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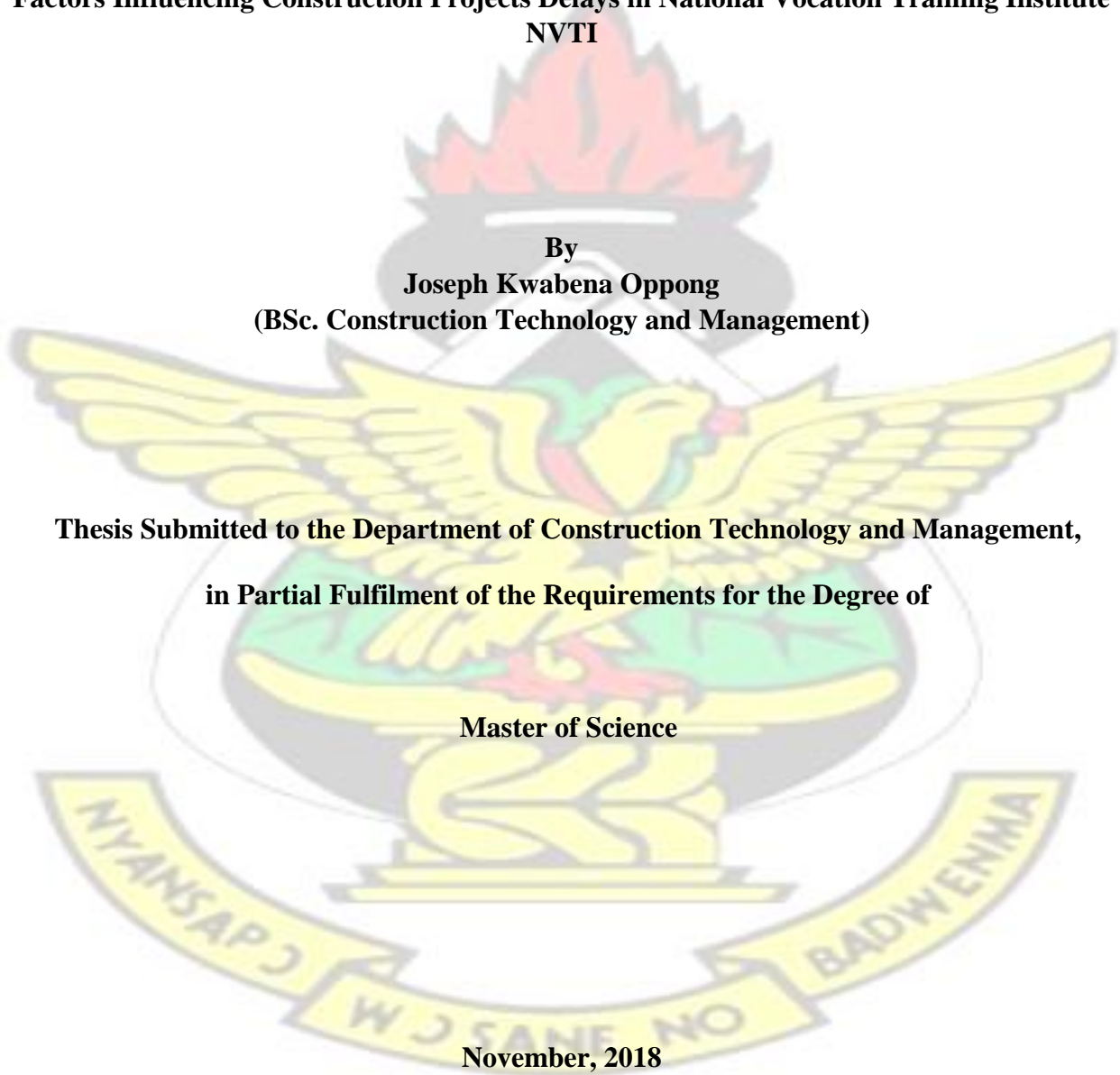
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Topic
**Factors Influencing Construction Projects Delays in National Vocation Training Institute
NVTI**

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Thesis Submitted to the Department of Construction Technology and Management,
in Partial Fulfilment of the Requirements for the Degree of
Master of Science

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DECLARATION

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

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ABSTRACT

Construction projects in National Vocational Training Institute (NVTI) have experienced several challenges with the strong challenge of delays of the projects. Numerous factors influenced this issue of construction project delays, and the aim of the study was to explore the causative factors influencing construction projects delays in NVTI. The objectives were: to identify factors which influence construction project delays in NVTI, to provide solutions / mitigation measures to reduce construction projects delays in NVTI. The study made use of quantitative approach of enquiry through survey questionnaires. A sum total of seventy – two (72) questionnaires were administered and sixty – two (62) responses were retrieved from NVTI Staff representing the client, Contractors and Consultants (project managers, architects, quantity surveyors, works engineers) who have previously executed NVTI construction projects indicating a high response rate of 86%. The analysis of the data gathered was done using descriptive statistics (frequencies, percentages) and mean score ranking. The study revealed that, there were sixteen (16) factors which influence construction project delays but ten (10) of them were identified as the key ones and include; Lack of adequate budgetary support, Inadequate funding allocation, Time and Cost overrun Lack of effective communication between parties, Slow in decision making. Design errors and omissions / Poorly defined scope/ specification of work Contractor's financial difficulties / Use of obsolete plant and equipment, Poor project management practices on a project site, inadequate experience of consultants Lack of vehicles for monitoring and supervision of works. It was recommended that the government should make adequate funds available before the start of every contract, contractors should practice proper site management whereas the consultants should also do due diligence to avoid errors and put in place good project management practices.

KEYWORDS: Delay, Factors, Construction, Projects, NVTI, Contractors, Consultants.

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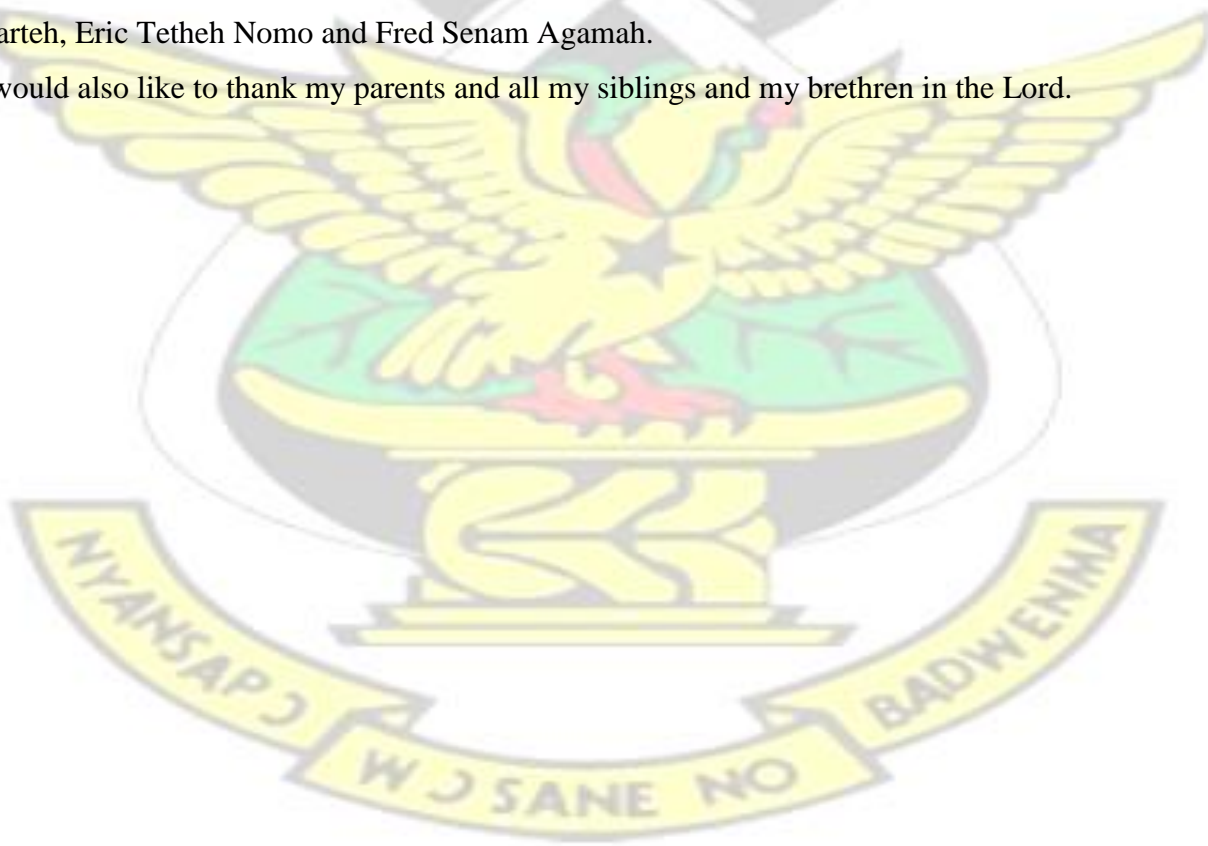
I am grateful to God Almighty for giving me the grace to sail through this work victoriously. I would like to thank my supervisor, Dr. Kofi Agyekum for his unflinching support, when you get closer to him, then you would know that he cares a lot for his students. And my hearty thanks to Pro. Theo Adjei – Kumi my internal examiner for his guidance.

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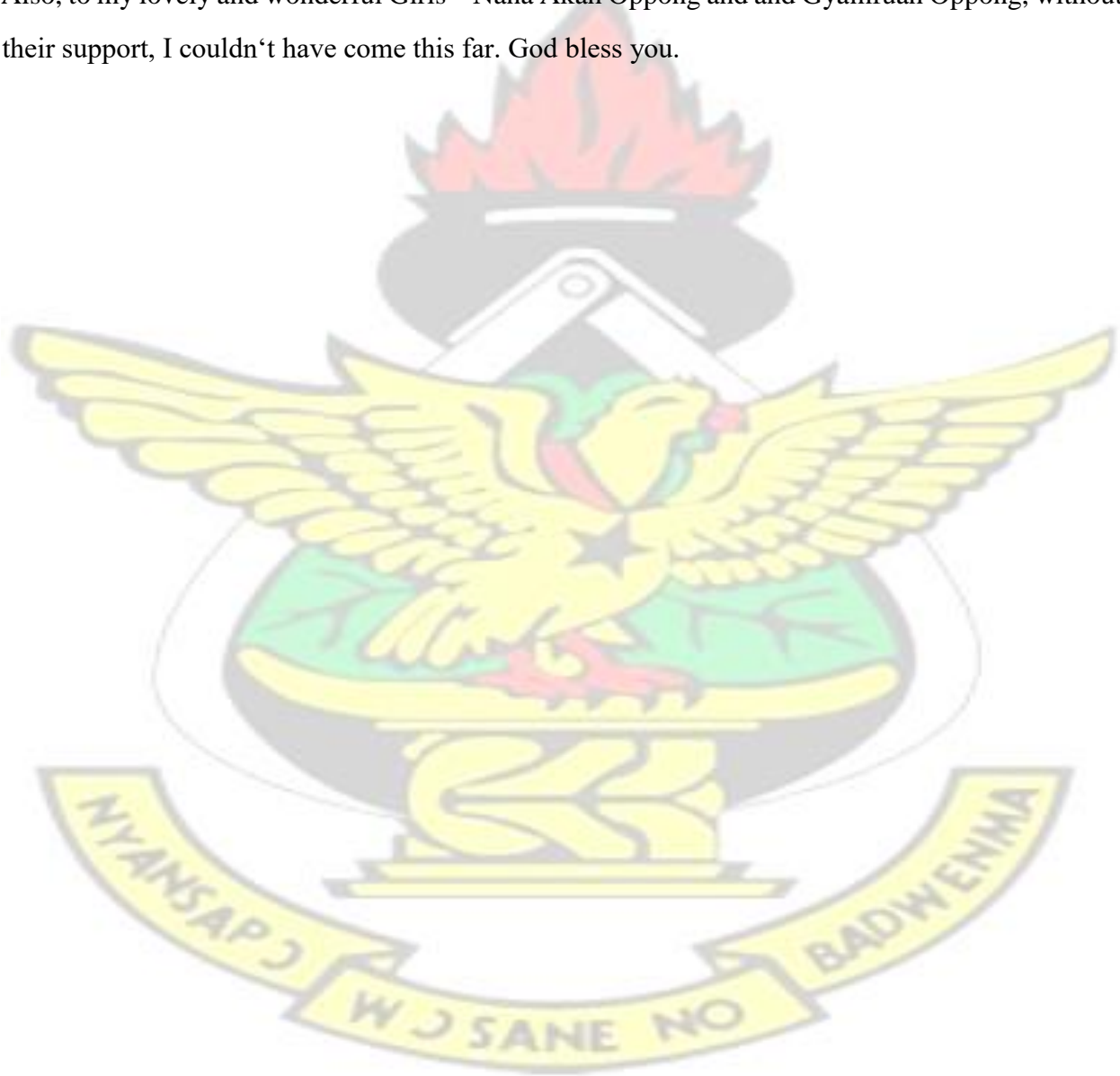


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DEDICATION

I dedicate this project to my Dearest and Loving Wife (Mrs. Millicent Osei - Oppong) for her love, care, support and encouragement to urge me on, to finish hard.

Also, to my lovely and wonderful Girls – Nana Akah Oppong and Gyamfuah Oppong, without their support, I couldn't have come this far. God bless you.



CHAPTER ONE

INTRODUCTION

1.0 BACKGROUND TO THE STUDY

Education is a very important element in nation building and a vital element for the development of every nation. According to Tandberg (2008), higher education increases the prospects of students regarding the opportunity for one's progression and personal development. Also, an educated workforce and people stimulate the economic growth of a nation. The educational sector of the society is plagued with numerous challenges. According to Effah (2003) and Atuahene (2006), financial strictness or stringency among others as posing a serious threat to developing effective higher education system in the world. Effah (2003) noted that —the most serious challenge facing higher education in Ghana is inadequate funding. The World Bank identifies the lack of sustainable financing as limiting enrolment growth and skewing higher education towards low cost and low-quality programs (World Bank/UNESCO, 2000). According to a report by the Monitoring and Evaluation Department of NVTI in July (2018) inadequate budgetary support by the Government Ghana, delay in the release of Government budgetary support, External policies, inadequate vehicles for monitoring and supervision are major factors which influence project delays in NVTI.

With regards to funding of projects in NVTI, there is no support from the Ghana Education Trust Fund (GETFund), because NVTI is not under the ministry of education, but under the ministry of employment and labour relations. Therefore, funding of projects in NVTI is done by budget allocation from the government through the ministry of employment and labour relations and also internally generated funds (IGF).

Delay in construction projects is inevitable and expensive due to possible construction loan involved which costs interest, management staff with time, dependent expenses, and ongoing

appreciation in wages and material prices. Project delays caused by the client such as failure to allocate sufficient funds, slow decision making coupled with delay caused by consultant such as late submission of drawings and specifications, frequent change orders, and inadequate site information generate claims from both the main contractors and subcontractors which most often involve prolonged court proceedings with massive impacts. Delays that occur as a result of blunder on the part of contractors are largely attributed to lack of effective planning, poor managerial skills as well as poor financial management which have led to some contractors' downfall. Ahmed et al (2002) stated that delays of construction projects are indeed a worldwide phenomenon. They are also mostly accompanied by cost and time overruns. Construction project delays further have a devastating effect on all parties (owner, contractor, and consultant). It is therefore correctly deduced that factors influencing delays of construction projects in NVTI is a study which would interest all stakeholders.

1.1 PROBLEM STATEMENT

National Vocational Training Institute (NVTI) was established by an Act of Parliament (Act 345 of 1970) to co-ordinate at the national level all aspects of vocational training including apprenticeship. But the institute has not received the needed attention over the years regarding infrastructural projects and other needed assistance since it began operations some 48 years ago. According to the Executive Director of NVTI, Mrs. Mawusi Nudekor Awity, the last time the institutes under the NVTI were provided with new tools was in the year 1998.

There are quite a number of construction projects in Ghana which have delayed in the course of execution. Project delays in Ghana are not limited only to large – scale projects. In NVTI, some construction projects which were started some years back and expected to be completed in a year's time still remain at various stages of completion with some not seeing the light of day.

Notable among them is the NVTI Head Office Building at Sheashie in Accra which started over 20 years ago, was scheduled to be completed in a year's time still remains incomplete up to date. Three-unit classroom block for Pilot Training Institute (PTI) at Kokomlemle in Accra was to start some five years ago, not yet started. Staff bungalows at our Lady of Fatima Vocational Technical Institute at Sampa took about two years to complete instead of one year, girls hostel project for New Century Career Training Institute (N.C.C.T.I.) at Dansoman in Accra which started in 2014 was not completed within the stipulated time frame due to delays (Monitoring and Evaluation Department Report 2018).

Delays in a construction of educational project is counted as a common problem and became a cause for projects completion with huge cost overrun, extended completion time, inferior quality deliverables and also bring contract to a close. According to Olawale and Sun (2010), for a project to be termed successful, it must meet all requirements agreed upon in the contract. Nevertheless, contemporary project management has a challenge with regards to; time and cost overrun, non-fulfilment of its functions and lack of quality (Williams, 2003). Projects not being completed within schedule will have adverse effects concerning the successful completion of the project and its appearances and comprise of the following: change in project scope, specifications being altered, rejection or refusal of project; and increased in claims when prices go up.

Ahmed et al. (2000) in a study found out that when construction projects exceed their completion time, it comes with a lot of negative impacts including broken relationships, mistrust, litigation, financial difficulties as well as project being abandoned.

Projects delays in NVTI, adversely affect teaching and learning in the training institutions and also day to day management of the institute as a whole. It is upon the basis of the above problems that the study wants to establish the factors influencing construction projects delays in National Vocational Training Institute (NVTI).

1.2 AIM OF THE STUDY

The aim of the study is to explore the factors which influence construction projects delays in NVTI.

1.3 OBJECTIVES OF THE STUDY

- To identify the factors which influence construction projects delays in NVTI.
- To come out with solutions which will mitigate the factors which influence construction projects delays in NVTI.

1.4 RESEARCH QUESTIONS

- What are the factors that influence delays of construction projects in NVTI?
- What are the effective measures in reducing delays?

1.5 SIGNIFICANCE OF THE STUDY

The findings of this study will help address the factors which influence projects delay in NVTI. The study will also identify any loop holes and contribute to better project management and policy implementation. This will serve as basis for further research in this field and also provide the needed information for future comparison with other empirical work. It will also inform policy makers on measures to ensure effective implementation on projects.

1.6 SCOPE OF THE STUDY

NVTI has thirty-four training institutions across the ten regions of Ghana, but the study covered the five NVTI training institutions in Accra namely: Pilot Training Institute at Kokomemle,

New Century Career Training Institute (NCCTI) at Dansoman, Kanda Career Training Institute (KCTI) at Kanda, Tema Industrial Mission Institute (TIM) at Tema Community 9, Construction Machinery Training Institute (CMTI) at Burma Camp and the Head Office. The choice of the location was due to the fact that Accra being the seat of NVTI Head Office, whatever findings being conducted here fairly represents the remaining training institutions of NVTI in other parts of the country. Also, it was due to the proximity of the researcher, ensuring easy distribution and retrieval of questionnaires.

1.7 RESEARCH METHODOLOGY

In order to achieve the aim of the study, information was gathered from both primary and secondary data sources. Secondary data were sourced from books, journals, pertinent articles, published and unpublished dissertations of students. Primary data involved the use of self-administered questionnaires to construction consultants such as project managers, contractors, architects, quantity surveyors, engineers, who have executed NVTI construction projects and to staff of NVTI institutions in Accra. Quantitative method of research was employed. The questionnaire incorporated the use of close ended questions and a Likert scale to rate and answer questions posed to respondents.

The relative importance index was used in analysing the data collected to identify key challenges and opportunities.

1.8 ORGANIZATION OF THE STUDY

The chapter one (1) outlined introduction; background of the study, problem statement, Aims and Objectives, scope of research and Organization of study.

Chapter two (2) Chapter two is the literature review and this was based on other researchers' point of view on this topic. Chapter three (3) dealt with the research methodology. Chapter four (4) also dealt with data analysis and interpretation. Chapter five (5) was on the conclusion and Recommendation as well as References. And Appendices contain materials which are related to the study but would make the body of the study voluminous. The questionnaires are part of the materials.



CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Upon the basis of the research objectives in chapter one, this chapter covers other related works done by different scholars with regards to identifying the factors influencing construction projects delays. This chapter also highlights the research work already done in this field and explains the key factors into detail.

2.2 OVERVIEW OF CONSTRUCTION PROJECTS

A lot of changes have taken place regarding the way and manner construction projects are being executed as well as how it has been practiced as years are gone by. Much consideration has been given to the customer, the market in addition to robust competition in service placement when it comes to performance enhancement and adding value with regards to projects delivery. Winch, (2002) as cited by Banaman (2015) in a thesis study stated that, a major technique in which modern civilizations come out with new products, is through building of projects which produces physical properties which will greatly help in attainment of societal and financial gains. Construction of this kind projects comprising of educational facilities, health facilities, and roads is often done by the state so as to achieve set targets in the direction of enhancements of settings in several sectors of nations (Ampadu-Asiamah, 2013).

According to Armah, (1999), as cited by Banaman (2015) stated that construction is regarded as unique in Ghana and also in every nation worldwide, due to the fact that it rekindles the growth of other areas of the economy and significantly add up to the total development of economic gains. The study again stated Ampadu-Asiamah, (2013), is of the view that construction has played major role government's administration from the time Ghana became an independent Nation in the year, 1957. The government's growth strategy, vision 2020, put measures in place to turn the Nation into a middle-income country in the year 2020. In a quest to achieve this

objective, Government saw the need to ensure that basic necessities of life, were provided in all public settings. Construction projects which are financed with state resources are usually plagued with issues of delays, over spending, inadequate funds during projects execution and funds being mismanaged at different levels of the project's execution. These setbacks, according to Armah (1999), can be credited to the difficult financial situation in the country, the kind of the construction industry in the country, then how construction projects are being handled. Nevertheless, it is imperative to determine the causes of these difficulties so as to lessen the likelihood of such difficulties coming back.

According to Elbeltagi, (2009), a project well defined is characterized by certain qualities such as; clearly stated objectives, definite activities that will be performed, a precise beginning and completion, and funds that will be used. Dikmen et al. (2004), in a study came out with these findings as the objectives of construction projects:

- To complete the structure in the estimated time frame;
- To complete the project without over spending
- To bring the project to a successful closure which should be in line with practical and managerial stipulations.

The idea behind each construction project is that, in the end a product will emerge. The difference between the construction industry and other industries is that, its operations are carried out on site, it involves complex set of activities from diverse professions. A lot of resources are used by the project (Elbeltagi, 2009). A study by Elbeltagi (2009), stated that projects starts with a particular need identified by the owner and accomplished by a team of construction experts. When experts take the initiative to strategize, come up with the cost, and put measures in place for the project start smoothly, the team studies the project into detail as compared to the period when the idea was first conceived.

Owner's budget with regards to projects being constructed covers the totality of all the finances he is ready to apply on the project, (Tech, 2010). Initial cost which is usually recognized before the start of the construction procedure depends on the sum of money the owner has allocated for the execution of the project, and the approximate estimate approved and prepared by the design team. It has become a vital issue that stimulates the owner's preference to engage in the project for the fact that, it is the basis of the financial obligation preceding the concluding designs and certification. This gives the design team prior knowledge of the initial cost which impacts the design results with respect to construction, the necessary conditions and finishes (Ibid). Regrettably, the initial estimate is usually done at the time when there is not much data on cost also, its precision depends mostly on previous similar activities which are trustworthy. Tech (2010) in a study came out with a finding that initial estimation of a project cost is very important and as such cannot be overstated because erroneous initial estimates would mean a project is going to commence on a bad note which will form a basis of inferior works because the contractor will cut corners and is likely to abandon the project. This will cause potential owners to lose money without getting any returns. Mostly every client who needs a building project is concerned about his capability to fund the project in order to make it a reality. Initially, when the cost estimate of a project seems so high, it may put some fear in the client and subsequently he will not have the desire to continue with the entire project. The precision of the primary estimate is vital in a sense that the owner would not want to spend any excess amount outside this budget, because it may become the basis of preparation and funding.

Dikmen et al. (2004) explain planning as anticipating what will happen in the future and putting adequate measures in place to achieve stated aims and objectives.

Project preparation has been also well-defined as the process of selecting a scheme and method of work to be deployed to a project out of the several approaches and the alternative means by

which it can be completed, (Callahan et al, 1992). The authors likewise realized that this system provides a whole indication accepted for time calculation in addition to plan; again, a yardstick for project regulation. Mubarak (2005) supported that project preparation goes with several roles including; cost estimates, scheduling, controlling of project and managing safety.

2.3 DEFINITION FOR CAUSES OF DELAYS

According to Sanders and Eagles (2001) as cited by Fugar and Agyakwa. Baah (2010), defined delay as an event that causes extended time to complete all or part of a project.

Project Delay is an unintentional and unexpected postponement of a project due to some happening or incidence that obstructs the project's beginning or continuation. It is the amount of time that pushes forward the project completion time and interrupts the delivery of project aims and objectives. (<http://www.taskmanagementguide.com/contact/index.php>).

Projects are considered delayed when their stipulated completion durations have not been achieved. Delays frequently occur in developing countries (Sunjka and Unwana 2013).

2.4 FACTORS AFFECTING THE COMPLETION OF CONSTRUCTION PROJECTS

Delay is seen to be a major issue which hinders the successful completion of a construction projects, of which buildings are part. A study by (Sweis, 2013) indicated that delay in construction is seen to be one of the numerous problems that happens every now and then, and comes along with its adversative bearing on project success attainment when it comes project duration, expenses, quality, and safety. Nega (2008) on the other hand specified that, some construction projects experience delay on during the completion. Aibinu and Odeyinka, (2006) in a study found out that, delays associated with building projects are as a result of the doings of the project team

members. Delay of construction projects according to (Nega 2008) needs a thorough examination in order to enhance the outputs of the construction organisation.

A study by Frimpong and Oluwoye, (2003) indicated that construction projects all over the world are being confronted with delays regarding the stipulated time in which projects should be completed due to divergent reasons. All construction works are plagued with delays of some sort, but their impact varies due to the fact that, all projects have their peculiar difficulties (Ahmed et al, 2002). Sweis et al. (2008) indicated, building projects are susceptible to delays irrespective of the size of the project, be it sophisticated or not. The authors notwithstanding, advised that the time has come for these challenges to be completely dealt with, in a sense that demand for buildings is on the increase due to population growth of nations.

Sanders and Eagles (2001) defined delay as an occurrence that happens to lengthen the time to complete all or portion of a project. Aibinu and Jagboro (2002), in study realized that delay is a condition where the contractor and the owner of a project together or as individuals, add to the non - completion of the project in the entire contract duration. From the owner's point of view, when a project is not able to be completed he loses income. But with the builder, when a project delays and for that matter is not completed, it means expenditure increase because of extensive working time, high labour cost, and increase in construction costs. Tumi et al, (2009) in their findings with regards to the most important factors which delay building projects completion in Nigeria, came out with the following thus; scarcity of material, inadequate initial preparation, funding, contracts being poorly managed, and variations in conditions of the location of the project. Haseeb et al., (2011) in a study conducted indicated that the topmost contributing factors of project delays comprised of contractors not being pay on time for completed works, insufficient fund allocation by the owner, inflation (time value of money) and difficulties in paying contractors every month.

Assaf and Al-Hejji (2006) in a related study outlined, the main causes for non-completion of construction projects in schedule from the consultant's perspective as; builders not sufficiently prepared, client's not paying early for works executed, contractor's not managing site well and unavailability of resources. Haseeb et al. (2011) came out with the following as key cause of project delays as far as consultants are concerned; modifications to designs, consultants not performing very well, willingness to endorse drawings, site examination being poorly done, contracts not being managed effectively of and slow responsiveness and valuation.

Sweis et al (2008) stated these as contributory factors to project delays; insufficient contractor's managerial staffs, insufficient practical specialists, lack collaboration regarding the owner and the performing organisation, contractor delaying in mobilizing the necessary funds to start work, lack of construction firms' health and safety plans, lack of practical competences of staff, wrongly interpreting design documents, project management problems among others. Sambasivan and Soon (2007) acknowledged inappropriate preparation by contractor, poor site management abilities on the contractor's par, contractor's inability to understand issues, and funding difficulties on the part of contractors as the foremost problems of projects not completing on time.

According to (Yang and Wei 2010) in connection with a study conducted, following were noted as factors which brings about delays in construction projects; difficulties in relation to funds, subcontractors program of works not going according plan at the time of project execution, work that has to be done again due errors, ineffective communication between parties to the contract, unproductive scheduling and preparation, lack of experience on subcontractors' part and insufficient trained personnel. Also, Zaneldin (2006), showed that problems associated subcontracts, disputes among contractors and other participants in a contract, contractor's financial problems etc affect completion duration of projects.

Fugar and Agyakwa-Baah (2010) did a study on the causes of delay of building construction projects in Ghana and found top ten most important factors such as: delay in honour certificates, not doing due diligence in terms estimating the cost of project, insufficient estimation with regards to complex nature of project, trouble in getting loan facility from the bank, weak supervision, contractors not doing thorough estimation of the period in which projects should be completed. scarcity of materials, experts being poorly managed, instability of prices/increasing cost of supplies as well as poor site administration.

In a study by Mezher et al. (1998) in relation most important factors which cause delays in Lebanon's construction industry, taking into consideration the perspective of clients, Contractors and consultancy firms, the clients were much concerned with monetary issues; whereas contractors cherished contractual relationships as some dear to them, however consultants were much concerned about project management issues. Abdo (2006) made a survey on delays in public building construction projects in Ethiopia. The result of the research indicated that 94% of the 52 surveyed public building projects undertaken by local Contractors between the years 1995 to 2005 have encountered delays. The most frequent causes of delay which in descending order of criticality were found to be: necessary variations, delayed payments, scarcity of materials, late material supply, less emphasis to planning, sub-surface condition, changes in design, material and labor price escalation, unrealistic time schedule, and failure to update schedules on time.

Mansfield et al (1994) studied the causes of delay and cost overrun in construction projects in Nigeria. The results showed that the most important factors are financing and payments, poor contract management, changes in site conditions, shortage of material, and improper planning.

According to a report by the Monitoring and Evaluation Department of NVTI in July (2018), inadequate budgetary support by the Government Ghana, delay in the release of Government

budgetary support, External policies, inadequate vehicles for monitoring and supervision are major factors which influence project delays in NVTI.

2.4.1 Project Time and Cost Overrun

Delay is one of the major risk factors for both contractors and owners and causes difficulties within the project and then leads to cost and time overruns. It is not strange to come across building projects which are unable to reach their operation of constructing amenities within the stated cost and time (Nega, 2008). Time overrun is a precise repeated incidence and is almost associated with projects in all the government institutions. Time overrun is the extra time which elapses when a project is not completed within the scheduled dates agreed by the contracting parties. (Kaming et al 1997). It is usually a challenge for timely completion of projects and within stipulated budget because several factors including; economic and political situations legal regulations, groups that have interest in the construction activities comprising; client, people who will use the product of the construction, consultants, contractors, sponsors, complex nature of construction, resources, and climatic conditions (Nega, 2008). In a similar study by Alinaitwe et al. (2013), it was realized that changes in the plan, project scope and project environments can impact the cost and the stipulated time in which projects will be completed. Chan et al. (2004) emphasized that cost overrun is seen as very crucial issue during performance stage of the construction project. According to Bubshait and Al-Juwait (2002) Bad weather the project setting, low productivity, supplier exploitation, issues with funding, inadequate production of local supplies among others, were been recognized to be causative factors of cost overrun. Van Der Westhuzien, (2005), also argued once there exist cost overruns in a project, it could cause the project to fail. But not all authors agree that the failure is viewed from one single factor but some believe there are a substantial number of factors influencing project delays. El-Razek et al., (2008) in like manner established the main factors

promoting cost and time overruns as inadequate tools and equipment; uneven sources of resources on the local market as in addition to accidents on the project site. When the closing cost of the projects goes beyond the initial cost estimate, it is resolved that the project has outlasted its budget then there is cost overrun (Azhar et al., 2008).

However, Morris & Hough (1987) suggested that there are three different measures to determine whether, the projects is successful or otherwise. Project should accomplish the purpose for which it was constructed, managerial aspects of the project and working of the contractors through the process. Okpala and Aniekwu (1988), found that architects, consultants and clients agreed that shortage of materials, finance and payment of completed works and poor contract management were the most important causes of cost overruns. Mansfield et al. (1994) also concluded that material price fluctuations, inaccurate estimates, project delays and additional work contributed most to cost.

A study by Kaliba, et al. (2009) resolved that increase in construction projects cost occurs due to factors like excessive weather, change in scope works, environmental safety, cost of improvement, labour strikes, procedural problems, inflation (price-rises).

2.4.2 Inflation

Adamson (2006) defined inflation as the occurrence of rise in general price level in a country. Thus, there loss in value country's currency. Inflation can escalate the costs of construction. Should inflation go beyond the anticipated level during the time of construction, then the current project budget will be overdone (Nega, 2008).

Since construction budgeting is done within a certain time and the prices used are suitable only for that particular time, if the project is not completed early enough inflation could cause the project

to overspend its budget. The impact of inflation will mean that the builder will not make any gains whereas the owner will spend more money on the project than he initially budgeted.

2.4.3 Access to the Site and Site Ground Conditions

A study by Griffith and Watson (2004) came out with findings that, conditions on construction project site contribute to project delays since it restricts the easy movement of supplies to the site, this also affects construction plant and labour particularly once the ground situations are not good. Poor ground conditions also slow down the rate at which projects will be completed. High water table of the ground on which the building will be constructed, existing buildings on the site, the state of the soil beneath, all contribute significantly to the progress of work on the project site, therefore proper soil investigation can should be done before construction of the project takes place as this will ensure successful completion of the project. Nega (2008) I a study indicates that unpredicted sub surface conditions can, at times, dictate needed restructure of projects at a very high cost. Disparities in surface ground conditions can lead to problems for moving plant and equipment as well as supplies round the site, also during excavations casting of concrete foundations. Poor ground conditions can also increase project costs and extend completion time of a building. Frimpong et al. (2003) in a study also discovered that problems in the ground and any unexpected environmental circumstances are key factors which influence construction projects to be completed on time.

At a point where it is difficult to have easy access to the work site, due to nature of damaged surfacing of pavements and shallowness of the road undesirably affect project finishing.

Therefore, it is important that that these difficult conditions are taken into consideration during the preliminary evaluation stage of the project.

2.4.4 The Problem of Poor Project Performance

A lot of construction projects in the country have encountered difficulties during execution. Issues such as unequal allocation of funds by the client, insufficient contract data and performance assessment, have all added up the delay of construction projects in NVTI. A report by the Monitoring and Evaluation Department in NVTI in (July, 2018), concerning tracking the performance of projects indicated a key finding that stood out as a major setback on the success of the project's completion is lack of adequate budgetary support and the late release of funds for the projects by the government of Ghana. This finding indicates that construction projects in NVTI have been plagued with a lot of difficulties with regards to performance.

Best and Valence (1999) also asserts that the issues with construction projects costing more than the initial budget and exceeding the stipulated time frame is due to improper planning prior to the design stage of the construction procurement process.

2.4.5 Physical Environmental Conditions

Physical green settings are domains or external influences where neither the client or contractors has control over (Faridi and ElSayegh, 2006). Mbachu and Nkado (2006) supported that environmental-cultural concerns as unexpected contingences create such elements and thereby limiting efficiently most public construction projects delivery. These include; political and economic instability, the influence of natural disasters such as flood, fire etc.

2.5 CLASSIFICATION OF FACTORS INFLUENCING CONSTRUCTION PROJECTS DELAYS

□ Excusable or Non – Excusable Delays

Delays occur in most types of projects ranging from simple building projects to complex projects.

According to Ochoa (2013), Construction delays are either excusable or non-excusable. Ahmed et al. (2003) takes into consideration that for a delay to be seen as excusable or nonexcusable, it all depends on the conditions of the contract. The authors stated that, standard construction contracts spell out types of delays which will allow the contractor an extra time to finish his work.

For instance, with regards to some contracts, unforeseen weather conditions are not regarded as excusable and therefore such contracts do not make provision for any extra time. Trauner et al., (2009) stated that excusable delay in effect is as a result of unpredictable occurrence beyond the contractor's control. The author identified the following as excusable delays and these include; force majeure, client related variations, labour strikes, errors in specifications, variation in site conditions, abnormal weather conditions etc.

It is important to classify the main causes of non-excusable delays and highlight the factors that contribute to those causes. Fugar and Agyakwa-Baah (2010), explained non - nexcusable delays as delays which result from a contractor's own fault or his subcontractors or material suppliers. such delays by the contractor are non-excusable he has more control and so is expected to take the necessary steps to avert such. Ruff et al (1996) asserts that flexible project management approaches, such as turnkey and partnering arrangements, and flexible contracting arrangements, such as cost-plus fee, were found to be better suited to allow such changes. Turnkey and design/build project structures had the best performance total of the management structures stated. Strategies to promote partnering and team building contributed significantly to project success as defined by budget and schedule (Ruff et al 1996). Figure 1 shows the types of delays.

□ Compensable Delays versus Non-compensable Delays

The delays by the client are the compensable delays on which the client can take essential timely action as he has more control over it.

Ahmed et al. (2003) and Mubarak (2005) established that an excusable delay can be classified as

—excusable compensable and —excusable non-compensable. Excusable but non-compensable delays -these are delays initiated by incidences in which none of the parties is responsible for its happening.

- Compensable delays - these delays result from acts or omissions on the part of the owner or the owner's representative. Compensable delays are those that are caused by either client or the design engineer/ architect (consultant) (Mubarak, 2005). In such situation the contractor is has the right to time extension or apply for claims. Trauner (2009) said factors which are specified in the contract resulting in delays such as difference in site conditions, variations in the work, access to the site are some examples of compensable delays. The author further explained that non-compensable delays are the ones though are justifiable, but do not entitle the contractor to any compensation. Mubarak (2005), stated that that excusable non-compensable delays are normally beyond the control of both parties to the contract. These include; extreme weather conditions, force majeure (Act of God), disputes, labour strikes among others. She adds that usually the contractor is entitled to a time extension, but not additional compensation. Trauner et al. (2009) in a study stressed that for a delay to be either compensable or noncompensable largely depends on the conditions of the contract.

□ Concurrent Delays

Concurrent delay is a combination of two or more independent causes of delays happening in the same time frame (Mubarak, 2005). Concurrent delay often includes excusable and nonexcusable delays. Trauner et al. (2009) defined concurrent delays as —separate delays to the critical path that occur at the same time. Levy (2006) refers to this type of delays as overlapping delays. He stated that concurrent delays may be produced by the contractor or the client, therefore when it

happens, both the owner and the contractor are responsible and neither of them is entitled to damages.

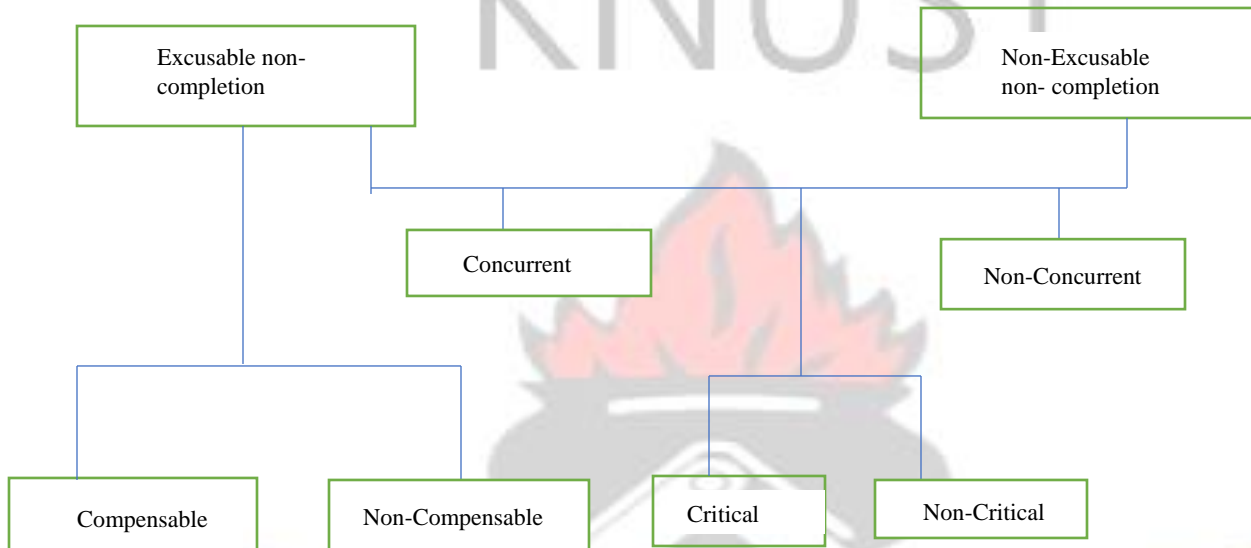
□ Critical Delays and Non-Critical Delays

According to Trauner et al., (2009), the main aim of the study of delays in a project is to see whether the delay affects the progress of the whole project or the completion date of the project. The delay to the project occurs when an activity on the critical path is delayed and they have an impact on the successor activities and the overall project. The authors specified that delays with an outcome resulting in extension of project completion period is considered as critical delays and non-critical delays are delays that do not affect the project completion date. The authors also state that the issue of critical delays come about as a result of the Critical Path Method forecast (CPM). Every single project has a critical path and if the critical activities on the path are delayed then the project completion date will have to be extended. The authors said the criteria for determining the project completion date are as follows: the project itself, the contractor's duration with respect to the critical path activities, the activities sequence and phasing as well as the physical restraints of the project. The allocation of responsibility between the client and the contractor for any delays to the project is an important factor in delay claims and its analysis.

When the activities on the critical path are delayed, the delay is reflected on the entire project. Hence, it is required to review the critical activities and analyze whether the re sequencing of works can be done for effective project control —sequencing construction activities is a critical task for project planners for effective project control. Sequencing activities require planners to determine the impact or "role" an activity has on successor activities. They also need to determine the status of activities, i.e., which activities may or may not be delayed (Koo et al 2007). The project

program which is made utilizing the critical path method indicates the critical and non-critical activities

Figure 1: Sequential relationship between the three classifications of factors influencing construction project delays



Source: Vidalis et al, 2002.

2.6 NATIONAL VOCATIONAL TRAINING INTITUTE

National Vocational Training Institute (N.V.T.I.) was established by an Act of Parliament (Act 345 of 1970) to co-ordinate at the national level all aspects of vocational training including apprenticeship. (www.nvtighana.org)

But the institute has not received the needed attention over the years regarding infrastructural projects and other needed assistance since it began operations some 48 years ago. According to the Executive Director of NVTI, Mrs. Mawusi Nudekor Awity, the last time the institutes under the NVTI were provided with new tools was in the year 1998.

Apart from the lack of tools, Mrs Awity mentioned the lack of adequate infrastructure and vehicles as some of the challenges hampering NVTI's operations (www.graphic.com.gh).

2.7 CONCEPTUAL FRAMEWORK

The various variables affecting the factors were identified in the previous section. Variables within each group seem be interconnected. A variable in one group can influence a variable in the other group, and vice versa. To study how these factors, influence project delays separately and collectively, it is assumed that project completion is a function of Business -related factors, project procedures, project management actions and human-related factors and they are interrelated.

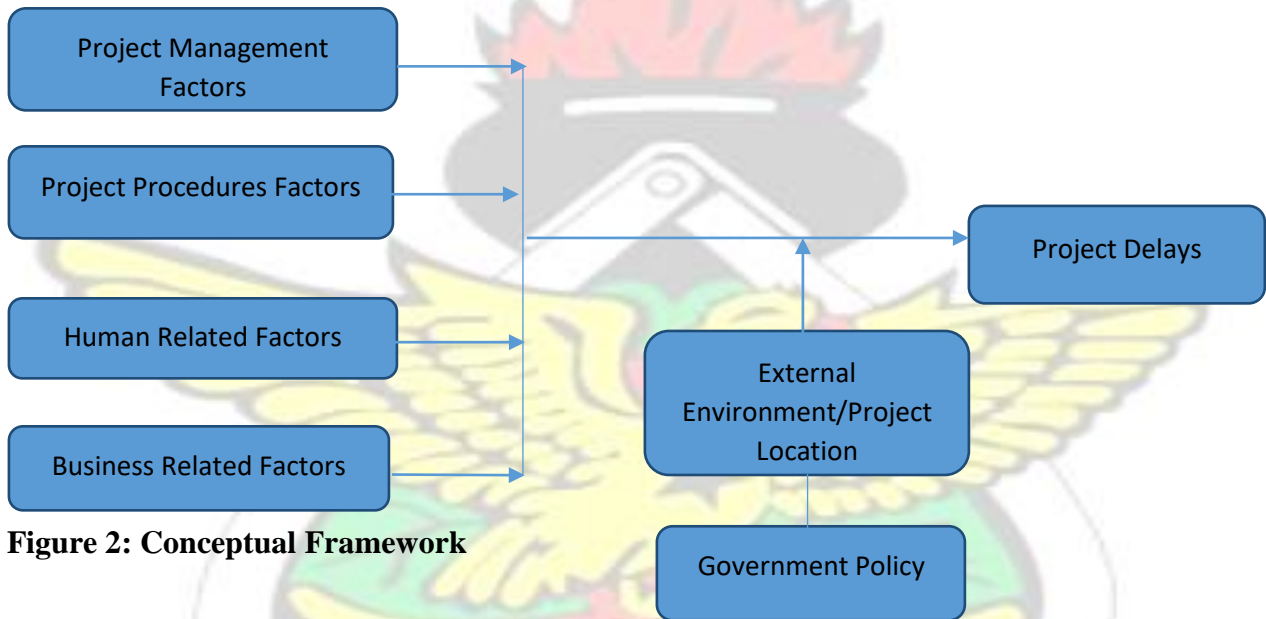


Figure 2: Conceptual Framework

2.7.1 Business Related Factors

These factors comprise adequate funding throughout the project, comprehensive contract documentation, availability of resources, continuing participation of all stakeholders in the project, and competent project manager. Funding, resources, efforts and leadership should always be available throughout the project's life. Adequate funding until project completion and availability of resources are obvious imperatives to carry out projects. Availability of funds/resources has also been ranked highest in recent studies (Belassi and Tukel, 1996; White and Fortune, 2002).

2.7.2 Project Management Factors

Sidwell (1984) found that managerial control (categorized as project management actions) is a very important element in achieving project success, because it significantly relates to all actions of success. Rowlinson (1998) also found that high level of managerial capability in the project team add to reduced time overruns, which in turn leads to increased satisfaction. Phua and Rowlinson (2004) asserted that the use of project management techniques is very important in the construction industry, because the harmonization and use of the many types of labor, skills, materials, and equipment's (resources) which are used in construction require daily application of proper project management techniques / practices.

2.7.3 Human Related Factors

Chua et al. (1999) defined project participants as the important performers, including project manager, client, contractor, consultants, subcontractor, supplier, and manufacturers. Walker (1995) in a study, established the influence of the client and his representative as a significant factor on project time performance. The client-related factors concerned with client characteristics, client type and experience, knowledge of construction project organization, project financing, client being confident in the construction team, owner's construction sophistication, well-defined scope, client's risk aversion, client project management (Dissanayaka and Kumaraswamy 1999). The framework is derived from the literature review, i.e. the independent variables consisting of funding, management and leadership, human related factors influence the construction projects in terms of time and rate of completion (dependent variables). However, the relationship between these variables depends on the intervening variables identified as government policies, construction laws and environmental factors. For a project to be complete, business related factors

such as funds, resources, leadership efforts and leadership should always be available throughout the project's life. In addition, project procedures comprising of procurement, method of tendering, selection of the most appropriate organization for the design and construction of the project requires early and particular attention. Also important are various project management actions which include coordination of subcontractors, scheduling, cost control, labour relations, procurements, and other functions related to the project should be streamlined to ensure that the project stick to the plan. Finally, human-related factors which touch on the project participants including project manager, client, contractor, consultants, subcontractor, supplier, and manufacturers are also important in project success.

The logo of Kenyatta University of Science and Technology (KNUST) is centered in the background. It features a yellow eagle with its wings spread, perched on a green shield. Above the eagle is a white and black mechanical gear or tool. The shield is set against a white circular background. Below the shield is a yellow banner with the Swahili motto 'WAKHABU WA SAKI WA RADHENA'.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 INTRODUCTION

The research methodology adopted is one of the fundamentals of the research activity as it details out the procedures, methods and philosophical keystones employed to assemble the requisite knowledge for the research question in realizing the aim as well as the objectives of this study. Chapter three presents the presentation of the study population, sample size and how the size was selected, all are highlighted in this chapter. Moreover, this chapter outlines the data collection

method used and also the data analysis strategies that were adopted for the study. This chapter concisely defines the rationale behind research method used for this study.

3.1 RESEARCH STRATEGY

It is necessary to adopt the most appropriate research strategy to collect data and subsequently analyse them (Bryman, 2004). A research strategy outlines a guide leading from a precise method, to a suitable way to collect and analyze data (Denzin and Lincoln 2005). Research design refers to a framework or a plan that guides a study (Adams and Schvaneveldt, 1985; Ogoe, 1993). As revealed by Naoum (1998), research strategy may be defined as the examination of research goals. Subsequently, Baiden (2006) affirmed that, the three main research strategies are qualitative, quantitative, and triangulation. However, the decision to select any of the strategies essentially is reliant on the aim of the research, the nature, and the availability of information for the study (Naoum, 1998; Baiden, 2006). The research strategy therefore determines the method to be used for data collection, which is also reliant on the necessary information required from the selected sample. Research strategy can be undertaken through two prime ways; qualitative and quantitative (Creswell, 1998; Saunders, et al., 2000).

Hence, this research employs a quantitative strategy.

3.1.1 QUANTITATIVE APPROACH

The main aim of adapting to quantitative approach for this study was to get information that can be generalized to represent the interconnections between the study variables. The study adopted the use of investigation design with a well-structured questionnaire administered by the researcher.

To gather data for the study, self-administered questionnaires were distributed to research participants.

Table 3.1 Quantitative approach

<i>QUANTITATIVE RESEARCH</i>	
<i>Outcomes</i>	Conclusive findings used to endorse a final course of action.
<i>Orientation to the role of theory to research.</i>	This is related to verification of theory and hypothesis testing.
<i>Objective</i>	Gather accurate data and examine the correlation between relationships and facts in agreement with theory.
<i>Data characteristics</i>	Hard data, large sample size, analyzed using statistical methods.
<i>Common data collection</i>	Questionnaires and prevailing database

Source: Bryman (2004) and Baiden (2006)

3.2 UNIT OF ANALYSIS AND DATA SOURCES.

The collection of data is very essential in research Bernard et al. (1986). This is due to the fact that data significantly facilitates understanding to a theoretic context (Bernard, 2002). This turned out to be imperative that in the quest to select the method of collecting data and also from whom the data would be gathered, considerable care should be taken for it to be done in order to get a sound judgment since not any amount of analysis can cater for data that was collected improperly (Tongoco, 2007). According to Naoum (1998) there are two methods of data gathering namely, primary and secondary data collection. Patton (2002) noted that using more than one data collection instrument strengthens and gives credibility to the study

For this study, the data used are mainly from two main sources; primary and secondary. For the sake of recognizing research gaps and appropriately placing the work in its suitable background, literature review was undertaken. The secondary sources involve existing literature from technical papers, academic journal, proceedings from conference etc. Primary data was obtained from Staff of NVTI representing the client, Contractors, Project managers, Quantity surveyors, Architects and Building Engineers in the form of field survey (questionnaires). These groups of individuals were identified as the unit of analysis.

3.3 POPULATION.

Cooper, et al. (2001) described population to be the composition of all individuals of whom measurement is taken. In order for a research to be conducted, a population must be defined from the unit of analysis. Rea and Parker (1997) state that, population is the all-inclusive list of conceivable participants encompassing the unit of analysis. The study was conducted to identify the factors which influence construction projects delay in the National Vocational training Institute (NVTI). The research covered a population of seventy-two (72) key personnel from NVTI representing the client, and construction professionals including Consultants and Contractors who have undertaken projects NVTI in Accra. The population comprise of forty (40) staff of NVTI who were strategically chosen based on their technical know-how in construction, twenty (20) Consultants / Professionals and twelve (12) Contractors who have undertaken construction projects in NVTI. The main reason for the usage of this class of people is that their doings directly or indirectly have a bearing on NVTI projects in definite areas.

3.3.1 SAMPLE FRAME

This comprised of six (6) NVTI institutions in Accra, having a total staff strength of two hundred and eleven (211) of which forty (40) staff were strategically selected who had a technical knowhow in construction, twenty – seven Consultants / Professionals out of which twenty (20) were selected and twelve (12) Contractors who have undertaken construction projects in NVTI.

3.3.2 SAMPLING SIZE

Sampling according to Strydom, et al. (2007) is simply the act of taking a part of the entire population to represent that exact population. Sampling is defined as the process of picking a representative of a whole. Because of the relatively bigger size of a target population in many studies impractical and improbable to carry out a survey of the entire target group due to financial and time constraints. Naoum (2008) stated that when considering a larger population, the percentage of the sample size needs to be smaller and vice versa, that is, if the entire population is smaller, the sample size should encompass a relatively larger proportion of the population. Polit and Hungler (1999) stated that, in order to attain an accurate conclusion and a more concrete prediction, the researcher should consider using a larger sample than a relatively smaller sample.

Yamane (1967) provides a simplified formula to calculate sample sizes. This formula was used to calculate the sample sizes in Tables 3.2 and is shown below. A 95% confidence level,

P = 0.5 and e= 5% are assumed.

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

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

Table 3.2. Sample Size for ±5%, ±7% and ±10% Precision Levels

Size of Population	Sample Size (n) for Precision (e) of:		
	±10%	±7%	±5%
450	82	140	212
425	82	138	207
400	81	135	201
375	80	132	194
350	78	129	187
325	77	125	180
300	76	121	172
275	74	117	163
250	72	112	154
225	70	107	144
200	67	101	134
175	64	94	122
150	61	86	110
125	56	78	96
100	51	67	81

Source: Yamane (1967)

$$n = \frac{250}{1 + 250(0.1)^2} = 71.43 \approx 72$$

N = 250, e = 10% (0.1)

For this study, the sample size used is seventy (72). This was based on statistics gained from the six (6) NVTI institutions in Accra, having a total staff strength of two hundred and eleven (211) of which forty (40) staff were strategically selected who have a technical know-how in construction, twenty-seven consultants / Professionals (27) out of which (20) were selected and twelve (12) Contractors who have undertaken construction projects in NVTI.

3.3.3 SAMPLING TECHNIQUE

Several sampling techniques exist for various purposes. For this study the main sampling technique employed was the purposive sampling technique. This sampling technique was used in the study based on the research design, purpose, and practical implication of the study.

Kothari (2004) posited that, the basis for employing purposive sampling technique relies on the condition that the selected items typically represent the whole population considered in the study.

The sample representation of Construction professionals for the study was selected using this strategy and also the staff representation of NVTI representing the client.

3.4 DATA COLLECTION INSTRUMENTS.

Questionnaires as depicted by Polgar and Thomas (2005); Saunders, et. al. (2000); Fellows and Liu (2003) are an economical way of gathering the needed data from a possibly large pool of respondents. Questionnaire is a data gathering instrument that has a set of designed and structured questions, to solicit answers and responses from various respondents (Sekeran, 2003). Formulating these questions took a lot of consideration to guarantee that the responses be measurable.

According to Frazer and Lawley (2000), mail questionnaire, self-administered questionnaire, phone questionnaire and internet questionnaire (use of survey monkeys, emails etc.) represent the four major methods of administering questionnaire. This study therefore employs the use of self-administered questionnaire. In formulating the questions, the format adopted were mostly closed ended choice format. The open ended enables the respondent to formulate or provide answers on their own whereas in the close ended, respondents are restricted to select from provided alternatives. It was therefore easy in recording, coding and analyzing the results quantitatively and easily reporting the results.

3.4.1 QUESTIONNAIRE DESIGN AND FORMAT.

The questionnaire was the primary data collection tool and was designed to draw up the requisite information from the respondents. The questionnaire was designed in line with the research objectives in relation to the comprehensive literature review conducted on the topic and demographic characteristics were also elicited. A Likert scale was employed here and the respondents were asked to rank based on a five-point scale arrangement with various statements. Target respondents for the questionnaire involved NVTI Staff (client) who have knowledge in construction, and consultants / construction professionals such as Project managers, Quantity surveyors, Architects and Site Engineers.

The format of the questionnaire used in this research to meet the required objectives is divided in three main sections: Section A, Section B and Section C. Section A sought to investigate demographics of the study and the biographical data of the respondents. Section B sought to identify the factors which influence construction project delays in NVTI. A Likert scale was employed here and the respondents were asked to rank based on a five-point scale arrangement with various statements. Section C also sought to propose mitigative measures / solutions to the factors influencing construction projects delays in NVTI with a 5-point likert scale thus from **1-Not Important; 2-Less Important; 3-Moderately Important; 4- Important; 5- Most Important** been employed here.

3.5 DATA PROCESSING AND ANALYSIS.

Data analysis refers to the manner by which answers are found by means of interpreting the gathered data (Strydom *et al.*, 2007). Interpreting here simply means finding meaning and to explain. Saunders *et al.*, (2000) defined data analysis as being made up of three major activities; reduction of data, presentation of data and drawing of conclusion. These three major steps were

captured in the analysis of the data collated for the purpose of this work. The main aim of the analysis stands to reducing data to a clear and understandable form and also in a form that can make the data interpretable so that research problem relations can be deliberated upon, verified and also allow the drawing of conclusions. The data gathered were structured to achieve the outlined research objectives.

In selecting statistical tool, parametric and non-parametric statistical test were deliberated. In picking one over the other, much attention was given to the level of measurements recognized in the study and also the type of variables. Non-parametric statistical testing using descriptive statistics, mean score index, Relative Importance Index (RII) and Kendall Wallis Test of Concordance were the statistical tools adopted. Descriptive statistics entails using percentages, frequency charts amongst others to illustrate the results. The results derived from the analysis necessitated some discussions. Identified patterns and nonconformities were unambiguously discussed. Details for the conclusion of the analysis present as well in line with findings from preceding studies.

3.6 CHAPTER SUMMARY

This chapter principally presented the methodology used to undertake this study, and the process through which the data collection instrument was designed. The chapter discussed the variants of research paradigms that existent literature suggested. Established on the goal of the research the required philosophies were selected. Subsequently, the choice of a research strategy based on the selected research philosopher was made. This chapter also presented the sampling technique and how the sample size for the study was obtained. Questionnaires that had both open and closed ended questions were used as the research tool in gathering primary data for the study. The chapter closes with a brief discourse of the selected data analysis method adopted for the study.

With this expatiated background the following chapter discusses and analysis the results.

KNUST

The logo of KNUST (Kenya National University of Science and Technology) is centered in the background. It features a yellow eagle with its wings spread, perched on a green shield. Above the eagle is a red and orange flame. The shield is supported by two white pillars. Below the shield is a yellow banner with the Swahili motto 'KWA SAMA NI BADI ENIMA'.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 INTRODUCTION

This chapter gives a complete and logical conversation of the results of the study. Analyzed in this section is the primary data gathered from the various respondents, comprised of NVTI Staff (Client), Project managers, Quantity surveyors, Architects and Site Engineers from the field through the administration of questionnaires. The initial aspect of the results deals with section general demographic / organisational data which included academic qualification and work experience and the position in the organization.

The following comprises causes of delay and solution. The analytical tools used for the analysis consists of simple descriptive statistics, mean score index and Relative Importance Index. The

analysis is centered round the objectives of the study, that is, to identify the factors which influence construction projects delays in NVTI and to provide some solutions / mitigative measures.

4.1.1 SURVERY RESPONSES

Sixty-two (62) questionnaires were retrieved out of a total number of (72) questionnaires distributed to NVTI Staff representing the client, Project managers, Quantity surveyors, Architects and Site Engineers who have worked on construction projects in NVTI.

Using the simple random sampling technique, a sum total of seventy-two (72) questionnaires were administered and sixty-two (72) responses were retrieved indicating a high response rate of 86.1%. This is so due to the fact that personal delivery and the constant follow-ups were made to retrieve the questionnaires.

4.2 DESCRIPTIVE ANALYSIS OF DEMOGRAPHIC DATA

This part of the questionnaire includes questions that were posed respondents in order to acquire the basic data and some other related matters from them so as to solicit their views regarding the study in order to offer complete respondent features. This segment is of significant importance because it creates the reliability and produces credibility in the data which has been gathered.

Data contained within the analysis of the demography comprised of respondent's highest level of education, current position in organization, length of stay in the organization.

4.2.1 Level of Academic Qualification

Respondents in the questionnaire were asked of their highest level of academic qualification. HND/Diploma, Bachelor's Degree, Master's Degree and Doctorate Degree (PhD) as can be identified in Table 4.1 were the options given; 48.4% of the total respondents were Bachelor's Degree holders representing thirty (30) respondents. Master's Degree holders had 41.9%

representing twenty-six (26) respondents. 9.7% were Diploma/ HND holders representing six (6) respondents. None of the respondents had PhD background.

Table 4.1: Level of Academic Qualification

Level of Education	Frequency	Percent (%)	Cumulative Percent (%)
HND/Diploma	6	9.7	9.7
Bachelor's Degree	30	48.4	58.1
Master's Degree	26	41.9	41.9
MPhil/Doctorate Degree	nil	0	0
Total	62	100	100

4.2.2 Current Position in Organization

Seen in this section are respondents' assessment based on their positions in their organizations. Table 4.3 represents the position of respondents in their various organizations. A larger percentage thus 54.8% were represented by NVTI Staff, who were 34 in number. Building Contractors were 12.9% representing 8 respondents. Quantity Surveyors were 6 thus 9.6% of the entire population. Project managers were 5 representing 8.1%. Works Engineers represented 5 respondents thus 8.1%. Architects represented 6.5% of the entire respondents totaling 4. **Table 4.2: Position in Organisation**

Current Position	Frequency	Percent (%)	Cumulative Percent (%)
Architect	4	6.5	6.5
Building Contractors	8	12.9	19.4
Project Manager	5	8.1	27.5
Quantity Surveyor	6	9.6	37.1
Works Engineer	5	8.1	45.2
NVTI Staff (Management / Instructional Staff)	34	54.8	100

Total	62	100
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4.2.3 Working Experience in Organisation

Table 4.3 shows that out of the total number thus sixty-two (62) which quantifies all the respondents, 54.8% which is the highest percentage representing thirty-four (34) respondents were within the over 10 years of working experience in their organisations. Followed by 40.4% of the respondents representing twenty-five (25) in number were found to be having working experience between 5-10 years in their organisations as the second highest. Whereas 3 respondents representing 4.8% had working experience in their organisations below five (5) years.

Table 4.3: Working Experience in Organisation

Working Experience (years)	Frequency	Percent (%)	Cumulative Percent (%)
Below 5	3	4.8	4.8
5 to 10	25	40.4	45.2
Over 10	34	54.8	100
Total	62	100	

4.3 RESPONDENTS' VIEW ON FACTORS INFLUENCING CONSTRUCTION PROJECTS DELAYS IN NATIONAL VOCATIONAL TRAINING INSTITUTE (NVTI)

In order to identify the factors influencing construction projects delays in NVTI, several studies had been carried out on the topic to come up with the factors influencing construction projects delays. In all, sixteen (16) factors were noted. Respondents were asked to rank the following factors presented in the table below, that influence construction projects delays in NVTI. This was done

on a Likert scale of 1 to 5; where **1 – Strongly disagree; 2- Disagree; 3- Unsure; 4- Agree; 5- Strongly Agree.**

The factors were ranked using the Relative Importance Index (RII) for analysing the data collected from the field. The mean and RII scores of all the sixty-two (62) respondents were calculated for each factor, among the sixteen (16) factors, ten (10) were found to be the main causes of construction projects delays in NVTI, the decision criterion was that any response with a mean of less than or equal to (\leq) 4.000 was rejected but any response greater than or equal to (\geq) 4.100 was accepted. These have been indicated in the Table 4.4 below.

Table 4.4 Factors influencing construction project delays in NVTI institutions in Accra

N o.	DELAY FACTORS TO CONSTRUCTION PROJECTS	Frequency of Ranking					Total	ΣW	Mean	Ranking	Decision
		1	2	3	4	5					
1	Misappropriations of project funds	1	4	5	28	24	62	252	4.065	12 th	rejected
2	Inadequate funding allocation by Government and delay in payment for works completed	0	3	2	14	43	62	283	4.565	2 nd	Accepted
3	Lack of vehicles for monitoring and supervision	1	2	2	41	16	62	255	4.113	10 th	Accepted
4	Shortage in material / labour supply	1	2	4	39	16	62	253	4.081	11 th	rejected
5	Lack of adequate budgetary support / Late release of funds by Ghana Government	2	2	1	10	47	62	284	4.581	1 st	Accepted
6	Inadequate experience of Consultants	1	5	5	22	29	62	259	4.177	9 th	Accepted
7	Poor project management practices on a project site.	0	2	5	30	25	62	264	4.258	8 th	Accepted
8	Conflict on the project site / general labour strikes	5	11	2	11	9	62	194	3.129	16 th	rejected
9	Delay in obtaining permit from the assembly	4	1	2	39	16	62	248	4.000	13 th	rejected
10	Project bidding method (Negotiated bidding, lowest bidder design and build)	2	4	1	48	7	62	240	3.871	14 th	rejected
11	Force Majeure / Bad weather conditions	5	4	6	33	14	62	233	3.758	15 th	rejected

12	Contractor's financial difficulties / Use of obsolete plant and equipment	2	4	2	21	33	62	265	4.274	7th	Accepted
13	Design errors and omissions / Poorly defined scope/ specification of work	0	1	5	24	32	62	273	4.403	6th	Accepted
14	Slow decision making	3	0	0	23	36	62	275	4.435	5th	Accepted
15	Lack of effective communication between parties involved	1	2	3	16	40	62	279	4.500	4th	Accepted
16	Time and Cost overrun	0	1	5	17	39	62	280	4.516	3rd	Accepted

4.3.1 The ten (10) main factors which influence construction project in NVTI are discussed below:

4.3.1.1 Lack of adequate budgetary support / Late release of funds by Ghana Government

Lack of adequate budgetary support / late release of funds by Ghana Government with Mean of 4.581 was ranked first the most importance cause of delay. it can lead to inadequate funding and delay in payment for works completed which was ranked second with Mean of 4.565 which is also an important delay factor. Fugar and Agyakwaah-Baah (2010) in a study, came out with these challenges as the key issues that cause delay in building project in Ghana. Contractors not being paid on time for works he has successfully completed possibly will result in cost overruns therefore sufficient funds should be made available prior to the award of a contract as this will ensure that the cost of project is does not exceed the estimated cost. As indicated by (Arditi et al., 1985), extended delays as a result of inadequate funding in inflationary periods really increase cost overruns tremendously. To control these challenges, contracting parties most particularly the client should address the challenges related to budgetary support / funding before a project starts and also prepare a good payment plan to ensure timely payments for works completed.

4.3.1.2 Time and Cost Overrun

These were ranked third with Mean of 4.516 as most of the respondents agreed strongly to the fact that projects not completed within the scheduled time and budget was a major factor of

construction project delays. Alterations in the plan, project scope and also situations surrounding a project, could negatively affect the funds allocated to a project and the period of completion (Alinaitwe et al. 2013) Also, El-Razek et al., (2008) in like manner established the main influences on cost and time overrun of a project as inadequate plant and equipment, different sources of resources (materials) on the local market, coupled with unfortunate occurrences on the site, such as accidents etc.

4.3.1.2 Lack of effective communication between parties involved

Lack of effective communication between parties involved with Mean of 4.500 was ranked 4th. Fugar and Agyakwaah-Baah (2010) in a study about key causes of project delays found this as one of the main causes of project delays as can be seen in the literature review.

Oosthuizen et al., (1998) stated that establishing strong communication channels was important in order that remedial cost control measures could be implemented by parties in charge. In effect poor communication among stakeholders could lead to delay.

4.3.1.3 Slow decision making

Slow in decision making was ranked 5th with Mean of 4.435. Slow in decision making from either of the parties to the contract, slows down the entire construction process thereby causing project delays.

4.3.1.4 Design errors and omissions / Poorly defined scope/ specification of work

This was ranked 6th with Mean of 4.403, 51.6% of the respondents strongly agreed that design errors in design and omissions / poorly defined scope of work or specification also one of the most important factors which influences construction project delays in NVTI. Therefore, it was

important that the parties in charge of drawings and specification should do due diligence to avoid errors and omissions when preparing the appropriate documents. When the scope of works is not clearly defined it could lead to time and cost overruns (Alinaitwe et al. 2013).

4.3.1.5 Contractor's financial difficulties / Use of obsolete plant and equipment

This was ranked 7th by the respondents with Mean of 4.272, when a contractor is not paid on time for works done or difficulty on the part of the contractor to obtain bank credit can put the contractor in financial crises Fugar and Agyakwaah-Baah 2010). This could also lead to the use of obsolete plant and equipment by the contractor.

4.3.1.6 Poor project management practices on a project site

Poor project management practices on a project site was ranked 8th by respondents with Mean of 4.258, Owolabi et al. (2014), in a study about causes and effect of delay on project construction delivery time, in their findings came out with project management problem as one of the major causes of project delays. Sidwell (1984) found that managerial control (categorized as project management actions) is a key element in achieving project success, being significantly related to all measures of success.

4.3.1.7 Inadequate experience of Consultants

The respondents strongly agreed that inadequate experience of consultants which ranked 9th with Mean of 4.177, was one of the major factors which influenced construction project delays. Consultants liaise between client and the contractor and therefore they play a very important role when it comes to successful project completion. Inadequate experience of consultants could also

lead to delay in instructions from consultants which according to Fugar and Agyakwaah-Baah (2010) leads to project delays.

4.3.1. 7 Lack of vehicles for monitoring and supervision

The response from the respondents indicated that lack of vehicles for monitoring and supervision of works which was ranked 10th with Mean 4.113 of was also an important factor which influences construction projects delays in NVTI. In a report by Monitoring and Evaluation Department of NVTI (2018), this among other factors was seen as a major factor impeding project delays in NVTI.

4.3.1. 8 The rest of the factors are Shortage in material / labour supply with Mean of 4.081 was ranked 11th followed by misappropriations of project funds with Mean of 4.065, the next is delay in obtaining permit from the assembly which was ranked 13th with Mean of 4.000, Project bidding method (Negotiated bidding, lowest bidder design and build) was the next and ranked 14th with Mean of 3.871, Force Majeure / Bad weather conditions was ranked 15th with Mean of 3.758 and lastly Conflict on the project site / general labour strikes with Mean of 3.129. According to Owolabi et al. (2014) in a study indicated that, strike rarely occurs on site only if the workers are not been paid their salaries is the period when strike occurs.

4.4 MITIGATION MEASURES TO FACTORS INFLUENCING CONSTRUCTION PROJECT DELAYS IN NVTI

Respondents were asked to grade the mitigative measures / solutions to causes of delay of construction projects and the manner in which any of them will aid in resolving delay problems. The mitigative measures / solutions to the causes of construction project delays identified were sixteen.

Table 4.5 Mitigative measures / solutions to construction project delays in NVTI institutions in Accra

No.	MITIGATIVE MEASURES / SOLUTIONS TO CONSTRUCTION PROJECTS DELAYS	Frequency of Ranking					Total	ΣW	Mean	Ranking	Decision
		1	2	3	4	5					
1	Proper project bidding / tendering methods should be put in place (competitive bidding, negotiated bidding, best value)	0	1	11	27	23	62	258	4.161	14 th	Rejected
2	Adequate budgetary support and Timely release of funds by the government	0	1	0	4	57	62	302	4.871	1 st	Accepted
3	Availability of required material / labour	0	1	5	30	26	62	267	4.306	11 th	Rejected
4	Adequate measures should be put in place (insurance policy) to cater for natural disasters and effect of weather	1	1	11	35	14	62	246	3.968	15 th	Rejected
5	Adequate funding and Prompt payment for work done	0	1	1	10	50	62	295	4.758	2 nd	Accepted
6	Proper management of funds for projects	0	1	9	24	28	62	265	4.274	12 th	Rejected
7	All Designs should be thoroughly checked to prevent errors and omissions / Work specifications should be clearly defined	0	1	1	27	33	62	278	4.484	6 th	Accepted
8	Proper planning at the initial stages of a project to obtain permit on time	1	3	2	32	24	62	260	4.193	13 th	Rejected
9	Provision of adequate vehicles for monitoring and supervision	0	2	2	31	27	62	269	4.339	10 th	Accepted
10	Provision of adequate conflict resolution measures and employee involvement in decision making	1	3	6	40	12	62	245	3.951	16 th	Rejected
11	Timely decision making	0	1	4	20	37	62	279	4.500	5 th	Accepted
12	Strong financial background of contractor / use of efficient plant and equipment	0	4	1	15	41	62	276	4.451	7 th	Accepted
13	Good project management practices	0	2	5	20	35	62	274	4.419	8 th	Accepted
14	Adequate experience of consultant /Quality assurance plan	1	2	4	20	35	62	272	4.387	9 th	Accepted
15	Projects being completed within estimated time frame and budget	0	1	2	14	45	62	289	4.661	3 rd	Accepted
16	Establishing appropriate communication with all parties	0	1	5	17	39	62	280	4.516	4 th	Accepted

4.5.1 Discussion of results on mitigation measures to factors influencing of construction project delays in NVTI

Summary of discussions on the most important factors of delays in construction projects as ranked in the table above.

As seen in the table above, adequate budgetary support and timely release of funds by the government is the ranked as the most important mitigative measure with regards to construction project delays in NVTI, this is followed by adequate funding and prompt payment for work done by contractor or labour. In a study carried out by Odeh and Battaineh (2002), it was realized that payment not being made on time was the second highest factor causing project delays, as graded by consultants. So, in order to bring these problems to a minimum, the client is required to plan very well ahead of time, and put in place adequate budgetary support and make funds readily available to enable payments to be made within the agree period of time.

The next is projects being completed within estimated time frame and budget. Should projects be finished on time and in the estimated cost, it prevents cost and time overrun thereby leading to project success. The next one which is equally and important factor is establishing appropriate communication with all parties involved in the contract promotes information flow which speeds up work Fugar and Agyakwaah-Baah 2010). The next is timely decision making, all designs being thoroughly checked to prevent errors and omissions / project scope /work specifications should be clearly defined, strong financial background of contractor will help him use of efficient plant and equipment when he is paid on time for works completed, this can also happen if he gets easy access to bank credit. The next important mitigation measure is good project management practices on site this will enhance proper coordination between consultants and all the other parties to the contract. Phua and Rowlinson (2004) asserted that the use of project management techniques is very important in the construction industry, because the coordination and use of the many types of

labor, skills, materials, and equipment's which are used in construction require daily application of proper project management techniques. Again, adequate experience of consultant /Quality assurance plan which is the next important mitigative factor, will ensure that the client gets value for his money since the consultants liaises between the client and the contractor, there will be checks and balances which will ensure timely completion of projects, proper briefing to client when it is adequately done before final design will help prevent any errors in the designs.

Also, with quality assurance, standards and codes of practice should be followed in order to ensure project success and the tenth mitigation measure is Provision of adequate vehicles for monitoring and supervision of projects. This according to a report from the Monitoring and Evaluation Department in NVTI (2018), is a very important measure which will help tremendously enable the client's representative to visit project sites in order to do proper supervision which in the long run curb project delays.

These are the ten (10) main mitigative measures to factors which influence construction projects delays in NVTI.

The rest of the mitigation measures are: Availability of required material / labour, proper management of funds for projects, proper planning at the initial stages of a project to obtain permit on time, Proper project bidding / tendering methods should be put in place (competitive bidding, negotiated bidding, design and build) adopting design and build methods instead of the traditional methods will reduce time wasting. Adequate measures should be put in place (insurance policy) to cater for natural disasters and effect of weather conditions on a project could promote project completion time. The sixteenth mitigation measure is provision of adequate conflict resolution measures and employee involvement in decision making process.

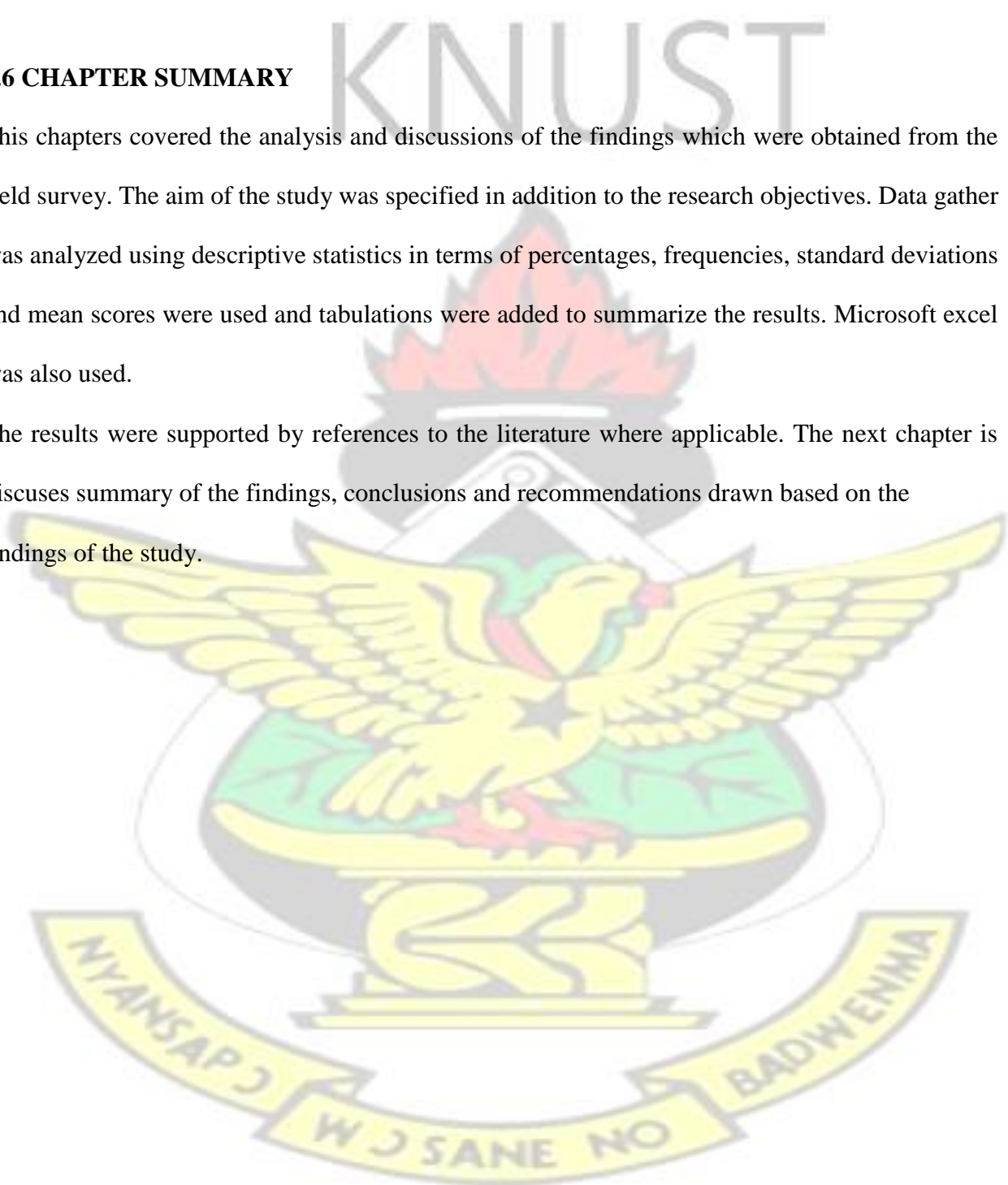
When employees are paid on time, conflicts will be minimized, but putting up dispute resolution measures in place in case of any conflicts on a project site as well as involving employees in

decision making on a project site enables them to abide by any rules which were made, this also promotes construction health and safety on site.

4.6 CHAPTER SUMMARY

This chapters covered the analysis and discussions of the findings which were obtained from the field survey. The aim of the study was specified in addition to the research objectives. Data gather was analyzed using descriptive statistics in terms of percentages, frequencies, standard deviations and mean scores were used and tabulations were added to summarize the results. Microsoft excel was also used.

The results were supported by references to the literature where applicable. The next chapter is discusses summary of the findings, conclusions and recommendations drawn based on the findings of the study.



CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.0 INTRODUCTION

This chapter presents the summary of findings and conclusions that have been drawn, based on outcomes to the findings, with some recommendations made.

5.1 SUMMARY OF FINDINGS

This research was intended to address two (2) objectives, which include

1. To identify the factors which influence construction projects delays in NVTI.
2. To come out with solutions which will mitigate the factors influencing projects delays in NVTI.

5.1.1 Factors which influence construction projects delays in the NVTI

This objective was accomplished when the identified factors that influenced construction project delays in NVTI described on the survey questionnaire were distributed to the respondents to rate their level of impact using a five-point Likert scale. The data gathered from the respondents was analysed and ranked using the mean score and out of the sixteen (16) factors, ten of them were ranked as the most important factors influencing construction project delays. The decision criterion was that, any response which was less than or equal to (\leq) 4.000 was rejected but a response with greater than or equal to (\geq) 4.100 was accepted. These include:

1. Lack of adequate budgetary support / late release of funds by Ghana Government with Mean of 4.581 was ranked first the most importance cause of delay.
2. Inadequate funding allocation by Government and delay in payment for works completed with Mean of 4.565.
3. Time and Cost overrun with Mean of 4.516.
4. Lack of effective communication between parties involved with Mean of 4.500.

5. Slow in decision making was ranked 5th with Mean of 4.435.
6. Design errors and omissions / Poorly defined scope/ specification of work was ranked 6th with Mean of 4.403.
7. Contractor's financial difficulties / Use of obsolete plant and equipment was ranked 7th by the respondents with Mean of 4.272.
8. Poor project management practices on a project site was ranked 8th by respondents with Mean of 4.258.
9. inadequate experience of consultants which ranked 9th with Mean of 4.177.
10. Lack of vehicles for monitoring and supervision of works which was ranked 10th with Mean of 4.113.

The rest of the factors are Shortage in material / labour supply with Mean of 4.081 was ranked 11th followed by misappropriations of project funds with Mean of 4.065, the next is delay in obtaining permit from the assembly which was ranked 13th Mean of 4.00, Project bidding method (Negotiated bidding, lowest bidder design and build) was the next and ranked 14th with Mean of 3.871, Force Majeure / Bad weather conditions was ranked 15th with an Mean of 3.758 and lastly Conflict on the project site / general labour strikes with Mean of 3.129.

5.1.2 To come out with solutions which will mitigate the factors influencing projects delays in NVTI.

To achieve this objective, questionnaires were sent to respondents to rank the solution / mitigative measures to factors which influence construction projects in NVTI on a Likert scale of 1 – 5. The

response from the survey came out with ten (10) main solutions / measures which are outlined below from table 4.5:

1. Adequate budgetary support and timely release of funds by the government was ranked as first with 91.9% endorsement from the respondents.
2. Adequate funding and Prompt payment for work done was ranked 2nd with 80.6% of the respondents strongly agreeing.
3. Projects being completed within estimated time frame and budget ranked 3rd with 72.6% of the respondents strongly in agreement.
4. Establishing appropriate communication with all parties involved in a contract was ranked 4th with 62.9% of the respondents strongly agreeing to that.
5. Timely decision making was ranked 5th with 59.7% of the respondents strongly in agreement.
6. All designs being thoroughly checked to prevent errors and omissions / Work specifications should be clearly defined was ranked 6th by the respondents with 53.2% in strongly agreement.
7. Strong financial background of contractor / use of efficient plant and equipment was ranked 7th with 66.1% of the respondents strongly agreeing.
8. Good project management practice was ranked 8th with 56.4% of respondents strongly agreeing.
9. Adequate experience of consultant /Quality assurance plan was ranked 9th with 56.4% respondents strongly agreeing.
10. Provision of adequate vehicles for monitoring and supervision was ranked 9th with 43.5% respondents strongly agreeing.

The rest are: Proper management of funds for projects, Proper planning at the initial stages of a project to obtain permit on time Proper project bidding / tendering methods should be put in place (competitive bidding, negotiated bidding, best value), Adequate measures should be put in place (insurance policy) to cater for natural disasters and effect of weather and lastly but not the least, provision of adequate conflict resolution measures and employee involvement in decision making.

5.2 RECOMMENDATIONS

To reduce construction projects delays in NVTI, the following recommendations should be considered and given the needed attention.

5.2.1 Client

Construction clients in this case NVTI representing Government of Ghana, must make sure that there is enough budgetary support for construction projects and also ensure the necessary funds before signing any contract. of projects. The long and administrative processes involved with regards to payments to contractors who execute NVIT projects, must be reduced for efficacy.

Also, contractors' payments must be made on time as and when they are due with strict adherence to the dictates of the contract.

5.2.2 Consultants

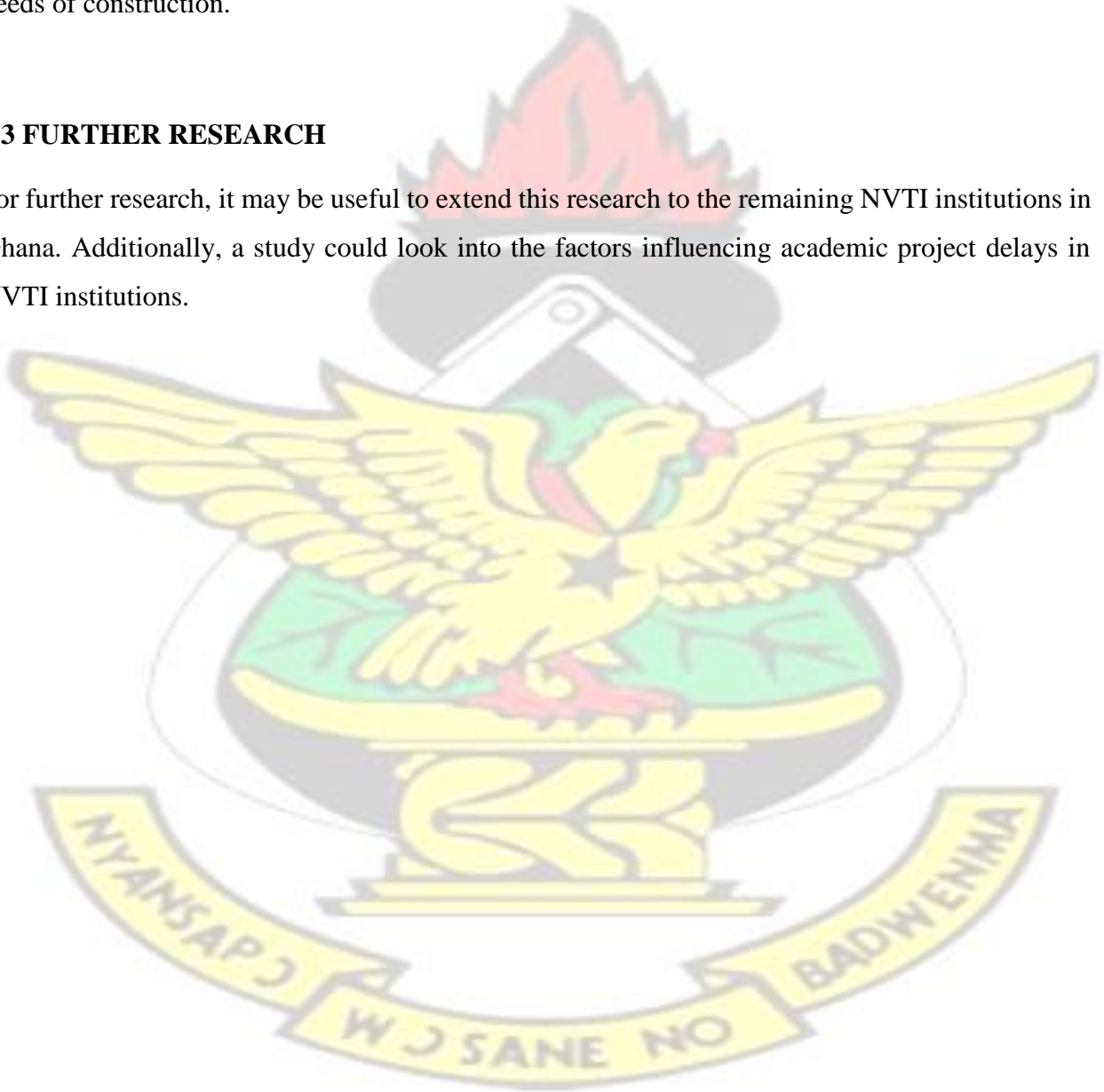
Consultants should adequately plan to certify that contractual procedures are followed accordingly. Good project management practices should be adopted on construction site.

5.2.3: Contractor

Contractors should well plan their construction activities from the initial stages of the contract through the end of the project. Employ qualified construction managers who will ensure that works are executed appropriately and ensure proper site organization. Contractors should endeavor to acquire modern plant and equipment and again, train their workforce to meet the contemporary needs of construction.

5.3 FURTHER RESEARCH

For further research, it may be useful to extend this research to the remaining NVTI institutions in Ghana. Additionally, a study could look into the factors influencing academic project delays in NVTI institutions.



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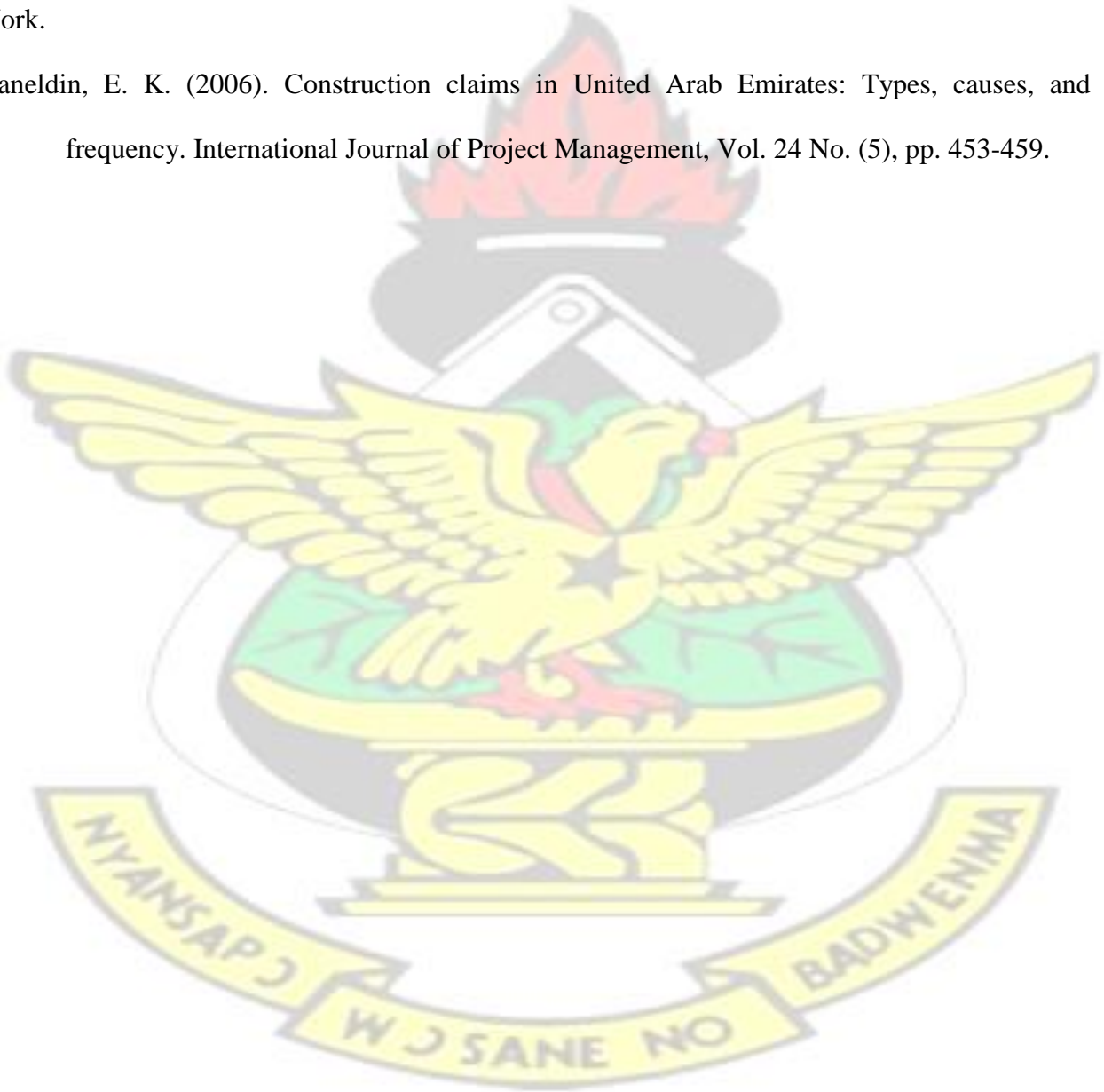
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APPENDIX

QUESTIONNAIRES

Dear Sir/Madam,

I am a **JOSEPH KEABENA OPPONG** final year MSc. Project Management student of the Kwame Nkrumah University of Science and Technology carrying out a research on **FACTORS INFLUENCING PROJECT DELAYS IN NATIONAL VOCATIONAL TRAINING INSTITUTE (NVTI)**. I would be grateful if you could provide answers to the following questions. The study is purely for Academic purposes. And all information provided by respondents will be treated confidentially. Thank you.

Kindly tick $\sqrt{\quad}$ where appropriate

SECTION A: DEMOGRAPHIC INFORMATION

1. What is your highest level of education?

(a) Technician (CTC I, II, III) Diploma /HND (b) Graduate (c) Post Graduate

2. Please indicate your position in your organization

- a. Architect
- b. Building Contractor
- c. Project Manager
- d. Quantity Surveyor
- e. Works Engineer
- f. NVTI Staff

3. Please indicate the number of years of working experience

- a. Below 5 years (b) 5 - 10 years (c) Over 10 years

4. SECTION B: MAIN

In your experience, which of the following factors influence construction project delays in NVTI?
 Please tick [✓] where appropriate by indicating the level of impact of each factor. 1= Strongly disagree
 Disagree= 3= Unsure, 4= Agree, 5=Strongly Agree

Factors influencing construction project delays in NVTI institutions in Accra

No.	DELAY FACTORS TO CONSTRUCTION PROJECTS	Rank				
1	Misappropriations of project funds					
2	Inadequate funding allocation by Government and delay in payment for works completed					
3	Lack of vehicles for monitoring and supervision					
4	Shortage in material / labour supply					
5	Lack of adequate budgetary support / Late release of funds by Ghana Government					
6	Inadequate experience of Consultants					
7	Poor project management practices on a project site.					
8	Conflict on the project site / general labour strikes					
9	Delay in obtaining permit from the assembly					
10	Project bidding method (Negotiated bidding, lowest bidder design and build)					
11	Force Majeure / Bad weather conditions					
12	Contractor's financial difficulties / Use of obsolete plant and equipment					
13	Design errors and omissions / Poorly defined scope/ specification of work					
14	Slow decision making					
15	Lack of effective communication between parties involved					
16	Time and Cost overrun					

In your experience, which of the following criteria will mitigate construction projects delays?

Please tick where appropriate by indicating the level of importance of each factor. Likert Scale 1-5. where 1= Not important 2= Less Important 3= Moderately Important 4 =Important 5=Most Important

No.	MITIGATIVE MEASURES / SOLUTIONS TO CONSTRUCTION PROJECTS DELAYS	RANK				
1	Proper project bidding / tendering methods should be put in place (competitive bidding, negotiated bidding, best value)					
2	Adequate budgetary support and Timely release of funds by the government					
3	Availability of required material / labour					
4	Adequate measures should be put in place (insurance policy) to cater for natural disasters and effect of weather					
5	Adequate funding and Prompt payment for work done					
6	Proper management of funds for projects					
7	All Designs should be thoroughly checked to prevent errors and omissions / Work specifications should be clearly defined					
8	Proper planning at the initial stages of a project to obtain permit on time					
9	Provision of adequate vehicles for monitoring and supervision					
10	Provision of adequate conflict resolution measures and employee involvement in decision making					
11	Timely decision making					
12	Strong financial background of contractor / use of efficient plant and equipment					
13	Good project management practices					
14	Adequate experience of consultant /Quality assurance plan					
15	Projects being completed within estimated time frame and budget					
16	Establishing appropriate communication with all parties					