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DEPARTMENT OF BUILDING TECHNOLOGY

FINANCIAL DISTRESS RELATED CAUSES OF PROJECT DELAYS IN THE GHANAIAN CONSTRUCTION INDUSTRY

BY

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DECLARATION

This is to certify that this work or any part thereof has not been previously submitted in any form to the University or to any other body whether for the purpose of assessment, publication or for any other purpose. I confirm that except for any express acknowledgements, reference cited in the work, the original work is the result of my own efforts.

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ABSTRACT

Construction firms are vital in the provision of infrastructure. Construction activities are capital intensive hence it is required of construction firms to be financially resourced. Many construction firms abandon their projects as a result of the phenomenon of financial distress consequently delay project delivery; a phenomenon that has eluded the radar of construction research. It is in this light that this research is necessary to identify financial distress causes in construction firms with their attendant effect on project delay. The research adopted quantitative methodology by utilizing survey questionnaires to collect data. The key findings of the research include payment issues; project financing issues; cash flow issues; economic issues; political influence and cost control issues. Key recommendations advanced for improving the performance of construction firms as a result of this research consist of clients ensuring sound financial and management practices to meet the financial obligations of construction firms in order not to put them in a financially distressed position; construction firms should be offered tax incentives especially those deemed financially distressed whiles executing projects that are strategic to the economy; construction firms should make claims that are devoid of contentious issues so that their payments will not delay to avoid inflation eroding their financial gains.

Keywords: financial, distress, construction, firm, project, delay

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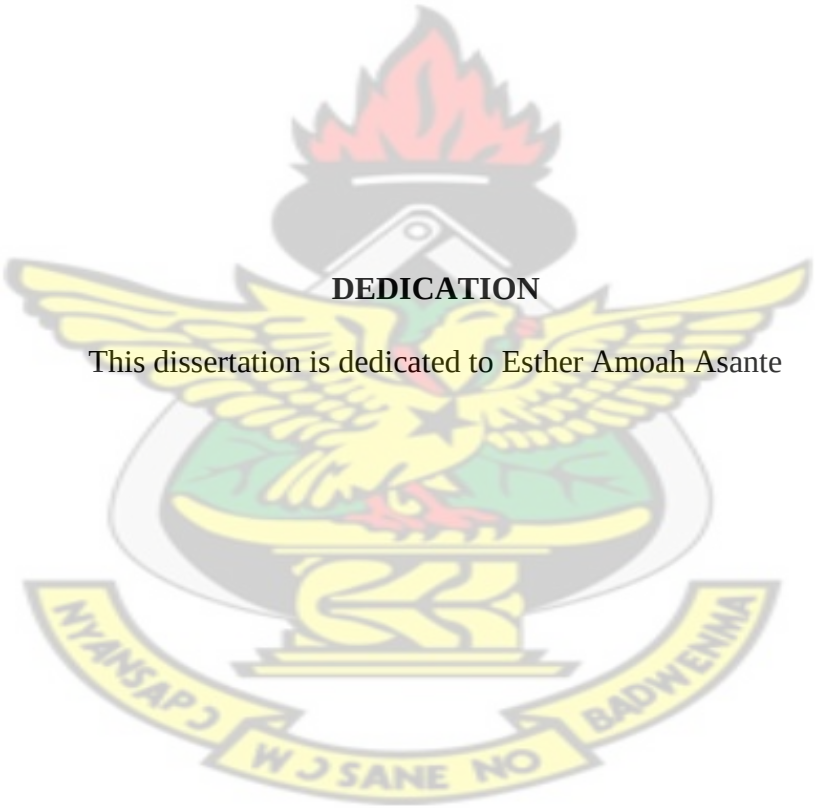

DEDICATION

This dissertation is dedicated to Esther Amoah Asante

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GENERAL INTRODUCTION TO THE RESEARCH

1.0 INTRODUCTION

Marshaled in its policy document, the Government of Ghana set forth a development strategy aimed at creating a stable macroeconomic environment and implementing a decisive structural transformation to foster strong economic growth and a broad-based improvement of living standards of Ghanaian populace (Doni-Kwame, 2007). This development target is indeed happening in Ghana with real manifestation of economic growth coupled with active entrepreneurial activity (BFT, 2011; Dzisi, 2009) and stable political environment (Aryeetey and McKay, 2007; Aryeetey and Baah-Boateng, 2007; Aryeetey and Fosu, 2002). Compared with other developing countries within the Sub-Saharan region, Ghana's economy remains resilient and economic development progress has been steady and considerably improved for the past one decade under the ambits of effective governance (Coulombe and Wodon 2007). Whilst Ghana continues to explore and exploit sustainable mechanisms of meeting millennium development goal of attaining middle-income economic status (Onyina-Adjei, 2007; GPRS, 2003), ample evidence suggest that Gross Domestic Product (GDP), inflation, interest rate and exchange rate have all been contained and appreciably within set targets (Asmah, 2011; Onyina-Adjei, 2007).

Without doubt, the construction industry of Ghana has made a significant contribution to the attainment of Ghana's buoyant economic growth and competitiveness (Badu *et al.*, 2011). Late research work by Ofori (1990:1980) and quite recent works by DTI (2004), Ofori

(2002, 2000a, b) and Hillebrandt (2000) have also conceded this assertion and concluded that the construction industry enormously contributes to the economic wealth of every country, which is underscored in terms of its Gross Domestic Product (GDP) contribution, the capacity to absorb and stimulate economic growth and the character to drive the activities of the economic sectors (DTI, 2004).

Appealing global trends have revealed that GDP contribution of the construction industry has been very consistent recording on the average annual growth of 8.2% to the economy of Ghana (Owusu-Manu and Badu, 2011) and between 8-10% in the UK and other developed economies (DTI, 2004; Crosthwaite, 2000).

Clearly, a modern, efficient and reliable infrastructure is a key driver of productivity which is essential to the development of any nation (*c.f.*Ngowi *et al.*, 2006), and the construction industry undoubtedly has a major role in delivering the built infrastructure in an innovative and cost effective way (Badu *et al.,* 2011). However, infrastructure financing gaps are immense and current receipts, savings, and central government transfers have proven to be insufficient to finance large-scale infrastructure projects in Ghana and many developing countries (Badu *et al.,* 2011; Ngowi *et al.,* 2006; Martell and Guess, 2006; Platz, 2009). Undeniably, infrastructure deficit hinders global industrial, social and political progress and is particularly acute in developing countries (UNECF, 2008; Crosthwaite, 2000).

Notwithstanding the contending infrastructure financing gaps confronting countries within the Africa region (Ngowi *et al.,* 2006), Ghana continues to make significant progress in terms of infrastructure design and delivery (Badu *et al.,* 2011). It is important to acknowledge that successive governments after independence in 1957 have initiated and

implemented diverse construction (infrastructure) projects across the length and breadth of the country. The list of these projects would be endless but to mention a few, efforts have focused on construction of new public housing, public offices, educational facilities, courthouses and health facilities; maintenance of existing public buildings; construction of new road infrastructure; rehabilitation and expansion of existing road infrastructure; and construction of other physical assets to support economic activities and improve quality of citizenry life (Badu and Owusu-Manu, 2011).

However, the most disturbing trend inherent in the delivery of these projects and a major criticism facing the Ghanaian construction industry is the growing rate of delays in project delivery (Fugar and Agyarkwa-Baah, 2010; Frimpong *et al.,* 2003; Frimpong and Oluwoye, 2003). This worsening phenomenon of delays limits the ability to successfully complete and commission projects within estimated time and budget jurisdiction, stifling economic development (Badu*et al.,* 2011). The rapid prevalence of delays in construction projects delivery and associated cost escalations in Ghana, and indeed, in many developing countries (DCs) stand accused (Aibinu and Jagboro, 2002). Faced with the enormity of DCs' paucity of resources (UNECF, 2008) and the fact that DCs have struggled to achieve economic development and competitiveness (Ngowi *et al.*, 2006), the construction industry is presented with a significant challenge to improve its performance (Badu and Owusu-Manu, 2010; Fugar and Agyarkwa-Baah, 2010; UNECF, 2008; Baiden 2006).

Also the contribution of the construction industry to national economic growth necessitates improved efficiency in the industry by means of cost-effectiveness and timelines (Aibinu

and Jagboro, 2002). Obviously, improving upon the performance of the industry would require fresh thinking and present a clarion call to policy-makers, construction industry players (consultants, contractors, client and suppliers) and all stakeholders to embark on strategic activities that would remove delay associated problems and improve the entire construction supply-chain whilst removing structural bottlenecks (Fugar and Agyarkwa-Baah, 2010; Badu and Owusu-Manu, 2010; Abd El-Razek *et al.*, 2008; Alaghbari *et al.*, 2007; Sambasivan and Soon, 2007; Assaf and AlHejji, 2006; Ahmed, *et al*., 2003; Frimpong *et al.*, 2003; Frimpong and Oluwoye, 2003). It is against this backdrop that this research is initiated and designed to respond to this christen.

1.1 THE PROBLEM STATEMENT

Both public and private sector infrastructure investment in developing countries has been volatile over the last decade, with perennial infrastructure gap of US$31 billion per year (*c.f.* Badu*et al.*, 2011; Foster and Briceño-Garmendia, 2009). Concurrently, investment dipped to $50 billion in 2003 after a peak at $131 billion in 1997, before rising again to $158 billion in 2007 (Platz, 2009; UNECF, 2008; Beck *et al.*, 2007; Martell and Guess, 2006; Kehew *et al.*, 2005). The seeming volatility in infrastructure delivery and the exacerbating inability of DCs to meet infrastructure needs has been largely attributed to the apparent delays in project delivery (Fugar and Agyarkwa-Baah, 2010; Abd El-Razek *et al.*, 2008; Sambasivan and Soon, 2007), which in most instances result in woefully construction cost escalations, prolonged duration and poor quality of workmanship (Dogbegah *et al.*, 2011).

This ascendancy of project delays in DCs has sparked the interest of academics as well as practitioners to explore the causes and potential interventions associated with project delays. A thorough scan through the extant literature revealed a myriad of research outputs, which show a convergence in the causes of project delays in both developed and developing countries (Assaf and AlHejji, 2006; Ahmed*et al.,* 2003; Frimpong *et al.,* 2003; Frimpong and Oluwoye, 2003). For instance, the recent work by Sambasivan and Soon (2007) provided a comprehensive list of project delay factors, and expounded in terms of client-related factors, contractor-related factors, consultant-related factors, ***financial-related factors,*** materials-related factors, labour-related factors, equipment-related factors, contract-related factors, conflict-related factors and other external factors.

Earlier, Ahmed *et al.* (2003) had categorized project delays into two categories, thus internal causes and external causes, and explained internal causes as those arising from the parties to the project (e.g. contractor, client, and consultant); and external causes as those events beyond the control of the project parties (including the act of God, government action, and material suppliers). Prior to the work by Ahmed *et al.* (2003), Ogunlana *et al.* (1996) had also entangled the causes of project delays in construction under three themes, thus problems of shortage or inadequacies in industry infrastructure (mainly supply of resources); problems caused by clients and consultants; and problems caused by contractor incompetence/inadequacies. Also, late research by Bolton (1990) classified project delays into three main typologies including excusable but non-compensable delays (i.e. delays caused by occurrences which are not attributable to any of the parties); compensable delay (i.e. delays result from acts or omissions of the owner or someone for whose acts an owner

is liable); and inexcusable delay (i.e. delays result from a contractor's own fault or his subcontractors or material suppliers). Recently, Fugar and Agyarkwa-Baah (2010) capitalized on the aforementioned studies to explore delay factors of building projects in Ghana which showed a convergence with earlier reports. Within these avalanches of project delay factors, *financial-related factors* have been acknowledged as the most crucial and troubling factor (*c.f.* Fugar and Agyarkwa-Baah, 2010; Sweis *et al.*, 2008; Alaghbari *et al.*, 2007; Sambasivan and Soon, 2007).

Admittedly, whilst research efforts into project delays continue to evolve around the paradigms of Sambasivan and Soon (2007), Ahmed *et al.* (2003), Ogunlana *et al.* (1996) and Bolton (1990), it is observed that little research (if any) has been conducted to examine the financial-related factors (Sweis *et al.*, 2008; Alaghbari *et al.*, 2007; Sambasivan and Soon, 2007; Aibinu and Jagboro, 2002) which is acknowledged to be the most disquieting factor. This dearth of research into financial distress related causes of project delays is particularly evident in the context of the Ghanaian construction industry (Fugar and Agyarkwa-Baah, 2010; Frimpong *et al.*, 2003). Amidst the current paucity of research into financial-related causes of project delays and the undying need to proffer sustainable methodologies to improve project time and cost efficiency ignited the interest of the research. The research considerably departs from the ascendant focus of research on this subject to uniquely explore the financial-related causes of project delay in the Ghanaian construction industry.

1.2 AIM AND OBJECTIVES OF THE RESEARCH

This section began by stating the working hypothesis governing the research enquiry. This was followed by research aim, research objectives and research questions.

1.2.1 Working Hypothesis

The research was developed on the working hypothesis (assumption) that "*financial distress related causes (factors) significantly contribute to project delays*".

1.2.2 Aim

The main research aim was to explore the underlying factors contributing to financial distress of construction firms and investigate the interconnections between these financial-distress-related factors and project delays with the view of establishing apposite response measures.

1.2.3 Specific Objectives

In order to verify the working hypothesis, to answer the research questions and to achieve the overall research aim as stated above, the following research objectives were articulated:

1. To conduct a critical literature survey to facilitate the contextualization of financial distress and project delays in the context of the construction industry;
2. To determine the underlying factors contributing to financial distress of construction firms in Ghana;

3. To uncover the underpinning relationship (interconnections) between these financial distress related factors and project delays; and
4. To establish appropriate restructuring strategies to address financial distress related factors and ascertain appropriate response measures to mitigate project delays.

1.2.4 Research Questions

The following key research questions were articulated to facilitate the enquiry:

- What are the underlying factors that would contribute to financial distress of a construction firm?
- What are the associations between these financial distress related factors and project delays?
- What are the potential strategies than could be installed to avoid the occurrence of financial distress among construction firms?
- What are the possible measures that could be established to mitigate or avoid the frequent incidence of project delays?

1.3 SCOPE OF THE RESEARCH

There are convergent observations that seem to propose that financial distress related (FDR) causes of project delays amongst *building-oriented-contractors* may differ from FDR causes of project delays amongst *road-oriented-contractors* (Badu and Owusu-Manu, 2010). There are also convergent views that appear to suggest that FDR causes of project delays of *small-medium enterprises* (SMEs) may differ from the FDR causes of their counterpart *large enterprises* (Owusu-Manu and Badu, 2009). Within the extant literature, consensuses are

that small-medium enterprises are more likely to experience financial distress than their large counterparts (Jorion and Jin, 2006; Bailey *et al.,* 2003) and for that reason, they would be able to exhibit more financial distress related symptoms (factors). Due to peculiarity of projects, thus characterized by their size (mostly dictated by project cost), duration and financing sources, there are growing convergent observations that seem to demonstrate that FDR causes of project delays of dissimilar projects such as feeder roads, urban roads, highways and mass housing may differ from each other (*c.f.* Ahadzie *et al.,* 2007). For instance Badu *et al.,* (2011) observed that financing of infrastructure would differ from projects to projects and supported this assertion by citing that "effective use of innovative financing needs to recognize what kinds of projects benefit most from which kinds of financing tools because it is important to achieve synergy in combining tools and projects" (Badu *et al.,* 2011, p.6). For instance whilst most road projects would depend on the road fund, water projects would depend on revolving fund and housing infrastructure would require the housing bond (*c.f.* Badu *et al.,* 2011, p. 10-11). By default, the design and administrative setup of these funding sources are distinctive and the inherent administrative lapses may affect the release of funds which may have repercussions on the project delivery.

Based on these assumptions and to avoid diffusion or interference of data (i.e. intermingling of data resulting in lack of coherency and generalizability), and to delineate the boundaries of the study, this research is narrowed to focus on *road-oriented-contractors.* This category of contractors has been chosen because; prior research in Ghana has been focused on building-oriented-contractors (*c.f.* Fugar and Agyarkwa- Baah, 2010). In particular, this study heavily concentrated on small-medium enterprises (SMEs) with an infusion of lean

dimension of large road contractors working on urban road contracts within Accra and Kumasi catchment areas. The infusion of SMEs with their large counterparts was purposeful, as this helped garner enough empirical data on both categories of road-oriented-contractors to examine whether large road-oriented contractors exhibit financial distress symptoms which the literature is silent on.

1.4 RESEARCH METHODOLOGY

Utilizing desk study and field work, this research adopted a quantitative approach of enquiry leaning towards positivist tradition. As a first step to the enquiry, a critical literature review was conducted to unearth the theoretical constructs underpinning the subject and help to identify the financial distress related causes of project delays. This facilitated the development of the conceptualization and contextualization of the subject. The review sourced credible and scientific data from the extant literature through journals and books.

The next step involved the drawing of the sample frame which targeted small-medium-large road-oriented-contractor firms operating within the catchment zones of Accra and Kumasi. The enquiry largely depended on survey questionnaires to assemble empirical data from the field. The questions on the questionnaires included close-ended questions and were ranked on Likert scale rating to allow easy categorization and synthesis.

The main dependent variable (DV) utilized was ***project delays*** whilst the independent variables (IVs) were the ***financial distress related factors***, which were used to make inferences about the dependent variable. The independent variables were sourced from the

literature and through initial consultation with construction and financial experts who have significant experience working on road projects. Due to the perceived large number of the IVs anticipated, factor (principal component) analysis was utilized as primary multivariate analytical technique to analyze the data. Secondary analytical tools used included discriminate chi-square test and descriptive statistics.

1.5 SIGNIFICANCE OF THE STUDY

Reiterating earlier concerns, financial distress related (FDR) factors are predominantly considered to be the most significant indicators of project delay and failure (Dikmen *et al.*, 2010; Elloumi and Gueyie, 2001). However, little research work (if any) has been conducted to diagnose financial distress related factors in the construction industry (Arditi *et al.*, 2000). Knowledge on the underlying factors contributing to financial distress of construction firms is scant, and this is particularly so in Ghana (Owusu-Manu and Badu, 2010). Also, theoretical and practical linkages between financial distress related factors and project delays is limited. This study is the first attempt in Ghana to explore the intricate relationship between FDR factors and project delays. The outcome of the study will be of utility to project parties mainly clients, contractors and consults who initiate, design and implement construction projects. Construction firms may benefit from the findings of the study to assess their current financial situations and take necessary actions to avoid possible project delays and failure. As a pioneering research, the study shall form the basis to spur further researches to explore the intricate relationships between financial distress variables and dependent variables such as project failure and business failure.

1.6 THESIS ORGANIZATION

The structure of the thesis (report) is divided into five (5) interdependent chapters, and conforms to the following outline. Chapter 1, labelled "General Introduction to the Research", presents the background to the research and states the problem meriting research efforts. The working hypothesis, research questions, research aim, objectives, and scope are all contained in this chapter. Chapter 2 contains the literature review. The review provides an extended coverage on earlier works. The review explored the connections between these strands of literature and attempts to tie them together. A brief conceptual framework was provided to explain the dependent variable (project delays) and independent variables (financial distress related factors) in order to bring these variables into the perspective of the study. Chapter 3 focused on the research methodology. It explored the philosophical dimensions of the research and situated it within its appropriate philosophical tradition and methodological jurisdiction. Detailed discussions were provided on the data collection analytical tools that were employed.

Chapter 4 presents the empirical analysis of data from the field survey that answered all the research objectives and questions. Chapter 5 wraps up the entire research endeavour by reviewing the main contributions of the research to knowledge. Policy recommendations and limitations of the study are also outlined. Pointers to where future research attempts should be directed are also clearly defined.

1.7 CHAPTER SUMMARY

This chapter discussed the general introduction and background to the research. The problem statement was also presented and the need for the research justified. The chapter also introduced the research aim, objectives, and the scope of the study. To arrive at the objectives of the study the research questions were formulated and a summary of the methodology adopted for the study was also presented in the chapter. Chapter one was concluded with discussions on the significance of the study and the organization of the research.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

This chapter touches on the review of extant literature related to the study. It contextualizes financial distress within the practice of construction firms; causes of financial distress; causes of construction project delay; firm size and profitability relationship; impact of financial factors on failure of construction firms *inter alia*.

2.1 CONTEXTUALIZATION OF FINANCIAL DISTRESS: CONSTRUCTION FIRMS IN PERSPECTIVE

This aspect of the review will position financial distress within the framework of construction practice especially within the domain of corporate practice- construction firms. The term financial distress to most firms including those related to construction symbolizes inadequate liquidity with its attendant difficulties of meeting financial obligations on time as far as the finances of the construction firm is concerned (*c.f.* Outecheva, 2007). In construction firm management financial distress encompasses failure, default, bankruptcy, or distressed restructuring (*ibid*). Among these varied forms of financial distress, construction firms are likely to encounter default being worst form of financial distress(*c.f.* Outecheva, 2007); failure and bankruptcy in most cases are related to construction related firms because of the nature of their formation, in the case of distressed restructuring, construction firms do not in most cases assume the structure of other corporate entities being governed by board room rules but on few occasions when construction firms have

progressed very well and transform into well-established conglomerate and holdings, distressed restructuring may occur.

Financial distress involves two key stakeholders mostly- the debtor and the creditor, within the construction industry, the debtor is represented by the supplier of materials and capital or other forms of resources for construction activities to proceed while the debtor represents the construction firm or even the contractor (Outecheva, 2007).

Financial distress can have dire consequences for construction firms in diverse ways; and understanding the reasons construction firms plunge into financial distress will be of immense help to the construction industry (*c.f.* McCarthy, 2011). Understanding the reasons construction firms get financial distress will help in devising policies that are sound to prevent the its snares(*ibid*).

Financial distress costs are in two dimension namely direct cost and indirect cost (Opler and Titman , 1994; Sharpe, 1994; Denis and Denis, 1995; Gilson, 1997; Andrade and Kaplan, 1998; Maksimovic and Phillips, 1998; Senbet and Seward, 1995), direct cost of financial distress encountered by construction firms include litigation fees which are insignificant unless less tussles arise (*c.f.* Weiss,1990), and indirect cost of financial distress comprise of market share (Opler and Titman (1994)and inefficient asset sales (Shleifer and Vishny, 1992), the indirect costs are very important but difficult to quantity hence in most cases elusive leading to financial distress if much attention is not paid to them. It is clear that construction firms in Africa in most cases have not paid much attention to the indirect cost aspect of financial distress due to their legal nature of formation. In most of these firms

share acquisition is non-existent and in the asset acquisitions in and their disposal do not follow proper accounting procedures to fence off financial distress, in a nutshell most of these activities result into financial loss.

2.1.1 Causes of financial distress

Individual characteristics of managers in construction firms suspect in financial distress; these characteristics are perceived to be capacity for self-control; planning and patience (*c.f.* McCarthy, 2011; Ameriks *et al*., 2003). Hence behavioural factors are important in determining the financial distress of construction firms; for instance, if the management of a particular construction firms are not financial discipline at the individual level, this phenomenon will translate into the management of the corporate finance of which could be of devastating consequences. Bonds are becoming the contemporary methods of construction finance, but a default of bond has the potential of causing financial distress for construction firms. A construction firms which experiences bond default is more likely to be financially distressed.

Chronic loses (Outecheva, 2007) encountered by construction as a result of poor financial and business management; high overhead expenses; client withholding payment; contractor's invalid claims; high insurance cost; high tax allocation (*c.f.* Alfan and Zakaria, 2013); divulging funds; fraudulent practices by employees; capital lock up (*c.f.* Harris and McCaffer, 2005; *c.f.* Outecheva, 2007); divulging funds; inaccuracy in valuation of work done culminating into under measurement and under estimation of project cost; unstable inflation rate; high interest rate (*ibid*) chargeable on loans (*ibid*); contractor handling many

projects at the same time hence not paying much attention to their financial management; lack of regular cash flow forecasting; low mark ups/profit margins; poor credit arrangement with creditors and financiers; difficulty in loan accessibility (Outecheva, 2007) ; and insolvency/liquidity. Construction firms enter into financial distress when their fund raising capabilities are weak leading to the amount of debt exceeding the value of the firm's total asset (Outecheva, 2007).

The inability of construction firms to measure financial distress leads to inability to detect it timeously and find lasting solution can be risk triggers for financial distress which were typified by Outeccheva (2007). Risk triggers of financial distress are attributable to exogenous and endogenous risk factors; endogenous risk factors borders on the internal problems of construction which affect certain category of firms at the same level and exogenous risk factors are prevalent and transcend all firms in the market irrespective of their level (ibid). The diagram below demonstrates the various financial risk triggers that are possible suspect in construction firms.

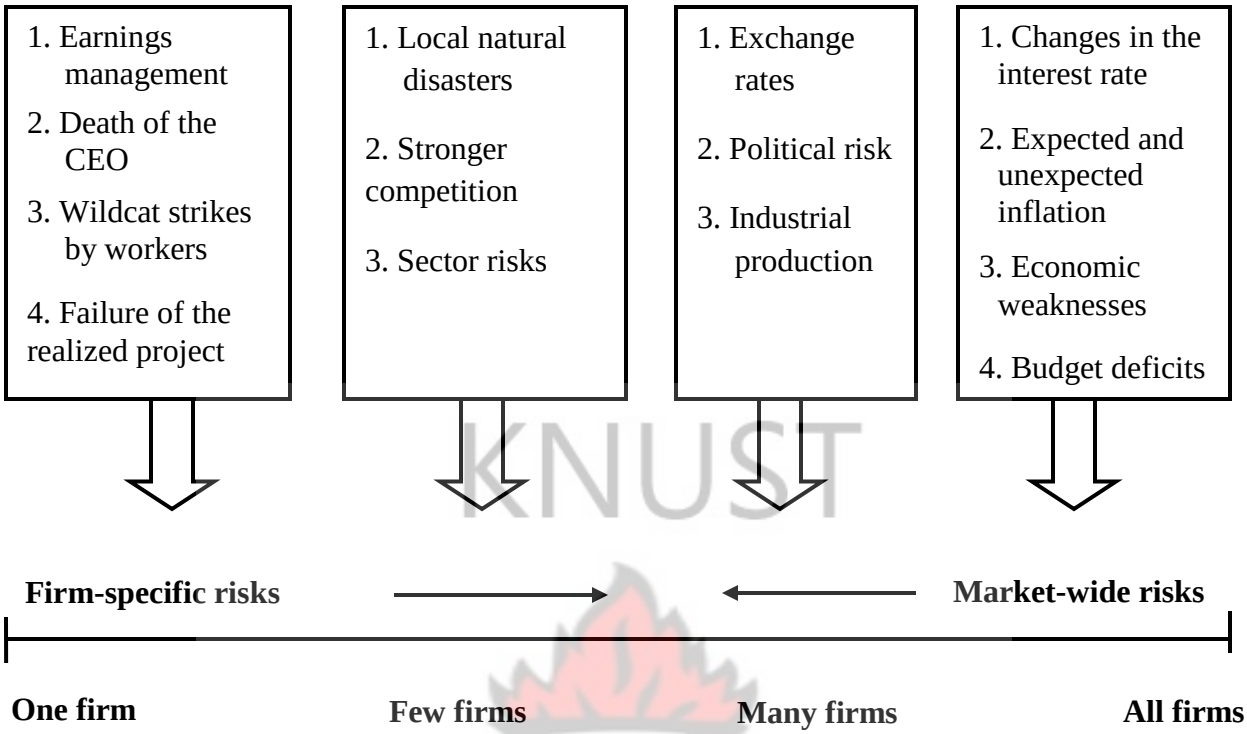

Figure 1 : Financial risk triggers in construction firms(Adapted from Outecheva, 2007)

External risk factors emanate from economic change, competitive change, government constraints, social alterations, and technological change (Bibeault, 1982)

Financial distress in construction firms have consequences for stakeholders including the client of various dimensions both private and public, financial donors, beneficiaries or users of projects and in most developing countries of Africa the state (*c.f.* Ko *et al*., 2001). Most construction firms prior to their corporate failure will exhibits signs of financial distress (*ibid*); and methods for the early detection of financial distress signs have been advocated by investors, creditors, auditors and other stakeholders with much interest in construction firms. In this direction research studies have been conducted in the prediction of financial distress

which is very much applicable to the construction firms, key statistical methods adopted in this direction include discriminant analysis, regression analysis, logit analysis or probit analysis, these methods will demand the behaviour of data to follow a particular distributional assumptions to produce vigorous outcomes (Platt and Platt, 1990; Hill *et al*., 1996, Clark *et al*., 1997, Mossman *et al*., 1998). Methods for dealing with financial distress are very important to construction firms for their survivability, identifiable approaches advocated by Senbet and Seward (1995) includes financial restructurings; asset sales; and injection of capital from the public.

2.2 CAUSES OF CONSTRUCTION PROJECT DELAY

Completing projects on time is an indicator of efficiency, but the construction process is subject to many variables and unpredictable factors, which result from many sources. These sources include the performance of parties, resources availability, environmental conditions, involvement of other parties, and contractual relations. However, it rarely happens that a project is completed within the specified time.

Many articles and studies have been conducted on causes of delay in construction projects, both locally and internationally. Surveys conducted by Assaf *et al.* (1995) outlined 56 main causes of delay in large construction projects. Delay factors are assembled into nine major groups with different levels of importance to different parties. Al-Ghafly (1995) discussed the delay in public water and sewage projects. Sixty causes were identified and classified. Al-Ghafly (1995) concluded the following: the delay occurred frequently in medium and large size projects, and considered severe in small projects. There are many important causes

of delay related to owner involvement, contractor performance, and the early planning and design of the project. Important causes are financial problems, changes in the design and scope, delay in making decisions and approvals by owner, difficulties in obtaining work permit, and coordination and communication problems.

Kaming *et al.* (1997) studied influencing factors on 31 high-rise projects in Indonesia and found out that cost overruns occur more frequently and are more severe problem than time overruns. They pointed out that the major factors influencing cost overrun are material cost increase due to inflation, inaccurate material estimation and degree of complexity. While in time overrun, the most important factors causing delays are design changes, poor labor productivity, inadequate planning, and resource shortages. Kumaraswamy and Chan (1998) studied the causes of construction delays in Hong Kong. They found that there was a difference in perceptions as to causes of delays by different groups of participants in building and civil engineering works. They suggested that biases of different industry groups might have direct blame for delays to other groups.

Noulmanee *et al.* (1991) investigated causes of delays in highway construction in Thailand and concluded that delays can be caused by all parties involved in projects; however, main causes come from inadequacy of sub-contractors, lack of sufficient resources, incomplete and unclear drawings and deficiencies between consultants and contractors. The study suggested that delay can be minimized by discussions that lead to understanding.

Al-Momani (1997) investigated causes of delay in 130 public projects in Jordan. The main causes of delay were related to designer, user changes, weather, site conditions, late

deliveries, economic conditions and increase in quantity. The study suggested that special attention to factors will help industry practitioners in minimizing contract disputes. Delays have strong relationship with failure and ineffective performance of contractors.

Odeh *et al*. (2002) found that contractors and consultants agreed that owner interference, inadequate contractor experience, financing and payments, labor productivity, slow decision making, improper planning, and subcontractors are among the top ten most important causes of construction delay in Jordan. Frimpong *et al.* (2003) conducted a survey to identify the significant factors contributing to delay and cost overruns in Ghana groundwater construction projects. They are monthly payment difficulties from agencies, poor contractor management, material procurement, poor technical performances, and escalation of material prices.

Sambasivan and Soon (2007) identified 10 most important causes of delay in construction projects. They are contractor's improper planning, contractor's poor site management, inadequate contractor experience, inadequate client's finance and payments for completed work, problems with subcontractors, shortage in material, labor supply, equipment availability and failure, lack of communication between parties, and mistakes during the construction stage. A similar study by Alaghbari *et al.* (2007) indicated that clients, contractors and consultants agreed that financial problems were the main factors and coordination problems were the second most important factor causing delay in construction projects in Malaysia.

Sweis *et al.* (2008) studied the causes of delay in residential projects in Jordan and concluded that financial difficulties faced by the contractor and too many change orders by

the owner are the leading causes of construction delay. El-Razek *et al*.(2008) in a similar study found that the most important causes of delay are financing by contractors during construction, delays in contractor's payment by owner, design changes by owner or his agent during construction, partial payments during construction, and non-utilization of professional construction/contractual management.

Fugar and Agyakwah-Baah (2010) investigated the causes of delay of building construction projects in Ghana to determine the most important according to the key project participants. All major stakeholders agreed that the top ten most important factors causing delay in Ghana are: delay in honoring payment certificates, underestimation of the cost of project, underestimation of complexity of project, difficulty in accessing bank credit, poor supervision, underestimation of time for completion of projects by contractors, shortage of materials, poor professional management, fluctuation of prices/rising cost of materials, and poor site management.

According to a study conducted by Haseeb *et al*. (2011) delays on construction projects could result in litigation, law suites, negotiations, disputes, overtime, over costs and total abandonment.

2.2.1 Types of delay in the construction industry

Delays are classified in several ways. The classification can be based on origin, compensability and the timing of those delays (Kartam, 1999). These classifications are however interrelated. Sweet and Schneider, 2004 also grouped delays in terms of the responsibilities of the various parties to the contract. Thus they can be owner-caused or contractor caused, which is within the control of is the fault of or through the negligence of owner (contractor). The third party caused delay is attributable to neither contractor nor owner (Kraiem and Dickmann 1989). Liability for a particular delay is stipulated by contractual terms.

2.2.2 Excusable Delay

They are delays not attributable to either owner or contractor (Kraiem and Diekmann ,1987). Its determination rests on whether delay event was foreseeable at the time of bidding and was beyond the control of both owner and contractor (Zack, 2000) .These delays are not attributable to contractor's actions or inactions and typically include unforeseen events. Excusable delays when found entitle contractor to time extension if completion date is affected. Furthermore, excusable delays can be compensable or non-compensable.

Excusable delays with compensation are caused by suspensions or interruptions to part or all work caused by an act by the owner resulting from owner's breach of an obligation stated or implied in the contract. They are from (i) acts of the owner in a contractual capacity and (ii) acts of another contractor in performance of a contract with the owner (Ponce de Leon, 1987). If the delay is compensable, the contractor is entitled not only to extension of time

but also an adjustment for any increase in cost caused by the delay (monetary damages). The determination of compensable delay can be challenging if there is a “no damage for delay” clause in the contract. Thus the language of a contract determines which delays are responsibilities of the owner (Hughes and Ulwelling, 1992). A typical instance is when an owner denies access to site once notice is given for work to commence. Certain delays are however caused by the owner or his agents and these are referred to as excusable but compensable delays as the contractor is entitled to claims for financial damages. These forms of delay are usually design related. This claim is justifiable as the contractor incurs additional cost for overheads on extended field office and home office overhead and unabsorbed home office overhead(Mohammed and Isah , 2012).

Non-compensable excusable delays are caused by factors that are neither the contractor nor client’s fault. When this type of delay is encountered only a time extension will be warranted since there are no grounds for damages. Instances such as unprovoked strikes and any act of god are examples of non-compensable excusable. McDonald (2000) categorized weather as an excusable non-compensable delay.

2.2.3 Non excusable delay

The contractor either causes or assumes the risk for this form of delay. They solely result from the contractors’ or their suppliers fault or performance deficiency; thus the contractor is therefore expected to compensate the owner or accelerate works to cater for the lost time (Mohammed and Isah, 2012). The contractor is not entitled to receive any time extension and the owner’s delay damages are calculated by contractual terms. The underlying concept is that a party should not benefit from its own fault or negligence, nor should it be free from

liability when mistakes are caused by some party for which it is liable (Zack, 2000). Late equipment deliveries, insufficient manpower and late mobilization are inexcusable delays (Stump, 2000).

2.2.4 Concurrent delay

Concurrent delay refers to delay situations when two or more delays occur at the same time or overlap to some extent, of which had the delays occurred separately, would have affected the completion period. Normally concurrent delays which involve any two or more excusable delays result in time extension. Usually they occur at the peak of projects when multiple responsibility activities are being performed at the same time (Baram, 2000). Customarily, they are described as two or more delays that occur at the same time, either of which would cause a delay that if either of them had not occurred, the project schedule the project schedule would have been delayed by the other (Rubin 1983, Cushman *et al*., 1990; Stump 2000). Baram (2000) also argued that concurrent delays are two or more separate causes of event delay that occur within a specific time period. They occur simultaneously.

The under listed guidelines can be used to analyse concurrent delays:

- If excusable and non-excusable delays occur concurrently, only a time extension is granted to the contractor;
- If excusable with compensation and excusable without compensation delays occur concurrently, the contractor is entitled to time extension but not damages; and
- If two excusable with compensation delays occur concurrently, the contractor is entitled to both time extension and damages.

In a scenario where client fails to supply detailed design for specified machine installation (excusable delay with compensation) , while at the same time the contractor who would have installed those machines is on strike (excusable without compensation) there will be an extension of time but no damages for the contractor.

Though the above listed guidelines are required for delay analysis, it is in the interest of parties involved in a construction project to agree at the initial stages of the project to include it in the contract language. Until the development of the CPM schedule analysis there was no reliable method to differentiate the impact caused by client delays and contractor delays.

Hegazy (2011) identified varied forms of delay comprising liability, occurrence, effect and impact, time of event, excusable, non-excusable, independent delays, concurrent *inter alia*. An illustration of the dynamics of construction project delay is depicted in figure 1 below.

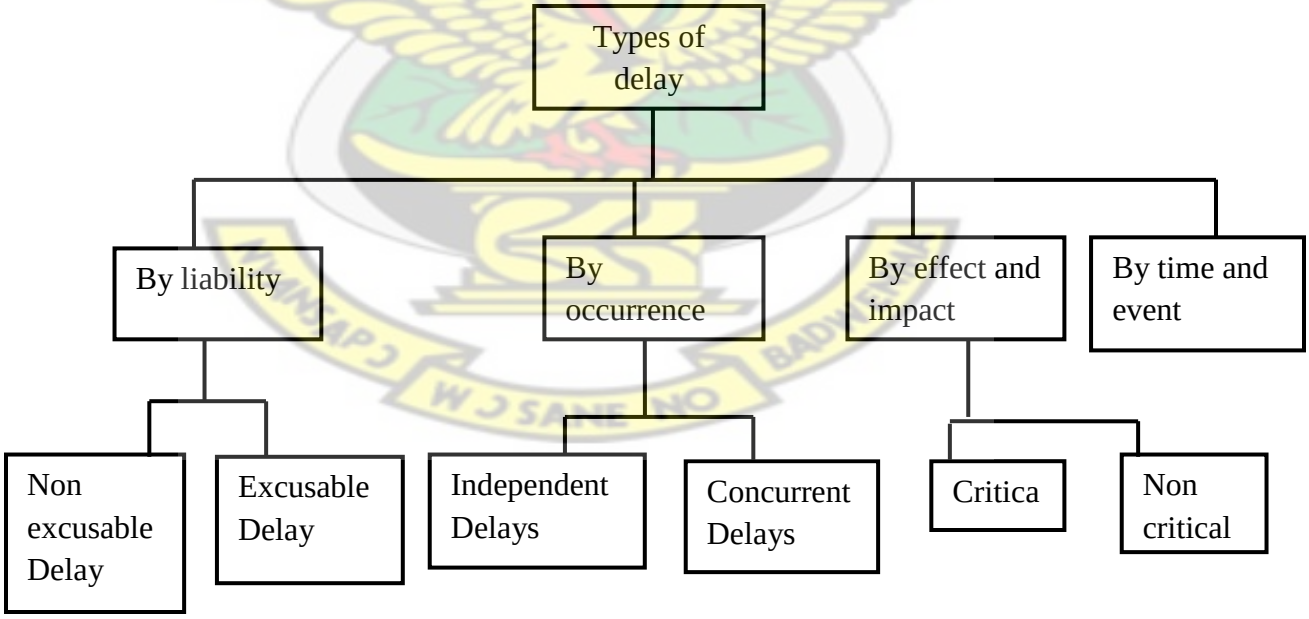

Figure 1: Types of Delay (Adapted from Hegazy, 2011)

2.3 IMPACT OF FINANCIAL FACTORS ON FAILURE OF CONSTRUCTION FIRMS

Studies on the impact of financial factors on failure of construction firms revealed that bad management and lack of capital are the main determinants of construction failure (Kangari, 1998). Six broad warning signs that a construction company is in trouble were identified as follows ; ineffective financial management system , bank line of credit constantly borrowed to the limit , poor estimating , poor project management, absence of comprehensive business plan and communication problems. According to Peterson (2005) the Surety Information Office (SIO) an office that collects data on surety bond in US, has proven that the main failure factors are directly related to financial management of the company.

Yin (2006), found that most of the Malaysian contractors do not have sufficient capital to finance their undertakings. Contractors generally do not have fixed assets, unlike most manufacturers. They usually do not have land or buildings, however they have construction equipment. Unfortunately banks do not accept these moving assets as collateral for loans. Without banks financing a contractor has greater difficulty in undertaking a project. Through the open tender system, contractors always have to produce quality work at the cheapest price. The findings of Yin (2006) strongly buttress the previous findings of Hwee *et al*. (2002) regarding the crucial flow management in the construction industry. Cash flow is the most important factor influencing profitability when a construction project is in progress as inadequate cash flow is a major cause of bankruptcy in the industry.

Furthermore, Jaafar (2004) shows empirical evidence that smaller capital is used by contractors to start a construction firm compared to other businesses. This is attributed to the following reasons:

- Suppliers are important creditors of construction firms
- Subcontractors give capital support; however they are only paid when contractors have collected payments from clients.
- For government projects, contractors may obtain advance payment of 25% of the total project price.

The findings of Jaafar (2004) prove that most contractors in Malaysia are highly dependent on outsourced capital. The study also supports McMahan (2001) whose findings reveal that business growth outcomes and better performance greatly depends on external finance. By using more outsourced capital (debt capital) the profit margin from the projects definitely decreases as contractors have to pay higher price for the credit terms as well as interest charges on banking facilities.

The total amount of loans disbursed by commercial banks in Malaysia to construction industry also proves that construction industry is highly dependent on debt capital in order to survive (Lin , 2008). In 2005, the total loan disbursed to construction industry was MYR 25.26 billion as compared to 23.29 billion and 21.71 billion in 2004 and 2003 respectively. Consequently, loans to construction firms have become collectibles and the dependence on bank loans payment of high interest (i.e. cost of capital) is the main factor behind the failure of contracting firms. (Enshassi *et al*., 2006).

Strischek and Mclntyre (2008) illustrated five financial causes of construction failure as mentioned by in Grant Thornton's report "2007 Surety Credit Survey For Construction Contractors: The Bond Producers Perspective ". They are slow collection, low profit margin, insufficient capital/ excessive debt, misuse of banks' line of credit and poor estimation. Findings by Sambasivan and Soon (2007) mentioned that construction work involves huge sums of money and most of the contractors find it very difficult to bear the heavy daily construction expenses when payment are delayed. Work progress will be delayed as a result and this will lead to inadequate cash flow that should otherwise support construction expenses especially that of contractors who are financially not sound. This gives a strong support on the role of cash flow management in the industry as it influences profitability when project is on-going (Hwee *et al*., 2002).

As suggested by Edum-Fotwe (1996) construction firms must undertake regular performance evaluation to ensure the adoption of timely and appropriate strategies to sustain the business. Understanding the causes and symptoms of business failure would help identify early warnings of an impending financial crisis (Kangari, 1992).

2.4 FIRM SIZE PROFITABILITY RELATIONSHIP

Empirical investigations of the relationship between firm size and profitability in industrial economies in the past have given varying results. The nature of the relationship between firm size and economic performance has received considerable attention in literature and has provoked vigorous debate. Some studies have found either a weak negative relationship or none at all (Marcus, 1969); others have found a positive association (Hall and Weiss, 1967).

Still others have found a positive association that disappears or reverses itself among the firms with the largest assets. The potential for a negative relationship was presented within the theory of the firm, which focuses on alternative theories of a firm's motivation (Amato and Wilder, 1985). One of the more important contributions to come from this theory is that managerial utility maximization may replace profit maximization as the firm's objective function (Alchian, 1965).

Several arguments favour larger firm sizes in attaining higher performance. Large firms are more likely to exploit economies of scale and enjoy higher negotiation power over their clients and suppliers (Serrasqueiro and MacasNunes 2008; Mansfield 1962; Singh and Whittington 1975). In addition, they face less difficulty in getting access to credit for investment, have broader pools of qualified human capital, and may achieve greater strategic diversification (Yang and Chen, 2009). On the other hand, small firms exhibit certain characteristics which can counterbalance the handicaps attributed to their smallness. They suffer less from the agency problem and are characterised by more flexible non-hierarchical structures, which may be the appropriate organisational forms in changing business environments (Yang and Chen, 2009).

Existing empirical evidence has not been unambiguous, lending support to both a positive and a negative impact of firm size on performance. Yang and Chen (2009) compared the technical efficiency of SMEs with that of large firms and were inconclusive about the relationship when choosing different estimation methods. In a study on Portuguese companies Serrasqueiro and Nunes (2008) found that size is related positively to

performance but only for the sample of SMEs and not for large firms. A similar finding by Diaz and Sanchez (2008) in the Spanish context suggested that SMEs were more efficient than large firms lending support to earlier studies that identified an inverse relationship between size and performance (Hall 1987; Hart and Oulton, 1996). These studies imply a relationship between firm size and performance that might not necessarily is linear, as illustrated in Barrett *et al*. (2010); Yoon (2004), and Risseeuw (1997), which conclude that company growth beyond optimal level, can deteriorate performance.

Managerial utility maximization is a by-product of the separation of ownership from management in modern corporations. This separation may increase with firm size, making large firms more vulnerable to managerial utility maximization than smaller firms. Managerial utility maximization thus provides a conceptual framework for a negative relationship between firm size and profitability.

An integration of the above-mentioned literature implies that the relationship between firm size and profitability may be positive over some firm size ranges and negative for others. Moreover, once a threshold size is reached, additional increases in size may further separate ownership from control. These arguments suggest that the relationship between firm size and profits can become negative beyond the threshold firm size (Amato and Wilder, 1985).

A closer investigation of the question of large or small enterprises reveals that the different lines of research and the different results need not necessarily contradict each other. Different researchers use different samples, industry groups, time horizons, and indicators. If

they were to pose identical questions and apply similar theoretical as well as empirical methodologies, they possibly would have come up with consistent answers (Schneider, 1991).

2.4.1Profitability and Industry Factors

The nature of the relationship between firm size and profitability is an important issue that may shed some light on the factors that maximize profits. A major study done by Crum in 1939 for all

United States industry formed the basis for much of the later work done in this field. One of the early themes in the empirical study of this relationship is economies of scale. Other themes or theories in the empirical study of this relationship include market imperfections, the concept of strategic groups, and the relative importance of concentration and market share.

Firms achieve economies of scale when their operating costs increase at a rate lower than their output. Firms do not achieve economies of scale simply by increasing their size. Economies of scale are likely to result only if the firms have sufficient idle capacity and organization systems already in place prior to expanding (Katrisher and Scordis, 1998). The studies of economies of scale found that plant size variations are associated systematically with market share, the degree to which sales are concentrated in the hands of a few leading producers. Concentration or seller concentration, which is a characteristic of the industry to which a firm belongs and one of the measures of interproduct competition computed by the product shipment, had a positive association with plant size (Scherer, 1973).

The nature of construction is different from manufacturing, in which firms have products to be shipped to customers, so the product shipment could be a factor associated with plant size and can be determined. On the other hand, the output of a construction firm is construction projects to be delivered on a certain schedule and at a certain cost. The product shipment is incorporated with other costs, that is, labour, materials, equipment, and overhead, and cannot be determined. These variables could be associated with firm size and profitability.

In market imperfection studies, there is a significant though probably not enormous capital requirements barrier that very likely has a greater effect on profit rates than concentration, the traditional index of market power. The study of strategic groups by Newman (1978) concluded that the standard structure-performance model supplies a better explanation of inter industry variations in market performance for a group of homogeneous industries, and it collapsed in a sample of heterogeneous industries. A traditional dependent variable in the structure-performance model is price-cost margin (PC), defined by Collins and Preston (1969) as the percentage gross return on sales before taxes. The statistical approximation used was PC = value added – payroll - equipment rental/value of shipments.

Independent variables are compressed to the following variables:

• K/O5average value of ratio of gross assets to value of shipments;

•GR5growth rate of industry shipments; and

• C5average value of firm concentration ratio.

In the construction industry, the shipment costs are incorporated with other costs such as labour, material, and equipment and cannot be determined when studying construction firms,

so that the structure-performance model is not suitable to be applied to the construction industry.

Other research related to a firm's size-profitability relationship, such as Lindsey (1981) and Hall and Weiss (1967) found that growth rate is one of the significant determinants of profitability.

Lindsey (1981) accounted for the effect of change in profit resulting from change in demand or cost by using the growth rate of firm assets. Profitability could be related to changes in output as a result either of increased demand or reduction of costs. The reduction in costs could come directly from investing in more productive capital equipment; increased demand could stimulate expansion on the part of the firm. A positive relationship is expected between profitability and growth rate. In construction, growth may not be best for every company, and even companies that should grow need to be aware of the cost and risk of growth (Side, 1993).

In this study, growth rate is defined as change in annual fixed assets of the firm because a firm's expansion is reflected in its annual fixed assets. Including growth rate in this study may clarify its role and significance as one of the determinants of profitability. Growth rate yields insight into management success and efficiency.

2.4.2 Profitability and Economic Factors

A macroeconomic model developed by Kangari (1988) to predict business failure in the construction industry found that the majority of these variables are significant in relation to the failure rate. Russell and Zhai (1996) developed a failure prediction model using

economic and financial variables. The significant variables used in the model are trend-prime interest rate, future position-new construction value-in-place, trend-new construction value-in-place, future position-net worth/total assets, trend-gross profit/total assets; and volatility-net working capital/total assets. Research in the construction industry that accounted for the effect of the economy did not examine business profitability but business failure. Considering the above literature, interest rate, gross domestic product, and new business activities may have a significant effect on the profitability of contractors.

2.5 PROJECT DELIVERY SCHEDULE FAILURES

The problem of project delivery schedule failure is an old but recurring problem in the construction industry. Project delivery schedule are notorious for their inability to deliver according to plan. In Nigeria, the problem is severe and is a major cause of cost overrun. Projects in Nigeria overrun their contract duration by between 50 and 420% (Elinwa and Jagboro, 1993). Delivery schedule slippage could have significant effect on the completion cost projects (Aibinu and Jagboro, 2002) . It often generates conflict between parties when they are unable to determine and allocate responsibility for the problem (Aibinu, 2007). Conflict and dispute could lead to further delivery schedule slippage. Factors contributing to schedule slippage are many. In an earlier study, variation order and price escalation were found to be factors significantly influencing schedule failures and cost overrun in Nigerian projects. According to Chan and Kumaraswamy (1994) timely delivery of projects within budget and to the level of quality standard specified by the client is an index of successful project delivery.

In order to lessen project delivery schedule failure, clients and their project management team need to pay greater attention to the most significant factors. In particular, they need to give adequate time for project planning in order to adequately capture client's needs, ensure adequate scoping of project, reduce incompleteness of design, reduce design errors and thereby reduce variations during construction. Clients need to arrange for sufficient finance prior to project award; and during tendering, consultants should conduct thorough due diligence investigation to ensure that the selected contractor is financially capable and has sufficient financial and management capability. The use of management-led procurement approach could also mitigate coordination and decision-making problems.

2.6 FINANCIAL DISTRESS RELATED FACTORS

According to Ahmed *et al.* (2003) and Alaghbari (2005) , the possible financial related factors that lead to delays in Malaysian construction projects are financial problems of clients such as delayed payments, financial difficulties and economic problems; financial and cash flow problems of contractors; and external factor of poor economic conditions such as currency and inflation rate. In addition, difficulties in obtaining loans (Arditi *et al.*,1985) and short of funding are adverse financial-related factors that were identified in previous works.

2.6.1 Late payment

Late payment problem is endemic in construction and needs to be explicitly recognized as this problem recurs from project after project. Payments, which implies a major problem as monies, is needed to pay for materials, labour, plant, subcontractors' account rendered,

preliminaries and general overheads expended during the progress of the work (Odeyinka,1998).

Late payment is defined as failure of a paymaster to pay within the period of honouring of certificates as provided in the contract (Harris and McCaffer, 2003). The parties involved in the process of payment claim such as client, contractor, superintending officer, architect, quantity surveyor, banker and other construction players may cause a payment to be delayed. A delayed payment by a party who is involved in the process of payment claim may have an influence on the supply chain of payment in whole.

According to the Construction Industry Working Group on Payment (2007), problems in payment at the higher end of the hierarchy will lead to a serious knock-on cash flow problem down the chain of contracts. The identified underlying causes of late payment include client's poor financial and business management, withholding of payment by client, contractor's invalid claim, delay in valuation and certification of interim payment by consultant, inaccuracy of valuation for work done, insufficient documentation and information for valuation, involvement of too many parties in the process of honouring certificates, heavy workloads of consultant to carry out evaluation for work done and contractor's misinterpretation of client's requirement of variation order.

The risk of late payment in the construction industry can be adversarial and disastrous. Late payment will affect cash flow of a company and may eventually lead to company's insolvency. Timeliness of payment is important to circumvent the risk of late payment. Once

a payment problem starts to expand, it typically gets worse over time (Gregory, 2007) and will shift the financial burdens from one participant to other participant and create cash flow problem.

Clients have become more demanding, more discerning, and are less willing to accept risk (Flanagan, 2002). It is normal practice for some clients to shift some risks to other parties further down the chain by reducing their financing costs through delaying of payments. This will shift the financial burden to the contractors who may not have large capital assets and large amounts of credit available to cover payment delays.

2.6.2 Poor Cash flow Management

Cash flow management is defined as a process of monitoring, analysing and adjusting projects' cash flow (Ward, nd). According to Ward (nd), the most important aspect of cash flow management is to avoid extended cash shortages that are caused by having too great a gap between cash in flows and outflows. Thus, a well-managed cash flow is important to enable the delivery of a successful project by performing a cash flow analysis on a regular basis to identify cash flow problems (Ward, nd). In analysing the cash flow of a project, cash flow forecasting is an essential method to head off cash flow problems. It is then important to develop and employ strategies that will maintain an adequate cash flow for the project. Therefore, a well-managed cash flow will improve the project's cash flow and subsequently improve the timely performance of a project.

Conversely, a poorly managed cash flow represents the opposite. The underlying causes to poor cash flow management can be categorised as (1) contractor handles too many projects at the same time, (2) contractor's instable financial background, (3) unqualified contractor underbidding the project cost, (4) lack of regular cash flow forecasting, (5) poor credit arrangement with creditors and debtors and (6) capital lock-up.

2.6.3 Insufficient Financial Resources

According to Kaming *et al*. (1997), one of the most important factors causing delays in high-rise projects in Indonesia is the shortage of resources. In addition, Noulmanee *et al. (*1999) investigated the causes of delays in highway construction in Thailand and concluded that one of the main causes of delays is the insufficient resources of an organisation. A survey by Ubaid (1991) concluded that the contractor s resources are the major measures on the contractors' performance that cause delays. The resources include financial resources, human resources, material resources and equipment resources. However, only the financial resources are focused in this research, as Abdul-Rahman *et al.* (2006) addressed that lack of funds may affect the project's cash flow and lead to delay in site possession, which consequently causes delays in the project as a whole. The factors that would cause insufficient financial resources are (1) difficulties in obtaining loan from financiers and (2) allocation of government budget not in place.

2.6.4 Financial Market Instability

According to Ahmed *et al*. (2003) and Alaghbari (2005) , the external factor of poor economic conditions such as currency and inflation rate would significantly give impact to

project's cash flow, and hence affect the timely performance of the project. The underlying causes to financial market instability, which will then lead to cash flow problems in construction project include (1) increment of interest rate in repayment of loan, (2) inflation of material prices, labour wages and transportation costs and (3)increment of foreign exchange rate for imported materials.

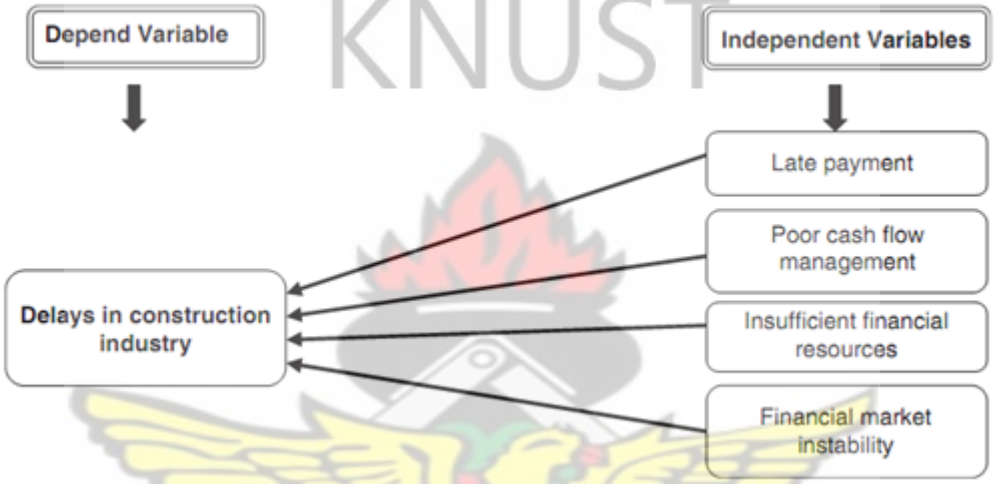

Figure 3: relationship between dependent and independent variables

2.7 CHAPTER SUMMARY

This chapter began with discussions on contextualisation of financial distress in construction firms, causes and classification of delays. Previous works on delays in construction by researchers in other countries were also discussed. The chapter also discussed project delivery schedule failures before finally concluding with discussions on the financial distress related causes of delay.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 INTRODUCTION

This chapter is very vital to the conduct of this research as it is the pivot around which all activities of the research revolve. It comprises of the key strategy adopted for the research and its finding followed by the rationale for the adoption of such a strategy. The research design comprises of data sources which involves desk survey which aided in the identification of key research variables; questionnaire development, distribution and statistical tools for data analysis.

The purpose of the methodology and research design is to provide direction in the planning and implementation of the study in a way that is most likely to achieve the intended goal. The methodology is a blueprint for conducting the study (Burns and Grove, 1998). Similarly, Polit and Hungler (1999) refer to it as the process of following the steps, procedures and strategies for gathering and analyzing data in research investigation. According to Burns and Grove (1998), methodology includes design, setting, sample, methodological limitation and data collection and analysis techniques in a study. It is the know-how of the scientific methods and techniques employed to obtain the valid knowledge. Thus methodology is the way by which we gain knowledge about the world, trying to discover how we can go about the task of finding out what we believe to be true (Christou *et al*., 2008).

3.1 RESEARCH STRATEGY

The clarification of the orientation of the researcher to the conduct of research (Bryman 2005), as cited by Baiden, 2006 is of paramount essence. The research strategy dwells on how the research objectives are questioned. The three main strategies are quantitative, qualitative, and triangulation (Baiden, 2008). The choice to follow any particular strategy depends on the purpose of the study, the type and availability of information for the research (Naoum, 2002), cited by Baiden (2006). This research follows a quantitative strategy by the utilization of survey questionnaires to elicit data from respondents. The quantitative strategy is suitable for this research because of the desire of the researcher to measure the opinions of respondents using scientific basis (positivist) approach. By adopting the quantitative strategy, the researcher was entirely detached from the research phenomenon unlike the other strategies like the qualitative strategy. It is envisaged that financial distress emanating into project delays are phenomenon experienced by managers of construction firms.

3.2 RESEARCH DESIGN

This deals with the framework for data collection and analysis; the structure that guides the execution of the technique for collection and analysis of data, which provides the connection between empirical data and its conclusions in a logical sequence to the initial research question of the study (Bryman, 2005; Yin 2003) cited by Baiden (2006). Research design includes experimental, survey, action research and case study (Blismas, 2001) *cited* by Baiden (2006).

This research adopts a survey design which is preceded by thorough literature review and interviews. In this study the indepth interview was employed to gain insight into the topic

and increase knowledge on the causes of financial distress in the Ghanaian construction industry. A survey questionnaire is selected because of the need for generalization in the findings across the industry. It also enhances reliability of observations and improves replication because of the inherent standardized measurement and sampling techniques (Oppenheim, 2003).

3.3.2 Data Sources

The approach for collecting data involves desk survey and field survey. The desk survey (literature review) forms an essential aspect of the research since it sets the pace for the development of questionnaire (Fadhley, 1991). The field survey deals with a collection of empirical data. A quantitative approach to data gathering is adopted for the purpose of this research which involved survey questionnaires. Desk survey culminated into the identification of key financial distress and project delay variables which were used in the development of questionnaires which were administered to respondents to collect data for analysis.

3.3.3 Questionnaire Development

It was essential to first establish the information to be gathered so that relevant questions are solicited (Oppenheim, 1996). The format of the questionnaires was guided by considerations of appeal to respondents and ease of reading and supplying the required data so that research participant's time were not wasted during the data collection. The questionnaires were designed to include; close ended questions and scaled response questions. The likert response scale of 1 to 5, where 1= not critical; 2= less critical, 3= averagely critical, 4=

critical and 5= very critical were employed to measure the strength or intensity of respondent's opinion. The diction of the questionnaire was simple as jargons and other technical terms were very minimal in the crafting of the questions. Similarly, the numbers of questions were kept minimal to encourage respondents to answer the questions. The questionnaire consisted of six (6) questions: the purposes of the first two questions were to determine the structure of the firms and their years of experience. The third question sought to ascertain whether FDR factors contribute significantly to project delay. In the last three questions on the questionnaire, respondents (small, medium and large size road contractors) were asked to respectively rate the extent of the 20 financial distress related factors to project delay, the degree of responsibility of the parties in reducing the impact of these factors and the relative importance of 14 mitigation actions in reducing the impact of these factors on project delivery.

3.3.4 Sampling and Sample Size Determination

From the Ministry of Road and Highways, the list of road contractors in good standing as at 9th November, 2011 consisted of 1,997 contractors and out of this 63% are in Accra and Kumasi. This means there are about 1257 registered road contractors. To determine the minimum sample size of these registered contractors in the Accra and Kumasi metropolis, Kish (1965) formula which gives a procedure for calculating minimum sample size has to be applied.

The Kish Formula states;

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

Where,

$\boldsymbol{n}$ = Sample size

N = Total number of road contractors in Accra and Kumasi

$\boldsymbol{n^1} = S^2/V^2$

V = the standard error of sampling distribution = 0.05

$\mathbf{S^2}$ = the maximum standard deviation of the population

Total error = 0.1 at confidence interval of 95%

$S^2 = P(1 - P)$ where P = 0.5

$= 0.5(1 - 0.5)$

$= 0.25$

P = the proportion of the population elements that belong to the defined region.

Since $n^1 = S^2 / V^2$

$= 0.25 / 0.05^2$

$n^1 = 100$

N = 1257

$$\boldsymbol{n} = \frac{100}{(1 + 100/1257)}$$

$$\boldsymbol{n} = \frac{100}{1.079}$$

$$\boldsymbol{n = 92.6}$$

$$\boldsymbol{\sim 93}$$

Adding 10% for non-responsiveness;

$\frac{10}{100} \times 93 = 9.3$

Sample size = 93 + 9 = 102

This means that the minimum sample size of road contractors in Kumasi and Accra to be used for the study is approximately 93. This 93 number of contractors helped in establishing the actual sample size for the study. A 10% allocation was then made for non-responsiveness giving a total of 102. This comprised 30% for Kumasi and 70% for Accra respondents. The percentages was based on the ratio of registered road contractors in the two cities.

The snowball sampling technique was adopted in selecting the respondents for the research. The snowball sampling is techniques of locating respondents who are very visible for administration of questionnaires at first instance and based on a network from these initial respondents other key respondents are located for questionnaire administration. The reason for utilizing the snowball technique is as a result of the inability to easily locate respondents whose office or places of work cannot be located by the researcher with ease because of structural planning problems within the scope of the study.

3.3.6 Questionnaire Distribution

The102 questionnaires were evenly distributed among contractors operating with feeder roads, urban roads and highways by the researcher. Out of this 78 questionnaires representing 76.47percent were completed, and these were used in the analyses. The response rate is the proportion of completed questionnaires in the total number of eligible respondents and literature assumes that higher response rate demonstrates validity of the study findings (Coffey *et al*., 1996). Aibinu *et al.* (2006), in accessing construction delays and their causative factors in Nigeria, made reference to assertion by Moser and Kalton (1971) that "the result of a survey could be considered as bias and little value if the return

rate was lower than 30-40%". This assertion indicates that the response rate of 76.47% was adequate for the analysis. The high response rate of 76.47 percent may be attributed to the strict adherence to the techniques employed in distributing the questionnaires and the persistent follow ups to retrieve the questionnaires. The whole survey process took approximately 6 weeks to complete.

3.3.7 Data Analytical Tool

After the questionnaire retrieved they were prepared by coding and fed into the Statistical Packages for Social Sciences (SPSS version 16) for data aggregation and subsequent analysis. The selection of an analytical tool is contingent on a thorough review of available analytical and statistical tool. The choice of test is dependent on the type of variables that one has i.e. whether variables are ordinal or interval, categorical and whether they are normally distributed. In this research since the data was ordinal data, the Chi square test was suitable for testing the hypothesis of the study.

Factor analysis was used to analyse the interrelationships among the large number of issues identified in the literature and to explain these issues in terms of their common underlying dimensions. It is a form of exploratory multivariate analysis that is used to condense the number of original variables into a smaller set of dimensions with a minimum loss of information (Hair *et al*., 1992), cited in (DeCoster, 1998) or to detect relationships among variables. It therefore establishes which of the variables could be measuring aspects of the same underlying dimensions.

3.4 CHAPTER SUMMARY

The chapter three has dwelt extensively on the procedures that were adopted in conducting the research. The key methodological dimensions of this study include the usage of quantitative research strategy; data collection instrument design in which survey questionnaire was utilized; the distribution of the survey questionnaire was solely by face-to-face using snowball sampling to locate respondents who were mainly contractors in the road sector of Kumasi and Accra. The retrieved data was analysed using SPSS which churned out interesting results in its output for analysis in chapter four below.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF RESULTS

4.0 INTRODUCTION

This chapter contains the analysis of the results realized through data collection. It concentrates on the profile of the respondents, the descriptive analysis of results cum their respective discussions; the inferential aspect which is hypothesis testing; and factor analysis intended to identify the latent characteristics of the results and subsequently to reduce the large number of variables that might have similar effects through classification.

4.1 RESPONDENTS PROFILE

A knowledge of the background of the respondents helps to create confidence in the credibility of data collected. As earlier indicated, the main characteristics that were of interest were the firm structure and the numbers of years of experience to ensure responses were valid and accurate. Respondents operating were asked to indicate their structure just to be assured that the targeted respondents (small, medium and large sized contractors) actually completed the questionnaire and not for the analysis of which class answered in which direction. According to Owusu-Manu (2008) *cited* in Otu-Nyarko (2010), it is often argued that the nature of legal organization affect the behaviour of the firm's activity. Again, as a requirement for acquisition of Government of Ghana works, firms are supposed to be legally registered.

4.1.1 Legal status of respondent firms

Table 1presents the responses on the legal status of the respondent firms. The table shows that 22 respondents representing 28 percent are enterprise or sole proprietorship, 18 of the respondent firms representing 23 percent are in partnership or joint venture and 38 respondents representing 49 percent are limited liability companies. From the above it can be concluded that the most dominant firm operating in the road sector in Ghana is the Limited Liability Companies.

Table 1: Legal status of firm

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sole proprietorship / enterprise	22	28.2	28.2	28.2
	Partnership	18	23.1	23.1	51.3
	Limited liability company	38	48.7	48.7	100.0
	Total	78	100.0	100.0	

The experience of the respondents in the context of this research is determined as the number of years of practice and involvement in road construction. The assumption here is that all things being equal a contractor's years of experience is likely to have a direct influence on his experience with respect to project delivery and the financial constraints that are associated with it, hence be in a position to supply credible answers to the questionnaire.

4.1.2Respondents years of experience

Table 4.2presents the results of the years of experience in the road sector. From **Table 4.2**, 19 percent of the respondents have up to 5 years of working experience, 35 percent have

working experience from 6 years to 10 years; 30 have working experience of 11 to 15 years; 10 percent have working experience of 16 to 20 years; and the remaining 6 percent have over 20 years' experience. In all the majority of the respondents constituting 81% indicated that they have been involved in road construction in Ghana for over five years. It may therefore be concluded that those who responded to the survey are sufficiently experienced in the construction industry to provide credible data.

Table 2: Respondents' years of experience

Years of experience		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	up to 5 years	15	19.2	19.2	19.2
	6 - 10 years	27	34.6	34.6	53.8
	11 - 15 years	23	29.5	29.5	83.3
	16 - 20 years	8	10.3	10.3	93.6
	over 20 years	5	6.4	6.4	**100.0**
	Total	**78**	**100.0**	**100.0**	

4.1 Relationship between FDR factors and project delay

The next stage of the analysis explores the perception of the contractors as to whether financial distress related factors significantly contribute to project delay. A look at the response from showed that all respondents were of the opinion that FDR factors contribute significantly towards project delay.

Table 3: Relationship between FDR factors and project delay

Response	Frequency	Percent	Valid Percent	Cummulative Percent
Yes	78	100.0	100.0	100.0

4.2 DESCRIPTIVE STATISTICS OF FDR CAUSES OF PROJECT DELAY

Prior to the main non-parametric test of the study, preliminary descriptive analysis such as mean ranking and standard deviations of each of the variables was conducted to help provide a clearer picture of the outcome of the survey; and the results are tabulated in **Table4.** Using the five-point Likert rating scale, a variable was arbitrary considered critical if it had a mean of 3.5 or more (Field, 2005) cited in Owusu and Badu (2009). The standard error is the standard deviation of sample means and it is a measure of how representative a sample is likely to be of the population (Field, 2005). A large standard error reflects a lot of variability between means of different samples and a small standard error suggests that most sample means are similar to the population mean and so the sample is likely to be an accurate reflection of the population (Field, 2005).

From **Table 4** almost all the variables have mean values above the accepted population mean of 3.5, it is reasonable therefore to conclude that they constitute the FDR factors that cause project delay in the Ghanaian context. The standard error associated with all the means were relatively closer to zero suggesting that the sample chosen is an accurate reflection of the population. Finally, from the results in **Table 4** the standard deviations of a large majority are less than 1.0 signaling that, there is little variability in the data collected and consistency in agreement among the respondents.

From the bases of the descriptive statistics, it could be concluded that the variables identified as the FDR causes of project delay in Ghana through the literature review and the interviews reflect the views of the respondents.

Table 4.4: Descriptive Statistics (FDR factors)

FDR FACTORS CRITICAL TO PROJECT DELAY	N	Mean	Std. Error	Std. Deviation
Client's poor financial and business management	78	4.46	0.087	0.768
High overhead expenses	78	3.58	0.072	0.635
Contractor's invalid claim	78	3.55	0.104	0.921
Withhold of payment by client	78	3.71	0.069	0.605
Bureaucracy in honouring payment certificate	78	3.53	0.077	0.679
High insurance costs	78	3.76	0.107	0.942
High tax allocation	78	4.44	0.094	0.831
Divulging funds	78	4.00	0.102	0.897
Fraudulent practices by employees	78	4.08	0.103	0.908
Capital lockup	78	4.08	0.085	0.752
Inaccuracy in valuation for work done by consultants	78	3.67	0.075	0.658
Unstable inflation rate	78	3.51	0.111	0.977
High interest rate chargeable on loans	78	3.56	0.119	0.988
Underestimation of project cost	78	3.47	0.907	0.801
Contractor handling many projects at the same time	78	3.83	0.080	0.710
Lack of regular cash flow forecasting	78	3.92	0.114	1.003
Low markups / profit margins	78	3.54	0.079	0.697
Poor credit arrangement with creditors and financiers	78	3.49	0.121	1.066
Difficulty in loan accessibility from financiers	78	3.69	0.117	1.036
Insolvency / liquidity	78	3.23	0.121	1.068

4.3 TEST OF HYPOTHESES

The descriptive analysis of the results have largely indicated that the respondents agreed with the identified variables as being the financial distress related causes of project delay in Ghana. However, it is possible that these observations might be due to chance, rather than

being the true reflection of the entire population. It was therefore necessary to test the data with an appropriate statistical method. The chi-square test (a non-parametric test) was chosen because of uncertainty about the nature of the distribution of the population. Thus the chi-square test of significance was conducted for the financial distress related causes of project delay. The null hypotheses were stated that "the financial distress related variables identified by the review and in-depth interviews are not critical in contributing to project delay in the Ghanaian context"; and the alternative hypotheses stated that "the financial distress related variables identified by the review and in-depth interviews are critical in contributing to project delay in the Ghanaian context". Below are the details of the test:

Hypotheses

Ho: financial distress related causes (factors) do not significantly contribute to project delays.

Hα: financial distress related causes (factors) significantly contribute to project delays.

The hypotheses were tested using the Chi Square test at the conventional p-values of $p \leq 0.05$. The rule for the acceptance or rejection of a hypothesis is that if a p-value < 0.05 is achieved, the hypothesis is accepted and if a p-value > 0.05 is achieved, the hypothesis is rejected (Field, 2005). The results of the chi square tests presented in **Table 5** indicate that all the financial distress related variables identified recorded p-values of ≤ 0.05.

The test of hypothesis for the FDR causes demonstrated that the *p-value* for all the variables are less than 0.05 (*p-value* < 0.05). This implies that the null hypothesis is rejected.

Therefore, there is significant statistical evidence to suggest that financial distress related causes (factors) significantly contribute to project delays as indicated in Table 5 below in relation to the variables (causes) tested. This test clearly shows that the causes of FDR are directly related to project delays.

Table 5: Test of hypothesis (factors)

FDR Factors	Chi square	df	Asymp. Sig. p values	Decision
Client's poor financial and business management	66.92a	3	0.000	Accept
High overhead expenses	56.872a	3	0.000	Accept
Contractor's invalid claim	35.333a	3	0.000	Accept
Withhold of payment certificates	62.205a	3	0.000	Accept
Bureaucracy in honouring payment certificates	31.000b	2	0.000	Accept
High insurance cost	17.897a	3	0.000	Accept
High tax allocations	65.282a	3	0.000	Accept
Divulging funds	26.923a	3	0.000	Accept
Fraudulent practices by employees	16.974a	3	0001	Accept
Capital lockup	16.000b	2	0.000	Accept
Inaccuracy in valuation for work done by consultants	54.718a	3	0.000	Accept
Unstable inflation rate	24.923b	2	0.000	Accept
High interest rate chargeable on loans	26.385b	2	0.000	Accept
Underestimation of project cost	28.538c	4	0.000	Accept
Contractor handling many projects at the same time	15.077c	4	0.005	Accept
Lack of regular cash flow forecasting	44.051a	3	0.000	Accept
Low markups / profit margins	49.282a	3	0.000	Accept
Poor credit arrangement with creditors and financiers	16.051a	3	0.001	Accept
Difficulty in loan accessibility from financiers	17.897a	3	0.000	Accept
Insolvency / liquidity	29.154b	2	0.000	Accept

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 19.5
b. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 26.0

c. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 15.6

4.4 FACTOR ANALYSIS

Factor analysis is a statistical technique used to identify a relatively small number of factors that explain observed correlations among variables (Marija, 2003). The fundamental logic underlying the technique is to statistically manipulate the empirical relationship among several variables to help reveal hypothetical constructs of the relationships (Kreuger and Neumann, 2003). For such relatively large number of the dependent variables (20) involved in the study, it is possible that some of the variables are measuring the same underlying effect. It was therefore considered appropriate to use factor analysis for data reduction to establish which of the variables could be measuring aspects of the same underlying dimensions.

4.4.1 INITIAL CONSIDERATIONS

4.4.1.1 Sample size

Correlation coefficient fluctuates from sample to sample. The reliability of factor analysis is therefore dependent on the sample size (Field, 2005). The common rule is to suggest that a researcher should have at least 10 to 15 participants per variable. (Field, 2005).

In SPSS a convenient option is offered to check whether the sample is big enough: the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO-test). The sample is adequate if the value of KMO is greater than 0.5.

The data from the survey for the financial distress related causes of project delay is adequate by these tests. The data has 78 observations per variable, with the value of the KMO greater than 0.5 (**Table 6**).

Table 6: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.705
Bartlett's Test of Sphericity	Approx. Chi-Square	845.063
	Df	190
	Sig.	.000

The KMO statistic varies between 0 and 1. A value of 0 indicates that the sum of partial correlations is large relative to the sum of correlations, indicating diffusion in the pattern of correlations (hence, factor analysis is likely to be inappropriate (Field, 2005). A value close to 1 indicates that patterns of correlations are relatively compact and so factor analysis should yield distinct and reliable factors (Field, 2005). Hutcheson and Sofroniou (1999), cited in Field (2005), indicated that a more detailed classification is that values between 0.5 and 0.7 are mediocre; 0.7 and 0.8 are good; 0.8 and 0.9 are great and those above 0.9 are superb values. The analysis gave a KMO of 0.705; hence factor analysis is appropriate for this study (*See* **Table 6).**

Bartlett's Test tests the null hypothesis that the original correlation matrix is an identity matrix (Field, 2005). For factor analysis to work we need some relationships between variables and if the R-matrix were an identity matrix then all correlation coefficients would be zero (Field, 2005). Therefore, we need this test to be significant (i.e. have a significance value less than 0.05) (Field, 2005). A significant test tells us that the R-matrix is not an

identity matrix; therefore, there are some relationships between the variables we hope to include in the analysis (Field, 2005). Bartlett's Test for this study was highly significant ($p<0.001$), and therefore factor analysis is appropriate. (Field, 2005) (**See Table 6**)

4.4.1.2 Communalities

The proportion of variance explained by the common factors is called the communality of the variable. It is the percentage of variable's variance explained by the factors. This is the sum of squares of variances multiplied by 100 percent of each common factor for each variable. Communalities can range from 0 to 1; where 0 implies that common factors do not explain any of the variance and 1 implies that all the variance is explained by the common factors. The variance that is not explained by the common factors is attributed to the unique factor for each variable.

The principal component starts with as many components as there are variables, so the component together explains all the observed variability in each of the variables. That is why in the communality table, the column labeled initial always has a value 1.0 for the communality of each variable. Reducing the factors to a smaller number reduces the communalities for each of the variables. That gives the extraction communality on the column labeled extraction on the communalities table.

As indicated in **Table 7** the average of the communalities of the variables after extraction was above 0.60.

Table 7: Communalities

FDR Causes of Project Delay	Initial	Extraction
Client's poor financial and business management	1.000	.679
Contractor's invalid claim	1.000	.912
High overhead expenses	1.000	.424
Withhold of payment by client	1.000	.810
Bureaucracy in honouring payment certificate	1.000	.812
Budget allocation not made by client	1.000	.455
High tax allocation	1.000	.944
Divulging funds	1.000	.851
Fraudulent practices by employees	1.000	.564
Capital lockup	1.000	.628
Inaccuracy in valuation for work done by consultants	1.000	.726
Unstable inflation rate	1.000	.917
High interest rate chargeable on loans	1.000	.655
Underestimation of project cost	1.000	.676
Contractor handling many projects at the same time	1.000	.416
Lack of regular cash flow forecasting	1.000	.835
Low markups / profit margins	1.000	.636
Poor credit arrangement with creditors and financiers	1.000	.716
Difficulty in loan accessibility from financiers	1.000	.821
Insolvency / liquidity	1.000	.696

Extraction Method: Principal Component Analysis.

The data was then subjected to principal component analysis (with varimax rotation). The eigenvalue and factor loadings were set at conventional high values of 1.0 and 0.50 respectively (Dainty *et al*., 2003).

Table 8: Rotated Component Matrix[a]

	Component					
	1	2	3	4	5	6
Client's poor financial and Business management			.578			
Contractor's invalid claim	.942					
High overhead expenses						.540
Withhold of payment by client	.891					
Bureaucracy in honouring payment certificate	.884					
Budget allocation not made by client					-.596	
High tax allocation				.964		
Divulging funds			.866			
Fraudulent practices by employees			.722			
Capital lockup						.784
Inaccuracy in valuation for work done by consultants	.848					
Unstable inflation rate				.941		
High interest rate chargeable on loans		.798				
Underestimation of project cost	.657					
Contractor handling many projects at the same time					.555	
Lack of regular cash flow forecasting			.882			
Low markups / profit margins					.662	
Poor credit arrangement with creditors and financiers		.841				
Difficulty in loan accessibility from financiers		.887				
Insolvency / liquidity		.810				

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

As show in **Table 8**, six components with eigenvalues greater than 1 .0 were extracted using factor loading of 0.50 as the cut – off point as cited in Ahadzie *et al*. (2010). In order to confirm the six components, both the Guttman-Kaiser rule and the Cattell scree test were used in determining the number of factors to be extracted. Guttman-Kaiser rule suggests that only those factors with an eigenvalue larger than 1 should be retained, whilst the Cattell scree test suggests that all further components after the one starting the elbow should not be

included. Applying these criteria on the number of principal components to be extracted suggest that 6 components should be extracted for the financial distress related causes of project delay. The scree plot which depicts the relationship between the various components and their corresponding eigenvalues can be seen to drop below eigenvalue 1 after the sixth component. As demonstrated in **Table 9**and**Figure 4.1**six (6) components with eigenvalues greater than 1.0 were extracted.

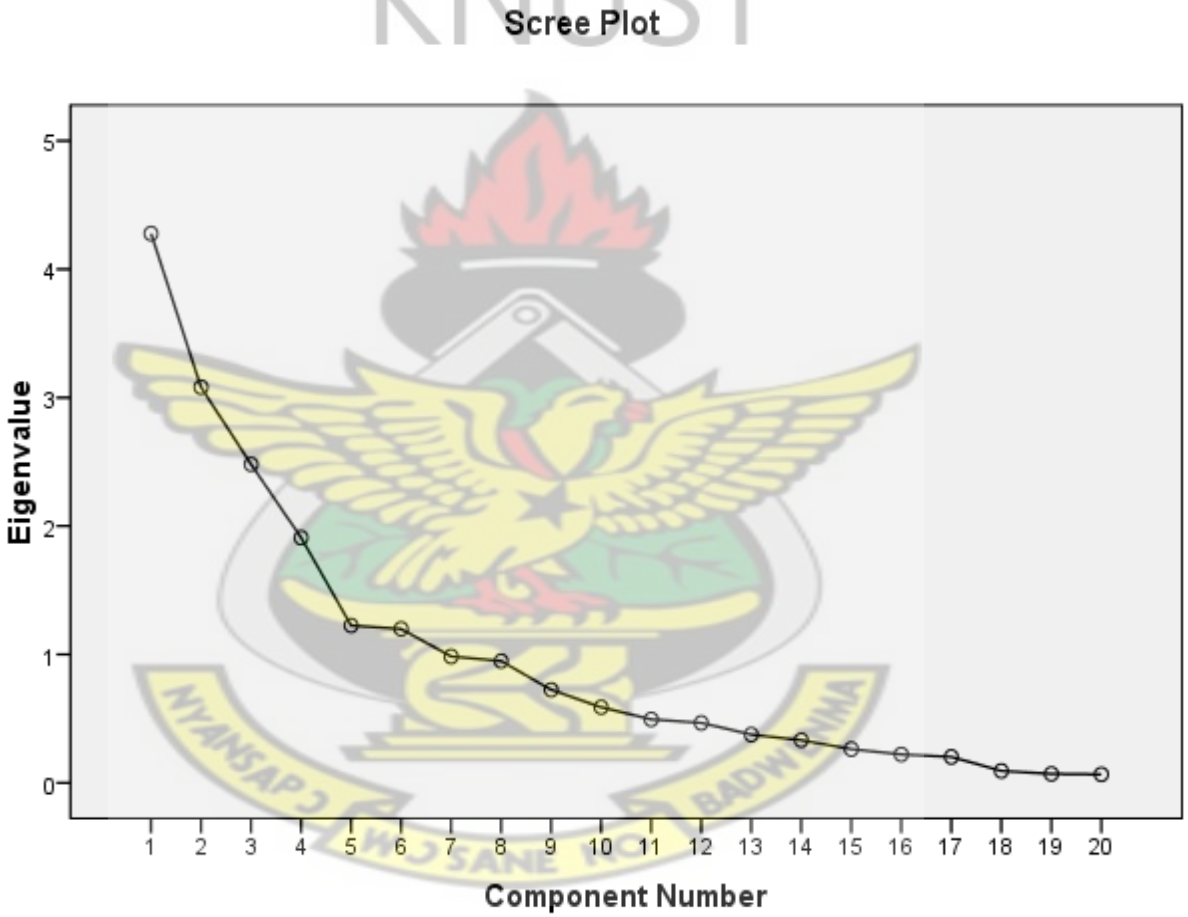

Figure 4.1: Scree Plot for the FDR variables

Table 9 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.277	21.387	21.387	4.277	21.387	21.387	3.794	18.970	18.970
2	3.081	15.405	36.792	3.081	15.405	36.792	2.914	14.570	33.540
3	2.480	12.398	49.190	2.480	12.398	49.190	2.598	12.988	46.528
4	1.909	9.547	58.737	1.909	9.547	58.737	2.054	10.272	56.801
5	1.226	6.129	64.866	1.226	6.129	64.866	1.411	7.056	63.857
6	1.199	5.993	70.860	1.199	5.993	70.860	1.401	7.003	70.860
7	.984	4.918	75.778						
8	.948	4.742	80.520						
9	.725	3.623	84.142						
10	.588	2.942	87.085						
11	.494	2.469	89.554						
12	.467	2.333	91.887						
13	.376	1.879	93.766						
14	.333	1.663	95.429						
15	.263	1.313	96.742						
16	.221	1.107	97.849						
17	.202	1.010	98.859						
18	.093	.464	99.323						
19	.069	.347	99.670						
20	.066	.330	100.000						

Extraction Method: Principal Component Analysis

As mentioned earlier, six components were extracted using an eigenvalue greater than 1. The total variance that accounted for each underlying component was explained using the percentages that loaded onto them. Component 1 accounted for 21.387% of the total variance; component 2 explained 15.405% of the remaining variation not explained by the first component whilst component 3 accounted for 12.398% of the remaining variation not explained by the first two components. The fourth component, component 4 explained 9.547% of remaining variation whilst component 5 explained 6.129% and component 6 accounted for 5.993% of the remaining variation that was not accounted for by the previous components. In all the six (6) extracted components cumulatively explained 70.860% of the variation in the data. According to the cumulative proportion of variance criterion, a minimum of 50% is adequate therefore 70.860 % is okay for this study.

4.4.2 ROTATION

The correlation pattern between factors and variables are very important because they are used to interpret the factors. It is the absolute value of the correlation coefficient that matters. Large negative correlations are as desirable as large positive correlations.

The purpose of rotation is to achieve a simple structure. In a simple structure, each factor has large loadings in absolute value for only some of the variables, making it easier to identify. It is desirable that each variable has large loadings for only a few factors, preferably one. This helps to differentiate the factors from each other. If several factors have high loadings on the same variables, it is difficult to determine how factors differ. It is worth noting that rotation does not affect the goodness of fit of a factor solution.

The results after factor rotation indicate the amount of variance between the variables that each factor accounts for and provides loadings of all the variables on each factor (Chris, 2004).

According to Comrey and Lee (1992), loadings of over 0.71 can be considered excellent, 0.63 to 0.70 very good, 0.55 to 0.62 good, 0.45 to 0.54 fair and 0.32 to 0.44 as poor.

4.4.3 DISCUSSION OF FACTOR ANALYSIS OF THE FDR VARIABLES

The result of the exploratory factor analysis was interpreted by assigning labels to the extracted variables (Chen and Choy, 2007). Thus, component 1 is labeled payment issues; component 2 as project financing issues; component 3 being cash flow issues; component 4 as economic issues; component 5 being political influence and lastly component 6 being represented by cost control issues. These names were derived based on their interrelated characteristics and combination of variables with high factor loadings

4.4.3.1 Component 1 - Payment issues

Five (5) variables loaded unto this component which accounted for 21.387% of the total variance: contractor's invalid claim, withhold of payment by client, bureaucracy in honouring payment certificates, inaccuracies in valuations for work done by consultants, underestimation of project cost with eigenvalues of 0.942, 0.891, 0.884, 0.848 and 0.657 respectively. From literature, conflicts and disputes often arise when a contractor perceives lack of fairness in the contract administrator's approach used in the assessment of claims (Spittler and Jentzen 1992). A dispute could also arise from what Zack (1993) described as "claimsmanship" which involves claims game and lack of fairness. This could reduce transparency during resolution of claims; subsequently mistrust will be generated and unnecessary tension generally leading to delay in payment and its rippling effect on the contractor's finances.

Reeves (2003) in his work stated that the main reason for delayed payment is as a result of errors in submitting claims. This includes claims without adequate supporting documents, wrongly calculated claims as a result of unqualified professionals and those submitted without following the right procedures. When these happen contractors will have to resubmit calculated claims and those submitted without making the required procedures and this repeats the whole process after making necessary corrections prolonging time involved in executing works. Withholding of payment by client may occur for a variety of reasons. They include defects in construction works, dispute works, failure to comply with any material provision of the contract, third party claim field or reasonable evidence that the claim will be filed and failure to make timely payments for project resources (Rourke and Gentry, 2002).

Yee and Abdul Rahman (2010), identified clients deliberate delay for their own financial advantage, delay in releasing retention monies to contractors and willful withholding of payment for personal reasons. When payments due under contracts are withheld, the contractor's financial position suffers and this in turn affects project performance (Sears *et al*., 2008; Gould 1997 Antill and Farmer, 1991; O'Brien and Zilly, 1997, Halpin and Woodhead, 1980, Carmechael, 2002).

Bureaucracy in honouring payment certificates accounts for payment related issues which affects a contractor's financial standing consequently as these processes also have their associated kickbacks to speed up proceedings. This indicates that although private sector has been able to find some factors that affect this delay in payment, bureaucrats and Government appointees in the ministry have not been able to solve the problem.

Inaccuracies in valuations for work done can arise in the issuance of payment certificates and can adversely affect the financial standing of the contractor. Variation orders are likely to contribute to such conditions; in the event of additions made and the necessary add ups neglected could cause the contractor a financial distress and delay project schedule. The industry is full of projects that were completed with significant cost deviations (Ahmed et al 2010). Cost deviations arise as a result of underestimation of projects. A more serious situation can confront a contractor when there is deliberate underestimation of costs in order to obtain project approval. According to Flyvbjerg (2003) large projects have been underestimated in order to obtain voter support for financing approval. Thus when projects exceed the budgeted estimate, difficulties are encountered in voting extra monies to cater for the differences and subsequently affect the project delivery.

4.4.3.2 Component 2 - Project financing issues

Four variables loaded unto the second component extracting 15.405% of the remaining variance that component 1 could not explain. The four variables that loaded on this component and their eigenvalues are: *high interest rate0.798, poor credit arrangement 0.841, difficulty in loan accessibility 0.887* and *insolvency 0.810*. Examination of the four variables that correlated very well with component indicates that the underlying factor for the component could be named project financing. Project financing involves problems firms encounter in sourcing funds for project and management issues.

The ability of firms to obtain credit varies widely based on the perceived risk of loan. A significant number of road contractors in Ghana are small firms and they represent a greater risk because of factors such as lack of significant credit history, inadequate collateral and

inadequate equity capital on their balance sheets. Klapper (2006) postulated that a major challenge for much small and medium enterprise (SMEs) is access to financing. Thus contractors propensity to gain access to financial market becomes problematic. Most of the contractors also have poor ownership characteristics with respect to education. As a result they stand a high risk of making poor decisions on credit arrangement and later suffer the adverse effect during repayment. The issues of interest rates associated with these credit facilities are not carefully considered as against their cash flow and as result contractors are faced with the problem of repayment, insolvency in the construction industry is high as compared to other industry sectors.

4.4.3.3 Component 3 – Cash flow Issues

The third component which accounted for 12.398%, of the remaining variation not explained by the first two components has been labeled "cash flow issues". The identified FDR factors which loaded onto this component are *divulging funds, fraudulent practices and lack of cash flow forecasting* with eigenvalues of 0.866, 0.722 and .882 respectively. Cash is the main engine of a company for making new investments, starting up new projects and keeping projects on track. Cash flow is the movement of cash into and out of a business outfit. Cash flow management entails a process of monitoring, analyzing and adjusting project's cash flow. In order to obtain success in a project, the lifeblood of the construction industry must flow with ease (Construction Industry Working Group on Payment 2007) thus regular cash flow forecasting must be conducted to identify cash flow problems as early as possible.

Divulging funds arise as a result of channeling or diversion of funds allocated for a particular project into other areas. Contractors sometimes channel payments for a particular project into other projects and personal use resulting in cash flow problems. This results from willfully failing to pay for services, labour, material or equipment provided for a project after payment has been made and wrongfully diverting the funds to pay for bills incurred on other projects. Thus money is used to defray cost with the intention of paying back and this adversely affects the project delivery.

Fraudulent practices is the second most important factor affecting construction delays in Nigeria as noted by Elinwa and Silas (1993). Hussein (1999) also noted that fraudulent practices and kickbacks are perpeturated by some major players in the industry. The perpetrators are predominantly found within the rank and file of contractors, consultants and public clients as evident from the report by TELL (2002).

4.4.3.4 Component 4 – Economic issues

Component 4 accounted for 9.547% of the variance and comprised *high tax allocation* loading 0.964 and *unstable inflation rate* 0.941 and was labeled **economic issues.** The longer the expected construction period, the more account will need to be taken of expected inflationary price increases over time. This is particularly important where a public authority's expenditure programme is involved. Initial cost estimates will need to allow for the value that will need to be paid at the time the project actually goes ahead. This affects original estimates of construction cost. Inflation may have been taken into account in the

original estimates, but if inflation increases above the predicted level during construction period, then the original cost estimate will be exceeded.

4.4.3.5 Component 5 – Political influence

The three variables which loaded on the fifth factor are: *budget allocation not made by clients, contractor handling many projects at the same time and low profit margins* with eigenvalues of .596, .555 and .662 respectively. This factor extracted 6.129% of the remaining variance that was not explained by the first four components. This component is named "**Political influence"** after a careful examination of the three variables that loaded onto it. In many areas of business, success comes down to who you know rather than what you know. This is especially true of government contracts where political affiliations can make all the difference in securing a contract. Political pressures influence contract decisions such as awarding many contracts to a particular contractor at a time; not based on competition and also awarding contracts without making budget allocations .Enshassi et al (2006) concluded that low margins of profit due to competition could account for contractors' failure. Many governmental projects are awarded primarily for political reasons and as a result the contractor's interest is sometimes not paramount with respect to profit margin. The contractors enter into these contracts and later suffer the adverse effect on their finances.

4.4.3.6 Component 6 – Cost control issues

The two variables that loaded onto the sixth component are: *high overhead cost and capital lockup* with eigenvalues of .540 and .784 respectively. This factor extracted 5.993% of the

remaining variance that was not explained by the first five components. Examination of the two variables that correlated very well with the component indicates that the underlying factor for the component in this case could be named **cost control.**

Cost control is the process or activity of controlling cost associated with a business. A business must identify what their costs are and evaluate whether those costs reasonable and affordable. Controlling and managing overhead costs are the main tools to improve a company's financial situation (Enshassi *et al*, 2005). Overhead costs are the charges that cannot be attributed exclusively to a single product or service (Tipper, 1966). They are not a component of the actual construction work but are incurred by the contractor to support the work (Cilensek R., 1991).

Though they are extremely important in construction estimation, when not controlled could result financial mismanagement and consequently affect the project delivery. Capital lock up occurs as a result of poor cost control mechanisms and this could lead to bankruptcy rather than lack of profit on projects. Likewise, Sing and Lakana (1992), stated that cash is the most important resource for supporting the day to day activities of ongoing projects and the lock up causes failure of the company. The onus therefore lies on construction managers to control and anticipate the financial situation of projects and its effect on cash during the tendering and post contract stage.

4.5 MITIGATION ACTIONS IN REDUCING THE IMPACT OF FDR FACTORS ON PROJECT DELAY IN THE GHANAIAN CONSTRUCTION INDUSTRY

A Likert rating scale was used to gather information about mitigation measures that can be enforced in order to minimize the occurrence of project delay caused by these FDR

variables. After the information for this section was collated, the relative importance index (RII) was used to identify the most important measures from the contractors' point of view. The various responses were given ratings with the very important actions given a weight of 5 and 1 for the least important ones.

Table4.11: Mitigation measures

No.	Mitigation measures	Frequency of Ranking					Weighting	RII	Rank
		1	2	3	4	5			
1	Adoption of quota system by contractors	5	13	31	29	0	240	0.615	10th
2	Adoption of quota system by client	7	23	31	17	0	214	0.549	13th
3	Practice of prompt payment by client	5	12	17	44	0	256	0.656	9th
4	Risk assessment practice by contractors	8	3	15	21	31	155	0.397	14th
5	Application of payment bonds	17	8	29	20	4	220	0.564	12th
6	Education of contractors on cash flow and business management	6	14	19	16	23	270	0.692	6th
7	Speed up by banks in processing loans	8	10	20	23	17	265	0.679	7th
8	Reduction in number of signatories to payment certificates	1	3	23	32	19	299	0.767	3rd
9	Enforcement of litigation on parties for breach on payment	0	2	17	31	28	319	0.818	2nd
10	Practice of good financial management	8	6	23	32	9	262	0.672	8th

11	Proper monitoring and evaluation	1	6	23	30	18	292	0.749	5th
12	Provision of mobilization funds	3	9	17	22	27	295	0.756	4th
13	Payment of interest on delayed payment	0	2	6	45	25	327	0.838	1st
14	Provision of letters of credit by client	12	22	18	14	12	226	0.579	11th

A critical observation of the ranked measures reveals the following results: payment of interest on delayed payment was ranked first with an RII of 0.838, enforcement of litigation on parties that breach payment conditions was ranked second with an RII of 0.818, reduction in number of signatories was ranked third with an RII 0.767 and provision of mobilization funds was ranked fourth with an RII of 0.756. A closer look at the RII of these measures gives the indication that they are very importance and this buttresses the response that clients are the most responsible group for minimizing delays caused by FDR factors as these measures are closely linked with the role of client. Other identified measures were considered to be moderately important with an RII below 0.7000.Risk assessment practice was ranked as the least important measure; this could be attributed to contractors' lack of knowledge on risk management and its advantages. A project by definition tries to introduce some form of changes and this involves uncertainties such as financial risk which can lead to project delay. Though risk assessment was ranked as the least important, it is a knowledge area under project management that can help combat the issue of financial distress in a construction company and subsequently reduce delay.

4.6 CHAPTER SUMMARY

This chapter was devoted to the analyses and discussions of the results obtained from the field survey. It began with a brief discussion of the survey questionnaires and descriptive statistics of the results obtained from the field. The chapter was concluded with factor analyses of the FDR variables. The descriptive statistics largely confirmed the variables which were identified in the literature and also through the exploratory interviews. The factor analyses of these variables resulted in 6 components and these were appropriately named and discussed.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATION

5.0 INTRODUCTION

This dissertation focused on financial distress related causes of project delay in the Ghanaian construction industry with specific focus on road contractors. The research is divided into five (5) independent but interrelated chapters. The main introduction to the research was covered in Chapter One. Chapter two touched on the review of relevant literature within the confines of project delay. Chapter three discussed the methodological issues of the research and chapter four presented the analysis and discussion of the results. This chapter begins with a summary of how the research objectives were achieved, followed by contributions of this research to knowledge. The chapter concludes with recommendations for further research that can be conducted based on the conclusions and limitations of the study.

5.1 REVIEW OF RESEARCH OBJECTIVES AND FINDINGS

This research was initiated with the primary aim of exploring the underlying factors contributing to financial distress of construction firms and to investigate the interconnections between these factors and project delays with the view of establishing appropriate response measures. In order to achieve the stated aim, four research objectives were set:

First, *to conduct a critical literature survey to facilitate the contextualization of financial distress and project delays in the context of the construction industry*; an extensive literature review was conducted which aided in the identification of key variables for the FDR related

factors and the their respective delay causes which were used in crafting the survey questionnaire.

The second objective was *to determine the underlying factors contributing to financial distress of construction firms in Ghana. With regard to this objective; and the third objective to uncover the underpinning relationship (interconnections) between these financial distress related factors and project delays the key findings include* client's poor financial and business management; high insurance costs; high tax allocation; divulging funds; fraudulent practices by employees; and capital lockup.

Lastly, the fourth objective was *to establish appropriate restructuring strategies to address financial distress related factors and ascertain appropriate response measures to mitigate project delays;* the key findings in relation to this objective consist of payment of interest on delayed payment; enforcement of litigation on parties for breach on payment; reduction in number of signatories to payment certificates; provision of mobilization funds; and proper monitoring and evaluation.

5.2 RECOMMENDATIONS

Based on the findings of this research, the following recommendations are advanced for adoption by stakeholders in the construction industry, these comprise of:

- Clients ensuring sound financial and management practices to meet to meet the financial obligations of construction firms in order to put them in a financially distressed position;
- Construction firms should be offered tax incentives especially those deemed financially distressed whiles executing projects that are strategic to the economy;

- Construction firms should make claims that are devoid of contentious issues so that their payments will not delay to avoid inflation eroding their financial gains;
- Construction firms must ensure sound business and financial management principles are adhered to prevent fraud and other forms of financial misappropriation;
- The establishment of commercial banks purposely for construction should be encouraged so that contractors can have access to credit in times of liquidity problems;
- ASROC should organise / institute measures to ensure that its members go through continual education to improve technical and managerial competencies of contractors;
- Contract provisions which allow contractors to claim interest on delayed payment must be strictly enforced; and
- A Construction Industry Payment and Adjudication Act must be implemented by government.

5.3 LIMITATIONS OF THE RESEARCH

The main limitations of this research which must be acknowledged have to do with the scope and the research process. These shortfalls which usually provide the basis for further studies are as

follows:

- The limitation of the survey to road contractors in Kumasi and Accra alone may affect the generalizations of the findings.

- The possibility of sampling and measurement errors and the effects of these errors on the data collected, analysis undertaken and the conclusions drawn.

- In addition to the scope the relatively small sample size used for the study should also be seen as a limitation, although the initial tests for sample size adequacy were favourable (for the factor analyses).

5.4 DIRECTION FOR FUTURE RESEARCH

This research exposes a number of areas which need research attention. The following recommendations are therefore made for future research:

- Further recommendation for this study are to identify the underlying FDR factors leading to project delay from the client and consultant's perspective and to make necessary comparison with the findings in this research.
- This dissertation used survey questionnaire to identify the financial distress related causes of project delay. Further studies may be undertaken using case studies on some major government funded projects.

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APPENDIX

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF BUILDING TECHNOLOGY

TO BE COMPLETED BY ROAD CONTRACTORS

STUDENT/RESEARCHER: JOYCELINE ANNOA ASANTE

TOPIC: FINANCIAL DISTRESS RELATED CAUSES OF PROJECT DELAY IN THE GHANAIAN CONSTRUCTION INDUSTRY**.**

AIM: To explore the underlying factors contributing to financial distress in the construction firms and investigate the interconnections between financial distress related factors and project delays.

Further instructions for completing this questionnaire:

1. This questionnaire will take less than 15 minutes to complete.
2. Please complete each question by following the instructions that precede it.
3. For some questions, your opinion or preferred action is being sought, so for individuals there are no "right" or "wrong" answers.
4. The answers to the questions will be analyzed collectively. An individual's responses will not be disclosed. Your firm will not have access to the source data, so please feel free to answer without inhibition.

STRUCTURED QUESTIONNAIRE

Please tick [√] in the spaces provided. Tick once for each question unless otherwise stated.

1. Which of the following ownership structures do you operate?

Enterprise/Sole Proprietorship [ ] Partnership/ Joint venture [ ]

Private Limited Company [ ] Other (please specify)…….

2. How long have you been involved in road construction projects in Ghana?

[ ] ≤5 years [ ] 6 – 10 years [ ] 11 - 20 years [ ] over 20 years

3. In your opinion do you think financial distress related (FDR) factors contribute significantly to project delay?

Yes [ ] No [ ]

4. The table below is a list of FDR variables that can result in project delay in a construction firm. Please rank these variables in order of significance by ticking the appropriate boxes.

Key; 1 =not critical, 2 = less critical, 3= averagely critical, 4= critical,5= very critical

CODE	Factors	SCORE				
		1	2	3	4	5
1	Client's poor financial and business management					
2	High overhead expenses					
3	Contractor's invalid claims					
4	Withhold of payment by client					
5	Bureaucracy in honouring payment certificates					
6	High insurance costs					
7	High tax allocations					
8	Divulging funds					
9	Fraudulent practices by employees					
10	Capital lockup					
11	Inaccuracy in valuation for work done					
12	Unstable inflation rate					
13	High interest rate chargeable on loans					
14	Underestimation of project project cost					
15	Contractor handling many projects at the same time					
16	Lack of regular cash flow forecasting					
17	Low markups/profit margins					
18	Poor credit arrangement with creditors and financiers					
19	Difficulty in loan accessiblty					
20	Insolvency/ liquidity					
	Others, please specify and rank					
21						
22						
23						
24						
25						

5. How will you rate the importance of the following mitigation actions in minimizing financial distress in the construction industry?

Key; 1 = not important, 2 = less important, 3= averagely important, 4= important, 5= very important

CODE	Factors	SCORE				
		1	2	3	4	5
1	Adoption of a quota system by client to manage the number of projects handled at a time.					
2	Adoption of a quota system by contractors to manage number of projects handled concurrently					
3	Practice of prompt payment by clients					
4	Risk assessment practice by contractors					
5	Application of payment bonds by contractors with banks and clients					
6	Education of contractors on importance of cash flow management practices					
7	Speed up by banks in processing loans after conditions are met by contractors					
8	Reduction in number of signatories to payment certificates					
9	Enforcement of litigation actions on parties that breach payment conditions.					
10	Practice of good financial management					
11	Practice of proper monitoring and evaluation					
12	Provision of mobilisation funds for projects					
13	Payment of interest on delayed payment by client					
14	Provision of letters of credit to secure funds for projects					
	Others, please specify and rank					
15						
16						
17						
18						
19						