailed)
Client Interference	Equal variance assumed	0.023	.881	3.136	.002
	Equal variance not assumed			3.215	.003
Poor Site Management And Supervision	Equal variance assumed	7.234	.008	3.845	.000
	Equal variance not assumed			4.809	.000
Inflation/Prices Fluctuation	Equal variance assumed	7.628	.007	2.073	.040
	Equal variance not assumed			2.435	.018

From Table 4.11, all the delay factors had the sig. values > 0.005; hence values for equal variance not assumed were used in analyzing their results. With the t-test results for Client

Interference and Poor Site Management we reject the null hypothesis at 5% significance level, then accept the alternative hypothesis which means that there are significance differences between the views of contractors and consultants. From Table 4.9, the t-test result for Inflation/Prices Fluctuation is > 0.005, meaning we accept the null hypothesis at 5% significance level, which means that there are no significance difference between the views of contractors and consultants. Supervision and Inflation/Prices Fluctuation from Table 4.10 and 4.11 based on the different factors of delay, the respondents generally agreed that the top three groups of delay were Client, Contractor and External related delays namely (Client interference, Poor site management and· supervision and Inflation/prices fluctuation) in the order of ranking were identified under the GETFund. Respondents did not see finance as a major problem with GETFund projects but rather the bureaucratic nature of the secretariat in handling all the consultancy works causes the delay, hence the perceived interference in the system.

TABLE 4.12: Mean scores from IGF

Delay Factor	Mean Score	Standard Deviation	Ranking
Monthly Payment Difficulties	4.22	0.92	1
Contractors Financial Difficulties	4.13	0.91	2
Inadequate fund allocation	4.00	1.00	3
Inadequate Project management assistance	3.43	1.10	4
Inflation/Prices Fluctuation	3.25	1.27	5
Poor Site Management And Supervision	3.15	1.30	6
Inadequate Modern Equipment	3.11	1.38	7

A total of twenty four (24) major factors that contributed to causes of delays were identified. The twenty four (24) factors were grouped into eight major groups: material related; labor-related; equipment-related; finance-related; contractor-related; client related; consultant-related; and external related factors. The mean score was ranked based on the values of the results greater than 3.0 test level from the viewpoint of contractors and consultants, as shown in Table 4.12.

TABLE 4.13: Independent samples test for IGF

Delay Factors		Levente Test		t- test for Equality of means	
		F	Sig	t	Sig (2-tailed)
Monthly Payment Difficulties	Equal variance assumed	13.991	.000	-3.845	.000
	Equal variance not assumed			-6.125	.000
Contractors Financial Difficulties	Equal variance assumed	2.343	.129	-2.139	.035
	Equal variance not assumed			-2.515	.015
Inadequate fund allocation	Equal variance assumed	11.969	.001	-1.796	.075
	Equal variance not assumed			-2.690	.008
Inadequate Project management Assistance	Equal variance assumed	.723	.397	-.779	.438
	Equal variance not assumed			-.802	.427
Inflation/Prices Fluctuation	Equal variance assumed	31.052	.000	-3.386	.001
	Equal variance not assumed			-5.010	.000
Poor Site Management and Supervision	Equal variance assumed	9.195	.003	8.079	.000
	Equal variance not assumed			9.720	.000
Inadequate Modern Equipment	Equal variance assumed	15.674	.000	9.616	.000
	Equal variance not assumed			14.375	.000

From Table 4.13, all the delay factors apart Contractors Financial Difficulties and Inadequate Project management assistance had the sig. values < 0.005; hence values for equal variance assumed were used in analyzing their results. With the t-test results for Inadequate Project management and Contractors Financial Difficulties had the sig. values > 0.005; hence we accept the null hypothesis at 5% significance level which means that there is significance difference between the views of contractors and consultants. With the t-test results for Monthly Payment Difficulties, Contractors Financial Difficulties, Inadequate fund allocation, Inflation/Prices Fluctuation, Poor Site Management and Supervision and Inadequate Modern Equipment we reject the null hypothesis at 5% significance level, and then accept the alternative hypothesis which means that there are significance differences between the views of contractors and consultants

From Table 4.12 and Table 4.13 based on the different factors of delay, the respondents generally agreed that the top three groups of delay were all financial related delays namely (Monthly payment difficulties, Contractors financial difficulties, inadequate fund allocation) in the order of ranking were identified under the IGF. The reason being most of the District Assemblies lack potential revenue source or are not innovative enough to create avenues for revenue generation within their Districts and always rely on government for release of the Common fund. So if not properly planned projects earmarked to be funded by IGF source would suffer delay because of lack of the availability of funds. It is also mandatory a 25% of all revenue generated from the IGF should be used for developmental building projects for the year. Assemblies then on this background award contracts with the motivate that funds generated from the IGF would be use, but most of the time the projects suffer delay because of the inadequate of

funds to pay the contractors who turn to lock up their capital in the initial cost incurred in the project, hence the delay.

TABLE 4.14: Mean scores from DDF

Delay Factor	Mean Score	Standard Deviation	Ranking
Inadequate Cost Estimate	3.08	1.288	1

A total of twenty four (24) major factors that contributed to causes of delays were identified. The twenty four (24) factors were grouped into eight major groups: material related; labor-related; equipment-related; finance-related; contractor-related; client related; consultant-related; and external related factors. The mean score was ranked based on the values of the results greater than 3.0 test level from the viewpoint of contractors and consultants, as shown in Table 4.14.

TABLE 4.15: Independent samples test for DDF

Delay Factors		Levene Test		t- test for Equality of means	
		F	Sig	t	Sig (2-tailed)
Inadequate Cost Estimate	Equal variance assumed	24.830	.000	-4.91	.000
	Equal variance not assumed			-6.51	.000

From Table 4.15, the delay factor of Inadequate Cost Estimate had the sig. values < 0.005; hence value for equal variance assumed was used in analyzing the results. With the t-test results of Inadequate Cost Estimate we reject the null hypothesis at 5% significance level, and then accept

the alternative hypothesis which means that there are significance differences between the views of contractors and consultants.

From Table 4.14 and Table 4.15 based on the different factor of delay, the respondents generally agreed that the top delay factor was one (1) Contractor related delays namely (Inadequate cost estimating) was identified under the DDF. The DDF was introduced not long ago and for that matter contractors are not familiar with their project ceilings which turn to affect their estimate for the projects. Contractors from experience will quote low to win bids, because of initial contracts worked on previously. Several contractors in developing countries are entrepreneurs who are in the business to make more profit Ogulana and Olomolaiye (1989); Wahab (1997) and therefore, may not be willing to pay professionals or highly skilled staff in their cost estimation for the projects undertaken. According to Fugar and Amankwah (2010) there is the perception that some parties are not very familiar with the conditions of contract resulting in breaches causing delay.

TABLE 4.16: Mean scores from DONOR

Delay Factor	Mean Score	Standard Deviation	Ranking
Inadequate project management assistance	4.01	1.178	1
Client interference	3.85	1.108	2
Incomplete drawing/details design	3.06	1.366	3

A total of twenty four (24) major factors that contributed to causes of delays were identified. The twenty four (24) factors were grouped into eight major groups: material related; labor-related;

equipment-related; finance-related; contractor-related; client related; consultant-related; and external related factors. The mean score was ranked based on the values of the results greater than 3.0 test level from the viewpoint of contractors and consultants, as shown in Table 4.16.

TABLE 4.17: Independent samples test for DONOR

Delay Factors		Levente Test		t- test for Equality of means	
		F	Sig	t	Sig (2-tailed)
Inadequate project management assistance	Equal variance assumed	14.611	.000	-2.262	.026
	Equal variance not assumed			-3.482	.001
Client Interference	Equal variance assumed	10.163	.002	-3.528	.001
	Equal variance not assumed			-5.257	.000
Incomplete drawings/details design	Equal variance assumed	40.774	.000	2.418	.017
	Equal variance not assumed			3.732	.000

From Table 4.17, all the delay factors of inadequate project management assistance, Client Interference, Incomplete drawings/details design had the sig. values < 0.005; hence values for equal variance assumed were used in analyzing the results. With the t-test results of Inadequate Cost Estimate, Client Interference, Incomplete drawings/details design we reject the null hypothesis at 5% significance level, then accept the alternative hypothesis which means that there are significance differences between the views of contractors and consultants.

From Table 4.16 and Table 4.17 based on the different groups of delay, the respondents generally agreed that the top three groups of delay were two (2) Consultant and one (1) Client related delay namely (Inadequate project management assistance, Client interference and

Incomplete drawing/details design) in the order of ranking were identified under the DONOR. The DONOR funding projects in the Assemblies are mainly handled by consultants from the donor partners with the help of the works department and in most cases the Assemblies have a little hand in its execution. Mainly the Assemblies seek approval from donor patterns in the payment of certificates with the idea of ensuring transparency of the funds allocated to the project. This in turn delay projects since a team from the donors also certify claims, hence the bureaucratic nature of the release of funds by the client and consultant to the contractors.

4.6 THE METHODS OF MINIMIZING CONSTRUCTION DELAY

The nine (9) methods of minimizing construction delays were identified. The mean score values of the methods of minimizing delays were ranked from the highest mean score based on the effectiveness of the proposed methods from the viewpoint of consultants and contractors as shown in Tables 4.18 below.

TABLE 4.18: Mean scores for Minimizing Construction Delays

Proposed Methods	Mean Score	Standard Deviation	Ranking
Ensure adequate and available source of finance until project completion	4.20	1.226	1
Availability of resources	3.94	1.198	2
Proper project planning and scheduling	3.93	1.223	3
Perform a preconstruction planning of project tasks and resources needs	3.83	0.874	4
Accurate initial cost estimates	3.72	1.151	5
Proper material procurement	3.65	1.061	6
Site management and supervision	3.62	1.245	7
Awarding bids to the right/experience consultant and contractor	3.62	1.388	8
Competent Project Manager	3.45	1.263	9

From Table 4.18 above the Ranking of the Mean score from both contractors and consultants on the Nine (9) methods of minimizing construction delays in the District Assemblies for the various sources of funding were ranked as follows:

1. To ensure adequate and available source of finance until project completion was ranked first from the view point of the respondents. The issue of financing and

building projects, work in hand in that the success of every project would depend mostly on the adequate financial resources to contractors which will make it possible for contractors to meet project objectives .

2. Availability of resources was the second ranked from the view point of the respondent's .In projects, resources are categorized into human, material, and equipment. For effective project management all the resources should be readily available for use as and when needed to avoid delay on the projects.
3. Proper project planning and scheduling was the third ranked from the view point of the respondents. These tasks have to be ensured by the consultants from the contractor's method statement of the programme of work to reduce delay on the projects.
4. Perform a preconstruction planning of project tasks and resources needs was the fourth ranked from the view point of the respondents. This task needs the services of the professional to assist in carrying out the planning and resource needs at the preconstruction stage to help reduce delay on site when the project is ongoing.
5. Accurate initial cost estimates was the fifth ranked from the view point of the respondents. Cost estimate plays a major role in Building projects, so if the right professionals are not involved in estimating projects the result turns out to delay the project because funds might not be available enough to continue the project due to the initial under estimating.
6. Proper material procurement was the sixth ranked from the view point of the respondents. The right material procurement comes from the initial quantities extracted from the bill of quantities. If the right quantity of materials are not procured

in bulk and stored for site use, shortage of materials would always be experienced on site which would eventual lead to delay of the project.

7. Site management and supervision was the seventh ranked from the view point of the respondents. These tasks are both the responsibility of the contractor ensuring the proper site management are in place and the consultant also ensuring that adequate supervision are carried out reduce any delay on the projects.

8. Awarding bids to the right/experience consultant and contractor was the eighth ranked from the view point of the respondents. Both contractors and consultants play a key role in the success completion of projects. With the right expertise and supervisory roles from both teams, building projects will not suffer unnecessary delays in their implementation.

9. Competent Project Manager was ranked ninth from the view point of the respondents. Both the contractor and the consultant have to employ the services of a competent project manager to stir the affairs of the project for any unnecessary delay.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

On time completion of project is an indicator of efficiency, but there are many unpredictable factors and variables resulting from various sources affecting building projects delay. However, many construction building projects experience extensive delays and thereby exceed initial time. The main objectives of this study, as shown in chapter one, is to identify any linkage between delays in construction projects in the Districts Assemblies and their sources of funding and to identify the methods of minimizing construction delays in the District Assemblies.

5.2 CONCLUSIONS

The main conclusions of the study are as follows:

The relationship between the various sources of funding and building projects delays in the MMDA's

The objectives of the study were to identify the most critical causes of delay under the various sources of funding, to determine if there is a significant difference from the views of Contractors and Consultants on the causes of delay in relation to the various sources of funding and to make recommendation on preventing delays specific to the various sources of funding.

A total of twenty four (24) factors that contributed to causes of building project delays in relation to the various sources of funding in the District Assemblies were identified and grouped into

eight major groups: material related; labor-related; equipment-related; finance-related; contractor-related; client related; consultant-related; and external related factors.

From the analysis it's showed that all the various sources of funding had some element of a delay related factor in the building projects in the Districts Assemblies. For DACF the three most prevalent delay factors from the view points of the respondents were Contractors Financial Difficulties, Monthly Payment Difficulties and Inadequate Fund Allocation all being financial related delay factor.

The three most prevalent delay factors for GETFund from the view points of the respondents were Client Interference, Poor Site Management and Supervision, and Inflation/Prices Fluctuation being client, contractor and external related delay factors.

IGF had the three most prevalent delay factors from the view points of the respondents as Monthly Payment Difficulties, Contractors Financial Difficulties and Inadequate Fund Allocation being financial and contractor related delay factors.

For DDF, the most prevalent delay factor from the view points of the respondents was Inadequate Cost Estimating being contractor related delay factor.

DONOR had the three most prevalent delay factors from the view points of the respondents as Inadequate Project Management assistance, Client interference and Incomplete drawing/details design being consultant and client related delay factors.

The method of minimizing construction delays in the District Assemblies

The overall result from the One Hundred and Seventeen (117) respondents had it that, Ensuring of adequate and available source of finance until project completion was the highest ranked method of minimizing construction delays in the District Assemblies for the various sources of

funding followed by availability of resources, proper project planning and scheduling, perform a preconstruction planning of project tasks and resources needs, accurate initial cost estimates, proper material procurement, site management and supervision, awarding bids to the right/experience consultant and contractor and competent project manager.

5.3 LIMITATIONS OF THE RESEARCH

Some limitations to the research were identified during the distribution of the questionnaires to both the consultants and contractors who were registered with the Assemblies. Locating their offices was a problem since some of them were not actively working with the Assemblies because of some difficulties in the past. Also some of the data from the Assemblies were not forth coming so the author relied on the Greater Accra Regional Co-ordinating Council since all progress reports on projects from the Assemblies were submitted to the Planning Unit quarterly.

5.4 RECOMMENDATIONS

Based on the findings from the research the following recommendations are made:

5.4.1 District Assembly Common Fund Projects (DACF)

The three most prevalent delay factors were Contractors Financial Difficulties, Monthly Payment Difficulties and Inadequate Fund Allocation all being financial related delay factor. Most public projects are financed by the government through the various District Assemblies in Ghana; hence, the government is one of the key role players in public construction projects. The over reliance of Assemblies on the government on this source of funding is a major burden on the

government. The untimely release of the quarterly funds is always in excess arrears from government and this makes the required budget available for project delay when it is awarded in the anticipation of using the fund to pay for the contractors work done. This is a major worry when it comes to the DACF source of funding in the MMDA's. Timely release of funds by the government would minimize the problem of funding and Assemblies awarding contracts only when they are sure their accounts have been credited by the government before engaging the services of contractors to avoid monthly payment difficulties when claims are raised.

5.4.2 Ghana Education Trust Fund Projects (GETFund)

The three most prevalent delay factors were Client Interference, Poor Site Management and Supervision, and Inflation/Prices Fluctuation being client, contractor and external related delay factors. The objective of the Fund is to provide finance to supplement the provision of education at all levels by the Government in terms of infrastructure. So the 2.5% component of Value Added Tax (VAT) collected is put in the consolidated fund handled by the GETFund secretariat. Mainly funding is not the issue of the delay in the projects under GETFund but rather the excessive bureaucratic procedures in the clients' organization which is seen by many as interference in the work of the Assemblies, hence the delay in projects. When this bureaucracy is reduced the delay of projects would be minimized.

5.4.3 Internally Generated Fund (IGF)

Under IGF, the three most prevalent delay factors were Monthly Payment Difficulties, Contractors Financial Difficulties and Inadequate Fund Allocation being financial and contractor

related delay factors. Projects funded by IGF source experiences delay mainly because of the unavailability of funds to pay contractors for their work done. Assemblies should harness their potential areas in terms of revenue generation to contribute enough to help carry out projects earmarked under IGF source of funding, since it's their obligation to undertake developmental projects from part of the generated revenue.

5.4.4 District Development Fund (DDF)

The most prevalent delay factor was Inadequate Cost Estimating being contractor related delay factor. Contractors are to employ the services of competent professional to ensure efficient time management through proper resource planning, duration estimation, and schedule development and control; to avoid delay on projects and hence stop the practice of bidding contracts on the notion of having worked with similar contract figure with other source of funding without taking into consideration project specific. So the engagement of professionals would best advice contractors.

5.4.5 Donor Fund

Three most prevalent delay factors were Inadequate Project Management assistance, Client interference and Incomplete drawing/details design being consultant and client related delay factors. Donor funded projects have the tendency of donors dictating and interfering with the works of the Assemblies because they want to ensure transparency and judicious use of the fund, this in turn delay the projects by their bureaucracy nature. Decentralisation of their fund would minimize the delay on projects under donor funded.

5.5 RECOMMENDATION FOR FURTHER RESEACH

A future research should be conducted into the statistical correlation between the sources of funding and project delays and offer some recommendation.

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APPENDIX 1

QUESTIONNAIRE

CAUSES AND EFFECTS OF DELAYS IN BUILDING PROJECTS IN THE MMDA'S

This questionnaire consist of **THREE** section:

Section A : Respondent Profile and Project description

Section B : Linkage between Delays and their sources of funding

Section C : Methods of Minimizing Construction Delays

OBJECTIVE OF THE STUDY

The objectives of the study are as follows:

1. To identify the most critical causes of delay under the various sources of funding.
2. To determine if there is a significant difference from the views of Contractors and Consultants on the causes of delay.
3. To make appropriate recommendations on preventing delays specific to the various sources of funding.

STUDENT NAME: DAVID AMEYAW

SUPERVISOR: DR. EMMANEUL ADINYIRA

NOTE: ***Your answer will be treated confidentially. The findings of the study will be used for academic purposes. Your name is optional in this questionnaire. Thank you very much for your corporation.***

SECTION A

COMPANY RESPONDENT PROFILE AND PROJECT DESCRIPTION (OPTIONAL)

Please, thick **one appropriate box** and fill in the blanks if you select others.

Organization/Company Name: .....

Address: .....

1. State organization/company type.
   - ☐ Contractor
   - ☐ Consultant

2. State position in the organization/company.
   - ☐ Director .
   - ☐ Site Manager
   - ☐ Project Manager
   - ☐ Engineer/Designer
   - ☐ Others, please specify .....

3. State the number of year respondent has experience in the construction industry.
   - ☐ 0 - 5 years
   - ☐ 6 - 10 years
   - ☐ 11 - 15 years
   - ☐ 16 - 20 years
   - ☐ More than 20 years

4. State the number of year the organization / company have experience in construction.
   - ☐ Less than 5 years
   - ☐ 5 - 10 years
   - ☐ 11 - 15 years
   - ☐ 16 - 20 years
   - ☐ More than 20 years

5. State the number of building projects delay which is faced by respondent from 2008 - 2011.
   - ☐ 1 - 3 projects
   - ☐ 4 - 6 projects
   - ☐ 7 - 9 projects
   - ☐ More than 9 projects

6. On which type of the stated projects did you encountered the most delays.
   - ☐ Building School
   - ☐ Public Facility
   - ☐ Medical Center (Clinic)
   - ☐ Housing Estate
   - ☐ Others, please specify: .....

SECTION B

LINKAGE BETWEEN DELAYS AND THEIR SOURCES OF FUNDING

1. **OBJECTIVE OF THE STUDY:** To determine if there is a significant difference from the views of Contractors and Consultants on the causes of delay.

Please, **thick one appropriate** box.

Each scale represents the following rating:

(5) = Very high contributing (4) = High contributing (3) = Medium contributing
(2) = Low contributing (1) = Very low contributing.

Questions: Which of the following related factors stated below has any linkage between delays in construction projects in the Districts Assemblies and their sources of funding?

SOURCE OF FUNDING	FACTORS CAUSING DELAY (CATEGORY)	1	2	3	4	5
DACF	**1. MATERIAL-RELATED**					
	1. Shortage of Construction Materials					
	2. Escalation of Material Prices					
	3. Late Delivery of Materials					
	2. LABOR-RELATED					
	1.Low Motivation/Morale					
	2.Slow Mobilization of Labor					
	3. Shortage of Skill Labor					
	3. EQUIPMENT-RELATED					
	1. Slow Mobilization of Equipment					
	2. Insufficient Numbers of Equipment					
	3.Inadequate Modern Equipment					
	4. FINANCIAL-RELATED					
	1. Inadequate Fund Allocation					
	2.Monthly Payment Difficulties					
	3.Contractor's Financial Difficulties					
	5. CONTRACTOR-RELATED					
	1. Inaccurate Cost Estimating					
	2. Poor Site Management & Supervision					
	3.Inadequate Contractor Experience					
	6. CLIENT-RELATED					
	1. Change Orders					
	2.Client's Interference					
	3. Slow Decision Making by Client					
	7. CONSULTANT-RELATED					
	1. Poor Design & Delays in Design					
	2. Incomplete Drawing/Details Design					
	3. Inadequate Project Management Assistance					
	8. EXTERNAL ENVIRONMENT					
	1. Inflation/Prices Fluctuation					
	2. Weather Condition					
	3. Unforeseen Ground Condition					

SOURCE OF FUNDING	FACTORS CAUSING DELAY (CATEGORY)	1	2	3	4	5
IGF	**1. MATERIAL-RELATED**					
	1. Shortage of Construction Materials					
	2. Escalation of Material Prices					
	3. Late Delivery of Materials					
	2. LABOR-RELATED					
	1.Low Motivation/Morale					
	2.Slow Mobilization of Labor					
	3. Shortage of Skill Labor					
	3. EQUIPMENT-RELATED					
	1. Slow Mobilization of Equipment					
	2. Insufficient Numbers of Equipment					
	3.Inadequate Modern Equipment					
	4. FINANCIAL-RELATED					
	1. Inadequate Fund Allocation					
	2.Monthly Payment Difficulties					
	3.Contractor's Financial Difficulties					
	5. CONTRACTOR-RELATED					
	1. Inaccurate Cost Estimating					
	2. Poor Site Management & Supervision					
	3.Inadequate Contractor Experience					
	6. CLIENT-RELATED					
	1. Change Orders					
	2.Client's Interference					
	3. Slow Decision Making by Client					
	7. CONSULTANT-RELATED					
	1. Poor Design & Delays in Design					
	2. Incomplete Drawing/Details Design					
	3. Inadequate Project Management Assistance					
	8. EXTERNAL ENVIRONMENT					
	1. Inflation/Prices Fluctuation					
	2. Weather Condition					
	3. Unforeseen Ground Condition					

SOURCE OF FUNDING	FACTORS CAUSING DELAY (CATEGORY)	1	2	3	4	5
GETFund	**1. MATERIAL-RELATED**					
	1. Shortage of Construction Materials					
	2. Escalation of Material Prices					
	3. Late Delivery of Materials					
	2. LABOR-RELATED					
	1.Low Motivation/Morale					
	2.Slow Mobilization of Labor					
	3. Shortage of Skill Labor					
	3. EQUIPMENT-RELATED					
	1. Slow Mobilization of Equipment					
	2. Insufficient Numbers of Equipment					
	3.Inadequate Modern Equipment					
	4. FINANCIAL-RELATED					
	1. Inadequate Fund Allocation					
	2.Monthly Payment Difficulties					
	3.Contractor's Financial Difficulties					
	5. CONTRACTOR-RELATED					
	1. Inaccurate Cost Estimating					
	2. Poor Site Management & Supervision					
	3.Inadequate Contractor Experience					
	6. CLIENT-RELATED					
	1. Change Orders					
	2.Client's Interference					
	3. Slow Decision Making by Client					
	7. CONSULTANT-RELATED					
	1. Poor Design & Delays in Design					
	2. Incomplete Drawing/Details Design					
	3. Inadequate Project Management Assistance					
	8. EXTERNAL ENVIRONMENT					
	1. Inflation/Prices Fluctuation					
	2. Weather Condition					
	3. Unforeseen Ground Condition					

SOURCE OF FUNDING	FACTORS CAUSING DELAY (CATEGORY)	1	2	3	4	5
DDF	**1. MATERIAL-RELATED**					
	1. Shortage of Construction Materials					
	2. Escalation of Material Prices					
	3. Late Delivery of Materials					
	2. LABOR-RELATED					
	1.Low Motivation/Morale					
	2.Slow Mobilization of Labor					
	3. Shortage of Skill Labor					
	3. EQUIPMENT-RELATED					
	1. Slow Mobilization of Equipment					
	2. Insufficient Numbers of Equipment					
	3.Inadequate Modern Equipment					
	4. FINANCIAL-RELATED					
	1. Inadequate Fund Allocation					
	2.Monthly Payment Difficulties					
	3.Contractor's Financial Difficulties					
	5. CONTRACTOR-RELATED					
	1. Inaccurate Cost Estimating					
	2. Poor Site Management & Supervision					
	3.Inadequate Contractor Experience					
	6. CLIENT-RELATED					
	1. Change Orders					
	2.Client's Interference					
	3. Slow Decision Making by Client					
	7. CONSULTANT-RELATED					
	1. Poor Design & Delays in Design					
	2. Incomplete Drawing/Details Design					
	3. Inadequate Project Management Assistance					
	8. EXTERNAL ENVIRONMENT					
	1. Inflation/Prices Fluctuation					
	2. Weather Condition					
	3. Unforeseen Ground Condition					

SOURCE OF FUNDING	FACTORS CAUSING DELAY (CATEGORY)	1	2	3	4	5
DONOR	**1. MATERIAL-RELATED**					
	1. Shortage of Construction Materials					
	2. Escalation of Material Prices					
	3. Late Delivery of Materials					
	2. LABOR-RELATED					
	1.Low Motivation/Morale					
	2.Slow Mobilization of Labor					
	3. Shortage of Skill Labor					
	3. EQUIPMENT-RELATED					
	1. Slow Mobilization of Equipment					
	2. Insufficient Numbers of Equipment					
	3.Inadequate Modern Equipment					
	4. FINANCIAL-RELATED					
	1. Inadequate Fund Allocation					
	2.Monthly Payment Difficulties					
	3.Contractor's Financial Difficulties					
	5. CONTRACTOR-RELATED					
	1. Inaccurate Cost Estimating					
	2. Poor Site Management & Supervision					
	3.Inadequate Contractor Experience					
	6. CLIENT-RELATED					
	1. Change Orders					
	2.Client's Interference					
	3. Slow Decision Making by Client					
	7. CONSULTANT-RELATED					
	1. Poor Design & Delays in Design					
	2. Incomplete Drawing/Details Design					
	3. Inadequate Project Management Assistance					
	8. EXTERNAL ENVIRONMENT					
	1. Inflation/Prices Fluctuation					
	2. Weather Condition					
	3. Unforeseen Ground Condition					

SECTION D

METHODS TO MINIMIZING OF CONSTRUCTION DELAYS

2. **OBJECTIVE OF THE STUDY:** To make appropriate recommendations on preventing delays specific to the various sources of funding.

Please, **thick one appropriate** box.

Each scale represents the following rating:

(5) = Very high effective (4) = High effective (3) = Medium effective
(2) = Low effective (1) = Very low effective.

Questions: Which of the following methods will minimize building project delays in the MMDA's?

PROPOSED METHODS	1	2	3	4	5
1. Competent Project Manager					
2. Ensure adequate and available source of finance until project completion					
3. Availability of resources					
4. Site management and supervision					
5. Proper project planning and scheduling					
6. Accurate initial cost estimates					
7. Proper material procurement					
8. Awarding bids to the right/experience consultant and contractor					
9. Perform a preconstruction planning of project tasks and resources needs					

Please state out your comment for any recommendations.

Thank you.

APPENDIX 2

Independent Samples Test (DACF)

		Levene's Test for Equality of		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
shortage of construction materials	Equal variances assumed	68.347	0	2.069	115	0.041	0.659	0.319	0.028	1.291
	Equal variances not assumed			3.596	112.42	0	0.659	0.183	0.296	1.023
escalation of material prices	Equal variances assumed	1.435	0.233	-0.201	115	0.841	-0.049	0.246	-0.537	0.438
	Equal variances not assumed			-0.225	48.711	0.823	-0.049	0.22	-0.491	0.392
late delivery of materials	Equal variances assumed	45.815	0	3.347	115	0.001	0.907	0.271	0.37	1.443
	Equal variances not assumed			5.564	114.81	0	0.907	0.163	0.584	1.229
low motivation/ morale	Equal variances assumed	23.432	0	2.485	115	0.014	0.599	0.241	0.122	1.076
	Equal variances not assumed			4.018	112.43	0	0.599	0.149	0.304	0.894
slow mobilization of labour	Equal variances assumed	29.426	0	5.123	115	0	1.313	0.256	0.805	1.821
	Equal variances not assumed			7.993	106.3	0	1.313	0.164	0.987	1.639
shortage of skill labour	Equal variances assumed	44.91	0	2.607	115	0.01	0.692	0.266	0.166	1.218
	Equal variances not assumed			4.395	114.96	0	0.692	0.158	0.38	1.004
slow mobilization of equipment	Equal variances assumed	1.05	0.308	0.843	115	0.401	0.242	0.287	-0.326	0.81
	Equal variances not assumed			0.891	43.921	0.378	0.242	0.271	-0.305	0.789

Independent Samples Test (DACF)

		Levene's Test for Equality of		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
insufficient number of equipment	Equal variances assumed	13.577	0	2.252	115	0.026	0.637	0.283	0.077	1.198
	Equal variances not assumed			2.922	66.914	0.005	0.637	0.218	0.202	1.073
inadequate modern equipment	Equal variances assumed	51.752	0	5.716	115	0	1.538	0.269	1.005	2.072
	Equal variances not assumed			8.924	106.43	0	1.538	0.172	1.197	1.88
inadequate fund allocation	Equal variances assumed	9.437	0.003	-2.261	115	0.026	-0.61	0.27	-1.144	-0.076
	Equal variances not assumed			-3.542	107.12	0.001	-0.61	0.172	-0.951	-0.269
monthly payment difficulties	Equal variances assumed	17.074	0	-3.265	115	0.001	-0.736	0.226	-1.183	-0.29
	Equal variances not assumed			-5.308	113.11	0	-0.736	0.139	-1.011	-0.461
contractors finanacial difficulties	Equal variances assumed	10.293	0.002	0.526	115	0.6	0.11	0.209	-0.304	0.524
	Equal variances not assumed			0.677	65.705	0.501	0.11	0.162	-0.214	0.434
inadequate cost estimating	Equal variances assumed	10.299	0.002	-2.727	115	0.007	-0.725	0.266	-1.252	-0.199
	Equal variances not assumed			-3.87	84.517	0	-0.725	0.187	-1.098	-0.353

Independent Samples Test (DACF)

		Levene's Test for Equality of		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
poor site mangement and supervision	Equal variances assumed	9.584	0.002	2.895	115	0.005	0.626	0.216	0.198	1.055
	Equal variances not assumed			4.223	90.816	0	0.626	0.148	0.332	0.921
inadequate contractor experience	Equal variances assumed	22.985	0	4.731	115	0	1.253	0.265	0.728	1.777
	Equal variances not assumed			7.113	98.007	0	1.253	0.176	0.903	1.602
change orders	Equal variances assumed	27.227	0	3.879	115	0	0.989	0.255	0.484	1.494
	Equal variances not assumed			6.397	114.39	0	0.989	0.155	0.683	1.295
client interference	Equal variances assumed	20.823	0	3.308	115	0.001	0.846	0.256	0.339	1.353
	Equal variances not assumed			5.061	102.08	0	0.846	0.167	0.515	1.178
slow decision making by client	Equal variances assumed	32.322	0	0.937	115	0.351	0.247	0.264	-0.275	0.77
	Equal variances not assumed			1.505	111.41	0.135	0.247	0.164	-0.078	0.573
poor design and delays in design	Equal variances assumed	13.809	0	7.056	115	0	1.725	0.245	1.241	2.21
	Equal variances not assumed			10.215	89.108	0	1.725	0.169	1.39	2.061

Independent Samples Test (DACF)

		Levene's Test for Equality of		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
incomplete drawing/details design	Equal variances assumed	10.559	0.002	5.47	115	0	1.445	0.264	0.922	1.968
	Equal variances not assumed			8.124	95.14	0	1.445	0.178	1.092	1.798
inadequate project management assistance	Equal variances assumed	10.668	0.001	2.623	115	0.01	0.61	0.232	0.149	1.07
	Equal variances not assumed			3.4	66.739	0.001	0.61	0.179	0.252	0.968
inflation/prices fluctuation	Equal variances assumed	8.839	0.004	-0.053	115	0.958	-0.016	0.311	-0.632	0.599
	Equal variances not assumed			-0.067	63.103	0.947	-0.016	0.245	-0.506	0.474
weather conditions	Equal variances assumed	18.894	0	0.423	115	0.673	0.121	0.285	-0.445	0.686
	Equal variances not assumed			0.597	83.04	0.552	0.121	0.203	-0.282	0.524
unforseen ground condition	Equal variances assumed	32.814	0	3.285	115	0.001	0.681	0.207	0.27	1.092
	Equal variances not assumed			5.224	109.92	0	0.681	0.13	0.423	0.94

Independent Samples Test (GETFUND)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
shortage of construction materials	Equal variances assumed	67.207	0	0.168	115	0.867	0.055	0.327	-0.593	0.703
	Equal variances not assumed			0.275	114.01	0.783	0.055	0.199	-0.34	0.45
escalation of material prices	Equal variances assumed	5.249	0.024	2.076	115	0.04	0.522	0.251	0.024	1.02
	Equal variances not assumed			2.668	65.397	0.01	0.522	0.196	0.131	0.913
late delivery of materials	Equal variances assumed	62.606	0	2.343	115	0.021	0.758	0.324	0.117	1.399
	Equal variances not assumed			3.981	114.68	0	0.758	0.19	0.381	1.136
low motivation/ morale	Equal variances assumed	26.72	0	3.274	115	0.001	0.824	0.252	0.326	1.323
	Equal variances not assumed			5.263	111.59	0	0.824	0.157	0.514	1.134
slow mobilization of labour	Equal variances assumed	13.47	0	1.658	115	0.1	0.489	0.295	-0.095	1.073
	Equal variances not assumed			2.186	69.72	0.032	0.489	0.224	0.043	0.935
shortage of skill labour	Equal variances assumed	44.486	0	4.163	115	0	1.253	0.301	0.657	1.849
	Equal variances not assumed			6.752	112.8	0	1.253	0.186	0.885	1.62
slow mobilization of equipment	Equal variances assumed	35.244	0	-1.161	115	0.248	-0.313	0.27	-0.847	0.221
	Equal variances not assumed			-1.647	84.316	0.103	-0.313	0.19	-0.691	0.065

Independent Samples Test (GETFUND)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
insufficient number of equipment	Equal variances assumed	23.667	0	1.372	115	0.173	0.352	0.256	-0.156	0.859
	Equal variances not assumed			1.84	72.794	0.07	0.352	0.191	-0.029	0.733
inadequate modern equipment	Equal variances assumed	26.909	0	3.901	115	0	0.973	0.249	0.479	1.466
	Equal variances not assumed			5.339	76.798	0	0.973	0.182	0.61	1.335
inadequate fund allocation	Equal variances assumed	16.973	0	3.619	115	0	0.852	0.235	0.386	1.318
	Equal variances not assumed			5.619	105.3	0	0.852	0.152	0.551	1.152
monthly payment difficulties	Equal variances assumed	8.71	0.004	1.537	115	0.127	0.291	0.19	-0.084	0.667
	Equal variances not assumed			2.09	75.574	0.04	0.291	0.139	0.014	0.569
contractors financial difficulities	Equal variances assumed	4.864	0.029	0.947	115	0.346	0.17	0.18	-0.186	0.527
	Equal variances not assumed			1.329	82.013	0.188	0.17	0.128	-0.085	0.425
inadequate cost estimating	Equal variances assumed	5.537	0.02	2.83	115	0.006	0.615	0.217	0.185	1.046
	Equal variances not assumed			3.749	70.566	0	0.615	0.164	0.288	0.943

Independent Samples Test (GETFUND)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
poor site mangement and supervision	Equal variances assumed	7.234	0.008	3.845	115	0	0.923	0.24	0.448	1.399
	Equal variances not assumed			4.809	61.24	0	0.923	0.192	0.539	1.307
inadequate contractor experience	Equal variances assumed	20.271	0	4.271	115	0	1.077	0.252	0.577	1.576
	Equal variances not assumed			6.378	96.417	0	1.077	0.169	0.742	1.412
change orders	Equal variances assumed	19.489	0	4.15	115	0	0.967	0.233	0.505	1.429
	Equal variances not assumed			5.889	84.508	0	0.967	0.164	0.64	1.294
client interference	Equal variances assumed	0.023	0.881	3.136	115	0.002	0.676	0.215	0.249	1.103
	Equal variances not assumed			3.215	41.916	0.003	0.676	0.21	0.252	1.1
slow decision making by client	Equal variances assumed	24.534	0	5.383	115	0	1.363	0.253	0.861	1.864
	Equal variances not assumed			8.664	111.81	0	1.363	0.157	1.051	1.674
poor design and delays in design	Equal variances assumed	14.992	0	3.469	115	0.001	0.967	0.279	0.415	1.519
	Equal variances not assumed			4.737	76.313	0	0.967	0.204	0.56	1.374

Independent Samples Test (GETFUND)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
incomplete drawing/details design	Equal variances assumed	13.981	0	6.125	115	0	1.516	0.248	1.026	2.007
	Equal variances not assumed			8.912	90.283	0	1.516	0.17	1.178	1.855
inadequate project management assistance	Equal variances assumed	12.825	0.001	6.092	115	0	1.56	0.256	1.053	2.068
	Equal variances not assumed			9.362	103.05	0	1.56	0.167	1.23	1.891
inflation/prices fluctuation	Equal variances assumed	7.628	0.007	2.073	115	0.04	0.604	0.291	0.027	1.182
	Equal variances not assumed			2.435	53.348	0.018	0.604	0.248	0.107	1.102
weather conditions(	Equal variances assumed	18.804	0	5.257	115	0	1.363	0.259	0.849	1.876
	Equal variances not assumed			7.899	97.905	0	1.363	0.173	1.02	1.705
unforseen ground condition	Equal variances assumed	17.249	0	3.965	115	0	0.984	0.248	0.492	1.475
	Equal variances not assumed			6.097	103.18	0	0.984	0.161	0.664	1.303

Independent Samples Test (IGF)

		Levene's Test for Equality of		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
shortage of construction materials	Equal variances assumed	9.27	0.003	1.202	115	0.232	0.341	0.283	-0.221	0.902
	Equal variances not assumed			1.539	64.866	0.129	0.341	0.221	-0.101	0.783
escalation of material prices	Equal variances assumed	27.004	0	1.941	115	0.055	0.549	0.283	-0.011	1.11
	Equal variances not assumed			2.726	82.234	0.008	0.549	0.202	0.149	0.95
late delivery of materials	Equal variances assumed	14.997	0	3.095	115	0.002	0.857	0.277	0.309	1.406
	Equal variances not assumed			3.979	65.434	0	0.857	0.215	0.427	1.287
low motivation/ morale	Equal variances assumed	8.138	0.005	4.226	115	0	0.995	0.235	0.528	1.461
	Equal variances not assumed			5.176	58.391	0	0.995	0.192	0.61	1.379
slow mobilization of labour	Equal variances assumed	6.981	0.009	3.221	115	0.002	0.885	0.275	0.341	1.429
	Equal variances not assumed			4.026	61.178	0	0.885	0.22	0.445	1.324
shortage of skill labour	Equal variances assumed	22.382	0	3.237	115	0.002	0.934	0.289	0.363	1.506
	Equal variances not assumed			4.436	77.007	0	0.934	0.211	0.515	1.353

Independent Samples Test (IGF)

		Levene's Test for Equality of		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
slow mobilization of equipment	Equal variances assumed	2.487	0.118	1.209	115	0.229	0.313	0.259	-0.2	0.826
	Equal variances not assumed			1.391	51.168	0.17	0.313	0.225	-0.139	0.765
insufficient number of equipment	Equal variances assumed	9.203	0.003	4.106	115	0	1.049	0.256	0.543	1.556
	Equal variances not assumed			5.264	65.001	0	1.049	0.199	0.651	1.448
inadequate modern equipment	Equal variances assumed	15.674	0	9.616	115	0	2.22	0.231	1.763	2.677
	Equal variances not assumed			14.375	96.665	0	2.22	0.154	1.913	2.526
inadequate fund allocation	Equal variances assumed	11.969	0.001	-1.796	115	0.075	-0.396	0.22	-0.832	0.041
	Equal variances not assumed			-2.69	97.169	0.008	-0.396	0.147	-0.687	-0.104
monthly payment difficulties	Equal variances assumed	13.991	0	-3.845	115	0	-0.802	0.209	-1.215	-0.389
	Equal variances not assumed			-6.125	110.187	0	-0.802	0.131	-1.062	-0.543

Independent Samples Test (IGF)

		Levene's Test for Equality of		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
contractors finanacial difficulties	Equal variances assumed	2.343	0.129	-2.139	115	0.035	-0.429	0.2	-0.825	-0.032
	Equal variances not assumed			-2.515	53.457	0.015	-0.429	0.17	-0.77	-0.087
inadequate cost estimating	Equal variances assumed	14.82	0	1.399	115	0.164	0.368	0.263	-0.153	0.889
	Equal variances not assumed			2.167	104.728	0.032	0.368	0.17	0.031	0.705
poor site mangement and supervision	Equal variances assumed	9.195	0.003	8.079	115	0	1.879	0.233	1.418	2.34
	Equal variances not assumed			9.72	56.149	0	1.879	0.193	1.492	2.266
inadequate contractor experience	Equal variances assumed	12.59	0.001	2.694	115	0.008	0.703	0.261	0.186	1.22
	Equal variances not assumed			4.264	109.107	0	0.703	0.165	0.376	1.03
change orders	Equal variances assumed	15.954	0	2.535	115	0.013	0.67	0.264	0.147	1.194
	Equal variances not assumed			3.534	80.599	0.001	0.67	0.19	0.293	1.048

Independent Samples Test (IGF)

		Levene's Test for Equality of		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
client interference	Equal variances assumed	23.885	0	2.399	115	0.018	0.637	0.266	0.111	1.164
	Equal variances not assumed			3.491	90.288	0.001	0.637	0.183	0.275	1
slow decision making by client	Equal variances assumed	19.694	0	3.283	115	0.001	0.868	0.264	0.344	1.392
	Equal variances not assumed			4.934	97.887	0	0.868	0.176	0.519	1.217
poor design and delays in design	Equal variances assumed	24.783	0	0.419	115	0.676	0.121	0.288	-0.45	0.692
	Equal variances not assumed			0.566	74.065	0.573	0.121	0.214	-0.305	0.546
incomplete drawing/details design	Equal variances assumed	22.582	0	7.829	115	0	1.758	0.225	1.313	2.203
	Equal variances not assumed			10.931	80.953	0	1.758	0.161	1.438	2.078
inadequate project management assistance	Equal variances assumed	0.723	0.397	-0.779	115	0.438	-0.192	0.247	-0.682	0.297
	Equal variances not assumed			-0.802	42.235	0.427	-0.192	0.24	-0.676	0.291

Independent Samples Test (DDF)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
shortage of constructio n materials	Equal variances assumed	49.174	0	2.502	115	0.014	0.819	0.327	0.17	1.467
	Equal variances not assumed			3.758	97.818	0	0.819	0.218	0.386	1.251
escalation of material prices	Equal variances assumed	21.338	0	3.586	115	0	0.896	0.25	0.401	1.39
	Equal variances not assumed			5.251	91.741	0	0.896	0.171	0.557	1.234
late delivery of materials	Equal variances assumed	67.773	0	5.261	115	0	1.577	0.3	0.983	2.171
	Equal variances not assumed			8.712	114.648	0	1.577	0.181	1.218	1.935
low motivation /morale	Equal variances assumed	38.777	0	3.068	115	0.003	0.901	0.294	0.319	1.483
	Equal variances not assumed			4.471	90.636	0	0.901	0.202	0.501	1.301
slow mobilizati on of labour	Equal variances assumed	21.307	0	5.406	115	0	1.451	0.268	0.919	1.982
	Equal variances not assumed			8.431	106.235	0	1.451	0.172	1.109	1.792
shortage of skill labour	Equal variances assumed	27.92	0	2.701	115	0.008	0.725	0.269	0.193	1.257
	Equal variances not assumed			3.947	91.289	0	0.725	0.184	0.36	1.09

Independent Samples Test (DDF)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
slow mobilization of equipment	Equal variances assumed	35.945	0	4.176	115	0	1.17	0.28	0.615	1.725
	Equal variances not assumed			6.594	108.611	0	1.17	0.177	0.819	1.522
insufficient number of equipment	Equal variances assumed	10.249	0.002	1.919	115	0.057	0.478	0.249	-0.015	0.971
	Equal variances not assumed			2.42	62.438	0.018	0.478	0.198	0.083	0.873
inadequate modern equipment	Equal variances assumed	32.886	0	1.811	115	0.073	0.5	0.276	-0.047	1.047
	Equal variances not assumed			2.69	95.142	0.008	0.5	0.186	0.131	0.869
inadequate fund allocation	Equal variances assumed	52.287	0	3.873	115	0	1.319	0.34	0.644	1.993
	Equal variances not assumed			5.864	99.676	0	1.319	0.225	0.873	1.765
monthly payment difficulties	Equal variances assumed	8.438	0.004	2.136	115	0.035	0.484	0.226	0.035	0.932
	Equal variances not assumed			2.583	56.784	0.012	0.484	0.187	0.109	0.858

Independent Samples Test (DDF)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
contractors finanacial difficulties	Equal variances assumed	4.421	0.038	3.278	115	0.001	1.005	0.307	0.398	1.613
	Equal variances not assumed			3.576	46.368	0.001	1.005	0.281	0.44	1.571
inadequate cost estimating	Equal variances assumed	24.8	0	-4.919	115	0	-1.286	0.261	-1.803	-0.768
	Equal variances not assumed			-6.51	70.34	0	-1.286	0.198	-1.68	-0.892
poor site mangement and supervision	Equal variances assumed	29.037	0	2.345	115	0.021	0.632	0.27	0.098	1.166
	Equal variances not assumed			3.496	96.094	0.001	0.632	0.181	0.273	0.991
inadequate contractor experience	Equal variances assumed	6.043	0.015	5.457	115	0	1.308	0.24	0.833	1.782
	Equal variances not assumed			7.237	70.727	0	1.308	0.181	0.947	1.668
change orders	Equal variances assumed	23.861	0	4.278	115	0	1.203	0.281	0.646	1.76
	Equal variances not assumed			6.246	91.062	0	1.203	0.193	0.821	1.586

Independent Samples Test (DDF)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
client interference	Equal variances assumed	24.643	0	3.795	115	0	0.989	0.261	0.473	1.505
	Equal variances not assumed			5.633	94.957	0	0.989	0.176	0.64	1.338
slow decision making by client	Equal variances assumed	9.719	0.002	0.979	115	0.33	0.374	0.382	-0.383	1.13
	Equal variances not assumed			1.538	107.707	0.127	0.374	0.243	-0.108	0.855
poor design and delays in design(DDF)	Equal variances assumed	19.242	0	4.241	115	0	1.198	0.282	0.638	1.757
	Equal variances not assumed			5.95	82.012	0	1.198	0.201	0.797	1.598
incomplete drawing/details design	Equal variances assumed	22.768	0	4.151	115	0	1.247	0.3	0.652	1.842
	Equal variances not assumed			5.377	66.67	0	1.247	0.232	0.784	1.71
inadequate project management assistance	Equal variances assumed	23.402	0	4.557	115	0	1.209	0.265	0.683	1.734
	Equal variances not assumed			6.761	94.897	0	1.209	0.179	0.854	1.564

Independent Samples Test (DONOR)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
shortage of construction materials	Equal variances assumed	42.719	0	1.404	115	0.163	0.445	0.317	-0.183	1.073
	Equal variances not assumed			2.115	98.498	0.037	0.445	0.21	0.028	0.863
escalation of material prices	Equal variances assumed	18.488	0	1.394	115	0.166	0.368	0.264	-0.155	0.891
	Equal variances not assumed			1.953	81.625	0.054	0.368	0.189	-0.007	0.743
late delivery of materials	Equal variances assumed	53.66	0	0.828	115	0.409	0.225	0.272	-0.314	0.764
	Equal variances not assumed			1.315	109.663	0.191	0.225	0.171	-0.114	0.565
low motivation/ morale	Equal variances assumed	26.206	0	4.414	115	0	1.264	0.286	0.697	1.831
	Equal variances not assumed			7.018	109.862	0	1.264	0.18	0.907	1.621
slow mobilization of labour	Equal variances assumed	34.216	0	1.821	115	0.071	0.478	0.263	-0.042	0.998
	Equal variances not assumed			2.919	111.218	0.004	0.478	0.164	0.154	0.803
shortage of skill labour	Equal variances assumed	18.775	0	4.177	115	0	1.132	0.271	0.595	1.669
	Equal variances not assumed			6.107	91.372	0	1.132	0.185	0.764	1.5

Independent Samples Test (DONOR)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
slow mobilization of equipment	Equal variances assumed	8.687	0.004	-0.452	115	0.652	-0.104	0.231	-0.562	0.353
	Equal variances not assumed			-0.576	64.101	0.567	-0.104	0.181	-0.467	0.258
insufficient number of equipment	Equal variances assumed	21.454	0	3.974	115	0	1.011	0.254	0.507	1.515
	Equal variances not assumed			5.426	76.283	0	1.011	0.186	0.64	1.382
inadequate modern equipment	Equal variances assumed	10.731	0.001	2.878	115	0.005	0.725	0.252	0.226	1.224
	Equal variances not assumed			3.635	62.658	0.001	0.725	0.2	0.326	1.124
inadequate fund allocation	Equal variances assumed	7.888	0.006	-3.003	115	0.003	-0.769	0.256	-1.277	-0.262
	Equal variances not assumed			-2.601	33.938	0.014	-0.769	0.296	-1.37	-0.168
monthly payment difficulties	Equal variances assumed	0.009	0.925	0.872	115	0.385	0.192	0.221	-0.245	0.629
	Equal variances not assumed			0.782	35.217	0.44	0.192	0.246	-0.307	0.692

Independent Samples Test (DONOR)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
contractors finanacial difficulties	Equal variances assumed	2.841	0.095	2.166	115	0.032	0.396	0.183	0.034	0.757
	Equal variances not assumed			2.442	49.226	0.018	0.396	0.162	0.07	0.721
inadequate cost estimating	Equal variances assumed	9.254	0.003	0.22	115	0.826	0.055	0.249	-0.439	0.549
	Equal variances not assumed			0.281	64.292	0.779	0.055	0.195	-0.335	0.445
poor site mangement and supervision	Equal variances assumed	61.576	0	4.278	115	0	1.225	0.286	0.658	1.793
	Equal variances not assumed			6.729	107.921	0	1.225	0.182	0.864	1.586
inadequate contractor experience	Equal variances assumed	22.865	0	5.439	115	0	1.511	0.278	0.961	2.061
	Equal variances not assumed			8.565	108.135	0	1.511	0.176	1.161	1.861
change orders	Equal variances assumed	19.599	0	3.399	115	0.001	0.984	0.289	0.41	1.557
	Equal variances not assumed			4.841	85.392	0	0.984	0.203	0.58	1.387

Independent Samples Test (DONOR)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
client interference	Equal variances assumed	10.163	0.002	-3.528	115	0.001	-0.83	0.235	-1.295	-0.364
	Equal variances not assumed			-5.257	95.903	0	-0.83	0.158	-1.143	-0.516
slow decision making by client	Equal variances assumed	20.467	0	4.229	115	0	1.132	0.268	0.602	1.662
	Equal variances not assumed			6.296	95.68	0	1.132	0.18	0.775	1.489
poor design and delays in design	Equal variances assumed	57.106	0	3.358	115	0.001	1.049	0.313	0.43	1.669
	Equal variances not assumed			5.509	114.002	0	1.049	0.191	0.672	1.427
incomplete drawing/details design	Equal variances assumed	40.774	0	2.418	115	0.017	0.72	0.298	0.13	1.309
	Equal variances not assumed			3.732	104.007	0	0.72	0.193	0.337	1.102
inadequate project management assistance	Equal variances assumed	14.611	0	-2.262	115	0.026	-0.582	0.257	-1.092	-0.072
	Equal variances not assumed			-3.482	103.423	0.001	-0.582	0.167	-0.914	-0.251

Independent Samples Test (METHODS OF MINIMIZING DELAY)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
competent project manager	Equal variances assumed	19.444	0	4.086	115	0	1.077	0.264	0.555	1.599
	Equal variances not assumed			6.09	95.959	0	1.077	0.177	0.726	1.428
ensure adequate and available source of finanace	Equal variances assumed	23.171	0	-2.777	115	0.006	-0.736	0.265	-1.262	-0.211
	Equal variances not assumed			-4.523	113.3	0	-0.736	0.163	-1.059	-0.414
availability of resource	Equal variances assumed	6.635	0.011	0.267	115	0.79	0.071	0.268	-0.459	0.601
	Equal variances not assumed			0.296	47.847	0.768	0.071	0.241	-0.413	0.556
site management and surpervision	Equal variances assumed	9.314	0.003	2.178	115	0.031	0.593	0.272	0.054	1.133
	Equal variances not assumed			2.776	64.042	0.007	0.593	0.214	0.166	1.02
proper project planning	Equal variances assumed	0.636	0.427	2.069	115	0.041	0.555	0.268	0.024	1.086
	Equal variances not assumed			2.364	50.465	0.022	0.555	0.235	0.083	1.026
accurate initail cost estimate	Equal variances assumed	2.523	0.115	2.09	115	0.039	0.527	0.252	0.028	1.027
	Equal variances not assumed			2.546	57.667	0.014	0.527	0.207	0.113	0.942
proper material procurement	Equal variances assumed	3.955	0.049	2.55	115	0.012	0.588	0.231	0.131	1.045
	Equal variances not assumed			3.143	59.26	0.003	0.588	0.187	0.214	0.962

Independent Samples Test (METHODS OF MINIMIZING DELAY)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
awarding bids to the right experience concultant and contractor	Equal variances assumed	0.102	0.75	1.322	115	0.189	0.407	0.308	-0.203	1.016
	Equal variances not assumed			1.366	42.461	0.179	0.407	0.298	-0.194	1.007
perform a preconstruction planning of project tasks and resourecs	Equal variances assumed	0.001	0.97	3.928	115	0	0.72	0.183	0.357	1.083
	Equal variances not assumed			4.527	51.37	0	0.72	0.159	0.401	1.039