

# The Level of Existence and Impact of Cost and Time Overruns of Building Construction Projects in Ghana

Emmanuel Bentil<sup>1\*</sup>, Rev. Edward Nana-Addy<sup>2</sup>, Eric Kwaku Asare<sup>2</sup>, Alfred Fokuo-Kusi<sup>2</sup>

1. THE CONSORTIUM(CIHSD)/COMPTRAN, P.O. Box AN7917, Accra, Ghana

2. Department of Building Technology, Sunyani Polytechnic, P.O. Box SY206, Sunyani, Ghana

## Abstract

The construction industry has over the years been challenged with cost and time overruns of construction projects all over the world including Ghana. This problem has become a major concern to all the stakeholders of construction industry in Ghana. This study attempts to identify and establish the level of existence of cost and time overruns of building construction projects in Ghana, its causes and its relative effect on the construction industry and offers recommendations to minimize or curbs it. A survey which relied heavily on questionnaires was used to elicit opinions from Quantity Surveyors, Architects and Project/Construction Managers in key institutions in the Ghanaian construction industry such as client organisations, contracting firms and consulting firms. The purposive, convenience and snowball sampling techniques were used and out of 120 questionnaires distributed, 89 were received. The findings showed that cost and time overruns exist in more than 40% of building construction projects in Ghana. It was also identified and established that cost and time overruns of building construction projects in Ghana exceed 40% of estimated project cost and time. It was further established that, public building construction projects in Ghana had an alarming average cost and time overruns of 75% and 146% respectively with a maximum limits of cost and time overruns of 376% and 400% respectively, whereas, private building construction projects in Ghana, rather had a relatively lower average cost and time overruns of 34% and 77% respectively, with maximum limits of cost and time overruns of 98% and 300% respectively. The study further identified 34 and 38 significant causes of cost and time overruns respectively, as well as 15 significant effects. This study has not only filled the gap in existing literature on the subject in Ghana, but has also made recommendations which will improve and minimize the occurrence of cost and time overruns of construction projects in Ghana.

**Keywords:** Level of Existence, Impact, Cost Overrun, Time Overrun, Building Construction Projects

## 1. Introduction

The construction industry worldwide has over the years been challenged with cost and time overruns of construction projects. This has therefore become a very frequent phenomenon associated with almost all projects of the construction industry even in the advent of advanced technology and construction management techniques. According to (Ahmed *et al.*, 2002), the inability to complete projects on time and within budget continues to be a chronic problem worldwide and is worsening.

Almost all construction projects executed across the globe tend to exhibit characteristics of cost and time overruns. Cost overruns are a major problem in both developed and developing countries (Angelo and Reina, 2002). Cost and time overruns tend to be norm with construction projects. Flyvbjerg (2002) established that it is common to find 9 out of every 10 construction projects globally with cost overruns of 50 to 100 percent.

Examples of various global projects not spared from cost and time overruns include: The famous Burj Khalifa completed in 2009, which was constructed with the most advanced construction technology and project management techniques, yet took nine months longer to complete and costs 71% higher than anticipated (Dubai-Architecture, 2014)

The inherent problem of cost and time overruns of construction projects has been a major concern for all construction industry stakeholders, hence, the numerous studies on the problem to help alleviate these recurring in the future.

Ghana's construction industry, which contributed 9.2% of gross domestic product (GDP) in 2011 (Ghana Statistical Service, 2012), has not been spared from the global challenge of cost and time overruns of

construction projects. This has therefore become a very frequent phenomenon associated with almost all projects of the construction industry.

### *1.1 Statement of the Problem*

According to (Frimpong *et al.*, 2003), 33 out of 47 representing 70% of projects in Ghana were delayed. Fugar and Agyakwah-Baah (2010) and Danso and Antwi (2012), also suggests that cost and time overruns of construction projects are common and are major problems facing the construction industry in Ghana. According to the World Bank Report on Ghana (2012), about 13 out of 26 World Bank funded projects in Ghana which should have completed within three to five years, have run far beyond their completion dates, with some running for eight to nine years. This has resulted in over US\$1.5 billion of funds out of US\$2.3 billion approved in total remaining in the World Banks chest.

How can there be expected development if this problem continues to prevail in construction projects in Ghana?

It is imperative that, attention is seen to be given to the challenge of cost and time overruns of construction projects in Ghana. It is therefore noteworthy that, studies which have resulted in some few published literature on the cost and time overruns of construction projects in Ghana exist. These literature, dealt with the causes and mitigating measure of delays in building construction projects, Fugar and Agyakwah-Baah (2010), causes of delays and cost overruns in groundwater construction projects in developing countries (Frimpong *et al.*,2003) as well as factors influencing time and cost overruns of telecom tower construction projects in Ghana, Danso and Antwi (2012).

So far, however, there is no reliable evidence of the level of existence and impact of cost and time overruns of building construction projects in Ghana. This study therefore sought to investigate and validate this knowledge gap.

## **2. Review of Related Literature**

The construction industry is one of the most significant industries that contribute toward socio-economic growth especially to developing countries. The nature of the industry are fragmented, unique and complex which always face chronic problems like cost overruns which sometimes exceed 100% of the anticipated cost of construction project and time overrun which affects about 70% of construction projects, (Hussin *et al.*,2013) and (Azhar *et al.*,2008).

Cost and time overruns are very frequent phenomena and are almost associated with nearly all projects in the construction industry. It is not uncommon to see construction projects failing to achieve their mission of creating facilities within the specified cost and time limits. Cost and time overruns occur in every construction project and their magnitude varies considerably from project to project. So it is essential to evaluate the magnitude, actual causes and effects of cost and time overruns in order to minimize and avoid the increasing cost and time overruns in any construction project.

The successful execution of construction projects, keeping them within estimated cost and the prescribed schedules, primarily depends on the existence of an efficient construction sector capable of sustained growth and development in order to cope with the requirements of social and economic development and to utilize the latest technology in planning and execution. According to (Chalabi *et al.*, 1984), adequate planning at the early stages of a project is crucial for minimizing cost and time overruns.

This chapter reviews literature concerning the major issues of cost and time overruns of construction projects in order to recognize the related information regarding those issues. This review is very important for the purpose of this research, as the main aim of this research is to establish the level of existence or the prevalence rate of cost and time overruns of building construction project in Ghana.

### *2.1 Concepts and Definitions*

The subject of cost and time overrun of construction projects has interested various researchers around the world. This has resulted in extensive studies culminating in the development of numerous concepts and definitions of cost and time overrun of construction projects. This section reviews a number these concept and definitions exhaustively.

### 2.1.1 Cost Overrun

Cost overrun is basically the amount by which the actual costs of a project exceeds the baseline or initially approved costs. Various researchers have defined it in a number of ways which have been reviewed. (Zhu *et al.*, 2004) defined *cost overrun* as the excess of actual cost over budget. They also concluded that it can sometimes be referred to as "cost escalation," "cost increase," or "budget overrun." Jackson (2002) also defined *cost overrun* as the change in contract amount divided by the original contract award amount. This calculation can be converted to a percentage for ease of comparison. Avots (1983) in analyzing *cost overrun*, simply defined it as when the final cost of the project exceeds the original estimates. He actually, used the word cost growth instead of cost overrun. Rowland (1981) earlier defined *cost overrun* as a percent difference in cost between the final cost of the project and the contract award amount.

Other researchers such as Choudhry and Phatak (2004) defined *cost overruns* as the difference between the original cost estimate of project and actual construction cost on completion of works of a construction project. Danso and Antwi (2012), reviewed various works and defined cost overrun as the difference between the final or actual cost of a construction project at completion and the contract amount agreed by the client (the project owner) and the contractor during signing of the contract.

Reviewing these definitions highlights a lot of similarities from how the various researchers developed their concept of cost overrun. This research therefore adopts Danso and Antwi (2012) definition for cost overrun as: the difference between the final or actual cost of a construction project at completion and the contract amount agreed by the client (the project owner) and the contractor during signing of the contract expressed in percentages.

### 2.1.2 Time Overrun

Time overrun is a common issue that results in monetary and time consequences in the construction industry. Choudhry (2004) and Chan (2001) defined time overruns as the difference between the actual completion time and the estimated completion time. It is measured in number of days. Al- Gahtani and Mohan (2007) also defined time overruns as the time increased to complete the project after planned date which caused by internal and external factors surrounded the project.

According to (Kaming *et al.*, 1997) *time overrun* is defined as the extension of time beyond planned completion dates traceable to the contractors. However, (Oko *et al.*, 2010) defined *time overrun* as the time difference between the actual and the initially planned (i.e, expected) dates of completion. It can also be defined as the duration between the date of approval of the project and its expected date of completion. Similarly, Vidalis and Najafi (2002), simply define *time overrun* as the project's duration difference between the project's original contract time before the bid and its overall actual contract time at the end of construction.

For the purpose of this research, Vidalis and Najafi (2002) definition will be adopted which defines *time overrun* as the project's duration difference between the project's original contract time before the bid and its overall actual contract time at the end of construction expressed in percentages.

## 2.2 Identification of Cost and Time Overruns of Construction Projects

Cost and time overruns in construction project can be identified by linking them to general project information to arrive at the elements associated with them (Hassanein & Nemr, 2009).

This project information includes the following: project name; role of contractor (main or subcontractor); contract conditions; contract type; ownership; estimated project cost; estimated project duration; actual project cost and actual project duration.

## 2.3 Level of Existence of Cost and Time Overruns of Construction Projects

Cost and time overruns are common in infrastructure and building construction projects. Researches on construction projects in some developing countries indicate that by the time a project is completed, the actual cost exceeds the original contract price by about 30 % according to Al-Momani (1996).

In a global study on cost overrun issues in transport infrastructure projects covering 258 projects in 20 nations, (Flyvbjerg *et al.*, 2003), concluded that 9 out of 10 projects face cost overruns ranging from 50 to 100 %. Studies of construction projects in India, for example, found that more than 60 % of projects experienced up to 200 % time overrun and 75 % cost overrun (Chandra, 1990).

According to Hall (1982), the Sydney Opera House in Sydney sets some kind of a world record for cost and time overrun. Although it was originally estimated in 1957 to cost just A\$7.000.000.00 and to be completed in January 1963, it was in fact finished in October 1973 at a cost of A\$102.000.000.00. This represents a cost overrun of 1357% and a time overrun of 167%.

According to Cooke and William (2009), it was reported that 73% of construction projects executed by the UK government departments and agencies had cost overruns while 70% had time overruns. It was also reported that a benchmarking study of 66 central government construction projects in UK with a total value of £500 million carried out in 1999 showed that 75% of the projects had cost overrun of up to 50%, while 67% of the projects also had time overruns of 63%.

A study conducted by Frame (1997) consisting of 8,000 projects showed that only 16% of the projects could satisfy the three famous performance criteria: completing projects on time, within budgeted cost and quality standard (Ameh *et al.*, 2010). Similarly, Omeregie and Radford (2006) reported a minimum average of cost escalation in construction projects in Nigeria to be 14% whereas minimum average percentage escalation period of projects was found to be 188%, while in Portugal construction projects face a minimum of 12% of cost overrun, (Moura *et al.*, 2007). In Pakistan, minimum cost overrun was reported as 10% of the estimated cost of project. This trend is sometimes more severe in developing countries where cost overrun sometime exceeds 100% of the anticipated cost of the project, (Azhar *et al.*, 2008).

According to Baloyi and Bekker (2011) and Hill (2008), The FIFA 2010 World Cup Stadia in South Africa were not immune to cost and time overruns. They reported that the stadia had cost overruns, causing the budget for all the stadia to run into a deficit of USD 267 million.

They also indicated that, although the stadia were completed in time for the FIFA World Cup, some were behind schedule and not ready for the Confederations Cup in 2009, the official 'curtain raiser tournament' and 'testing tournament' to assess the stadia's readiness for the FIFA World Cup during 2010.

According to their study, the FIFA 2010 World Cup stadia of which five were newly built and the other five refurbished and upgraded had an average cost overrun of about 45%.

According to (Zujo *et al.*, 2010), out of 177 projects in Bosnia and Herzegovina, 51.40 % of them had time overruns while 41.23% of them also had cost overrun. Similarly, 81% of 333 projects in Croatia had cost overruns. Al-Momani (2000) also noted that 106 out of 130 public projects in Jordan representing (82%) had time overruns.

(Endut *et al.*, 2009), analysed the performance of 359 projects (301 new constructions while 58 refurbishment projects) in Malaysia. Of these 301 were public projects and 51 private projects. They observed that 81.8% of the public sector projects and 70.55% of private sector projects had time overruns of averagely 49.71%, while 53.2% of the public sector projects and 62.8% of private sector projects had cost overruns. According to (Frimpong *et al.*, 2003), 33 out of 47 representing 70% of projects in Ghana had time overruns.

#### 2.4 Factors Contributing to Cost and Time Overruns of Construction Projects

A lot of studies have been conducted in the past regarding factors which contribute to cost and time overruns of construction projects. Generally, the factors that have an impact on cost and time performance of the project and cause cost and time overruns are present from the estimating stage to the completion stage of the project (Baloi and Price, 2003). Therefore, understanding the main factors that cause cost and time overruns is important due to the fact that it helps to minimize the impact and create a strategic plan to face uncertainties in all stages of the project (Reichelt and Lyneis, 1999).

(Frimpong *et al.*, 2003), studied 26 factors contributing to time overruns (delay) and cost overruns in Ghana groundwater construction projects. They stated that out of the 26 factors, the main causes of time overrun (delay) and cost overruns in construction of groundwater projects were: monthly payment difficulties from agencies; poor contractor management; material procurement; poor technical performances; and escalation of material prices.

Fugar and Agyakwah-Baah (2010) also identified 32 time overrun (delay) factors in building construction projects in Ghana, out of which ten were ranked as the most influencing factors. They also categorized the 32 factors into nine major groups of which the financing group of time overrun (delay) factors was the most influential. Their result agrees with that of (Frimpong *et al.*, 2003), who found that financial problems are the main factors that causes time overruns (delay) in the construction of groundwater projects in Ghana.

Similarly, Danso and Antwi (2012) who studied the factors influencing time and cost overruns in telecom tower construction Ghana found 15 major factors influencing time overruns and 14 major factors causing cost overruns in telecom tower construction projects. Their findings also confirm earlier studies by (Frimpong *et al.*, 2003) and Fugar and Agyakwah-Baah (2010).

Several studies of major projects across the globe showed that cost and time overruns were common in construction. There were various causes of cost overruns in construction projects, some of which were not only hard to predict but also difficult to manage (Morris and Hough, 1991).

According to a study made in Turkey by (Arditi *et al.*, 1985), the important sources for cost overruns were found to be inflationary pressures, increases in material prices and workmen's wages, difficulties in obtaining construction materials, construction delays, deficiencies in cost estimates prepared by public agencies and unexpected sub soil conditions were the most important sources for cost overruns.

Studies by (Kaming *et al.*, 1997), on the factors influencing construction time and cost overruns for high-rise projects in Indonesia, concluded that, the prime variables of cost overruns have been commonly identified as: unpredictable weather, inflationary material cost, inaccurate materials estimates, complexity of project, contractor's lack of geographical experience, contractor's lack of project type experience, and non-familiarity with local regulations. (Mansfield *et al.*, 1994), also found that cost overrun is attributed to problems in finance and payment arrangements, poor contract management, material shortages, changes in site conditions, design changes, mistakes and discrepancies in contract documents, mistakes during constructions, price fluctuations, inaccurate estimating, delays, additional work, shortening of contract periods, and fraudulent practices and kickbacks.

(Apolot *et al.*, 2009) conducted an investigation into the causes of delay and cost overrun in Uganda's public sector construction projects and concluded that the five most important causes of cost and time (delays) overrun were change of work scope; delayed payments; poor monitoring and control; high cost of capital; political instability/insecurity.

(Flyvbjerg *et al.*, 2003) stated in their book "Megaprojects and Risk: an Anatomy of Ambition" that the factors that affect cost performance and caused cost overruns in a developing country can be generalised to all developing countries because they have similar problems in construction projects.

### 2.5 *Effect/Impacts of Cost and Time Overruns Of Construction Projects on Stakeholders*

The global construction industry is plagued with cost overruns in project delivery. This development has brought about loss of clients' confidence in consultants, added investment risks, inability to deliver value to clients, and disinvestment in the construction industry (Mbachu and Nkado, 2004).

Mbachu and Nkado (2004), further stated that cost overruns have obvious effects for the key stakeholders in particular, and on the construction industry in general. To the client, cost overrun implies added costs over and above those initially agreed upon at the onset, resulting in less returns on investment. To the end user, the added costs are passed on as higher rental/lease costs or prices. To the professionals, cost overrun implies inability to deliver value for money and could well tarnish their reputations and result in loss of confidence reposed in them by clients. To the contractor, it implies loss of profit for non-completion, and defamation that could jeopardize his/her chances of winning further jobs, if at fault. To the industry as a whole, cost overruns could bring about

project abandonment and a drop in building activities, bad reputation, and inability to secure project finance or securing it at higher costs due to added risks. All these consequences undermine the viability and sustainability of the construction industry.

According to (Arditi *et al.*, 1985), the effects of cost overrun are not confined to the construction industry but also reflect in the state of the overall economy of a country. They stated that cost and time overruns (delays) in construction projects prevent the planned increase in property and service production from taking place, and this phenomenon in turn affects, in a negative way, the rate of national growth.

Angelo and Reina (2002), stated that the problem of cost overrun was critical and needed to be studied further to alleviate the problem in the future. Project cost overruns can cause a slower payout and reduce an early return on the client's or project owner's investment (Ritz, 1994).

Cost and time overruns occur due to wide range of factors. If project costs or time exceed their planned targets, client satisfaction would be compromised. The funding profile no longer matches the budget requirement and further slippage in the schedule could result (Kaliba *et al.*, 2009). According to (Ahmed *et al.*, 2002), time overruns (delays) on construction projects are a universal phenomenon and road construction projects are no exception. Time overruns (delays) are usually accompanied by cost overruns. These have a debilitating effect on contractors and consultants in terms of growth in adversarial relationships, mistrust, litigation, arbitration, cash-flow problems, and a general feeling of trepidation towards other stakeholders (Ahmed *et al.*, 2002). This problem is not unique to developed countries and is being experienced in most of the developing economies.

### 3. Methodology

A survey which relied on questionnaire to generate data for the analysis was used. In order to obtain the relevant data both primary and secondary data were used to address the specific details under the study.

The primary data provided reliable, accurate and first-hand information relevant to this study. It was obtained through the distribution of questionnaires to people involved in building construction projects in Ghana. The questionnaire was enriched for the research through a review of journals, technical papers and text books to identify the various efforts that have been made in the past to evaluate and examine cost and time overruns on construction projects. Secondary sources of data were obtained from relevant literature that covered research and publication on the subject matter.

The study is a practical problem developed through experience and observation of construction projects. The research questions were oriented to investigate the existence, causes and effects of cost and time overruns of building construction projects in Ghana. This research can be categorized as applied, exploratory and descriptive. It is applied and exploratory because the research was initiated from practical problems and seeks to find the existence of cost and time overruns of building construction projects in Ghana. It is also descriptive, because it tried to describe the actual rate of cost and time overruns and the variables of cost and time overruns of building construction projects in Ghana.

The population for the study comprised construction professionals in key institutions in the Ghanaian construction industry such as client organisations (project owners), contracting firms and consulting firms with direct exposure to building construction activities. Their population was three thousand four hundred and two (3,402) regarding general registered members and members in good standing as of 2014 with the Ghana Institution of Engineers, Ghana Institution of Surveyors – Quantity Surveyors Division and Ghana Institute of Architects.

The purposive, convenience and snowball sampling techniques which are non-random or non-probability sampling techniques were used to select the sample for the research. These were adopted because it provided the chance to reach the samples that will give the needed information that will satisfy the research objectives based on logistical considerations.

Statistical formula was therefore used to determine the sample size required to estimate a proportion with a specified level of confidence and precision. The sample size was determined by using the formula (AusVet Animal Health Services, 2014) shown below:

$$\text{Sample Size (n)} = (Z^2 \times P(1 - P))/e^2$$

Where the inputs are:

**Z** = value from standard normal distribution corresponding to desired confidence level (e.g.  $Z=1.96$  for 95% Confidence Interval (CI))

**P** = expected true proportion (0.3 used for sample size needed)

**e** = desired precision or margin of error (0.0807 or +/-8.07% used)

**N**= Population size is (3402)

$$\text{Sample Size (n)} = (1.96^2 \times 0.3(1 - 0.3))/0.0807^2 \approx 120 \text{ Construction Professionals}$$

Questionnaires were therefore issued to 120 construction professionals purposely selected from the various regions. The professionals chosen for the study comprised Quantity Surveyors, Architects and Project/Construction Managers. The selected professionals belong to client, consultancy and contractor organisations. They were selected because they were the key professionals mostly involved with the project from inception to closure and were in a position to provide the project information required. The number of questionnaires issued to the various regions was based on convenience and the general distribution of construction professionals across the regions.

The data collection process involved two stages. The first stage consisted of literature search for information on the contributing factors and effects of cost and time overruns. This stage resulted in the identification of forty-one (41) and forty(40) contributing factors each of cost and time overruns respectively and fifteen (15) effects of cost and time overruns of building construction projects. The second stage involved the development of questionnaire incorporating these contributing factors and effects identified in the questionnaire for data collection.

The questionnaire consisted of four sections based on the respondents profile, existence and degree of cost and time overruns, factors contributing to cost and time overruns and the effects of cost and time overruns of building construction projects in Ghana. It was carefully designed in light of getting high response rate from respondents.

The sections one and two of the questionnaire were structured to comprise open ended and close ended questions which respondents were asked to provide the appropriate answers. The sections three and four were structured based on Likert scale of five ordinal measures of relative importance towards each statement (from 1 to 5). Respondents were asked to indicate by ticking a column; the relative importance of each of the factors contributing to and the effects of cost and time overruns of building construction projects in Ghana. (In terms of 5 = 'very important'; 4 = 'important'; 3 = 'neutral'; 2 = 'not important'; 1 = 'not important at all'). The response categories of the questions called quantifiers reflect the intensity of the particular judgement involved and the numerical value shown beside the category of response represents the intensity of the response (Naoum, 2007). The mean score of 3.0 and above were considered significant and relatively important to the study.

The data collected was analysed using descriptive statistical tools such as Charts, Graphs and Tables to present the data for easy explanation.

#### 4. Findings

The major conclusions drawn in relation to the summary of findings are as follows:

- *Existence of Cost and Time Overruns of Building Construction Projects in Ghana*  
The study identified that, over 40% of Building Construction Projects in Ghana suffers cost and time overruns with the majority being public funded institutional buildings which is unacceptable. This has resulted in high cost of public expenditure on infrastructural development coupled with a very slow rate of socioeconomic development.
- *Level of Existence of Cost and Time Overruns of Building Construction Projects in Ghana*

The Level of Existence of cost and time overruns of building construction projects was identified to exceeds 40% of initial estimated project cost and time. It was also established from the study of Sixty-six (66) Building Construction Projects in Ghana as shown in Table 1 that, public building construction projects in Ghana had an alarming average cost and time overruns of 75% and 146% respectively with a maximum limits of cost and time overruns of 376% and 400% respectively, whereas, private building construction projects in Ghana, rather had a relatively lower average cost and time overruns of 34% and 77% respectively, with maximum limits of cost and time overruns of 98% and 300% respectively. These high levels of cost and time overruns of building construction projects have adversely impacted the Ghanaian building construction industry and has become a major concern to stakeholders.

Table 1: Degree and Existence of Cost and Time Overruns of Sixty-six (66) Building Construction Projects in Ghana with within the past 10 years

	Estimated Project Cost (Gh¢)	Estimated Project Duration (Months)	Actual Project Cost At Completion (Gh¢)	Actual Project Duration At Completion (Months)	Cost Overrun	Time Overrun
<b>Public Projects</b>						
<b>Frequency(N)</b>	46	46	46	46	46	46
<b>Mean</b>	873,690.00	15	1,743,900.00	39	75%	146%
<b>Range</b>	4,207,000.00	21	8,380,000.00	114	392%	392%
<b>Minimum</b>	93,000.00	3	120,000.00	6	-16%	8%
<b>Maximum</b>	4,300,000.00	24	8,500,000.00	120	376%	400%
<b>Private Projects</b>						
<b>Frequency(N)</b>	20	20	20	20	20	20
<b>Mean</b>	6,080,600.00	15	6,351,900.00	25	34%	77%
<b>Range</b>	39,760,000.00	16	37,600,000.00	32	103%	289%
<b>Minimum</b>	240,000.00	8	400,000.00	16	-5%	11%
<b>Maximum</b>	40,000,000.00	24	38,000,000.00	48	98%	300%

- Factors Contributing to Cost and Time Overruns of Building Construction Projects in Ghana**  
 There are many contributing factors of cost and time overruns. The study identified 34 and 38 contributing factors to cost and time overruns respectively. The Ten (10) main factors contributing to cost overruns were identified as (1) change in the scope of the project, (2) price fluctuations, (3) additional work at owner's request, (4) resources constraint: funds and associated auxiliaries not ready, (5) lack of cost planning/monitoring during pre-and post-contract stages, (6) design changes, (7) underestimation of cost of projects, (8) inadequate project preparation, planning and implementation, (9) contractual claims, such as, extension of time with cost claims, etc and (10) incomplete design at the time of tender, whereas, the Ten (10) main factors contributing to time overruns were identified as(1) delays in honouring payment certificates, (2) cash problem during construction, (3) price escalation of materials and for manpower, (4) late deliveries of materials, (5) Poor economic conditions (currency, inflation rate, etc.), (6) contract modifications (replacement and addition of – new work to the project and change in specifications), (7) owner – initiated variation, (8) Suspension of work by owner or contractor, (9) poor judgment in estimating time and resources and (10) Underestimation of time for completion by contractors and project managers.
- Effects/Impacts of Cost and Time Overruns of Building Construction Projects in Ghana**  
 Cost and Time overruns of building Construction project has become a social and economic canker in Ghana, which negatively affects the construction industry and its stakeholders. Fifteen (15) effects/impacts were identified of which, the ten (10) most significant effects/impacts were identified as (1) abandonments of building construction projects, (2) inability to secure project finance, (3) high cost of securing project finance due to added risk, (4) additional investment risk, (5) loss of reputation of contractors and consultants, (6) less return on investment, (7) loss of investment in the construction industry, (8) non-sustainability of the industry, (9) slow



rate of national growth and (10) Inability to deliver value to clients.

## 5. Recommendations

In line with the various findings, the following recommendations are made in support to minimizing cost and time overruns of building construction projects in Ghana:

- Proper stakeholder management strategy should be adopted to ensure that the stakeholders' needs, expectations and influence in relation to the project requirements are catered for and managed to ensure project success. This will ensure that, all the requisite information needed to make the project successful at the design and construction phases are available and incorporated into the designs, thus, minimizing the need for new information which will in turn minimize cost and time overruns.
- An adoption of an integrated change control mechanism in building construction projects, will also ensure that changes/variations which heavily contributes to cost and time overruns are properly managed and controlled to limits its impact on the project.
- Effective design management approach should be adopted for all building construction projects to ensure that, the cost and design are properly coordinated, managed and controlled from the preparation, design, pre-construction and construction stages to making sure that the situation of incomplete designs before construction and its associated cost and schedule challenges are eliminated from the on-set and throughout the construction.
- Comprehensive cost planning and cost control during pre and post contract stages should be enforced to make sure that project cost is contained within the budget.
- The overall project budget should be converted to a more stable currency and be managed for the client, so that the depreciation of the local currency and inflation does not heavily impact the cost of the project estimated in the local currency.
- Clients should be committed to honouring payment certificates in time to prevent cash flow challenges, delays and interest on delayed payments from affecting the project.
- Proper planning and assessment of the magnitude and complexity of building construction projects should be undertaken to ensure that accurate estimation of the project time is achieved.
- I will recommend that, price and physical risk allocation on projects should be properly assessed to assign an appropriate contingency sum to a project. This will therefore limit the occurrence of cost overrun on the project

## References

- Ahmed, S., Azher, S., Castillo, M., and Kappagantula, P. (2002). Construction Delays In Florida; An Empirical Study, Florida, 2002. [http://www.cm.fiu.edu/publication/Delays .pdf](http://www.cm.fiu.edu/publication/Delays.pdf) [Accessed: 22 June 2014].
- Al- Gahtani K. and Mohan S., (2007). Total Float Management for Delay Analysis. *Journal of Cost Engineering*, Vol. 49, No. 2, pp. 32-37.
- Al-Momani, A., (1996). Construction Cost Prediction for Public School Buildings in Jordan. *Construction Management and Economics*. 14: 311-317.
- Al-Momani, A., (2000). Construction Delay: A Quantitative Analysis," *International Journal of Project Management*, vol. 18, pp. 51–59,
- Ameh, O., Soyngbe, A., Odusami K., (2010). Significant Factors Causing Cost Overruns in Telecommunication Projects in Nigeria. *Journal of Construction in Developing Countries*. 2010, Vol. 15.
- Angelo, W. J., & Reina, P., (2002). Megaprojects Need More Study Up Front to Avoid Cost Overruns.
- Apolot, R., Alinaitwe, H., and Tindiwensi D., (2009). An Investigation into the Causes of Delay and Cost Overrun in Uganda's Public Sector Construction Projects" in *Proceedings of Second International Conference on Advances in Engineering and Technology*, pp 305-311.
- Arditi, D., Akan, G. T., & Gurdamar, S., (1985). Cost Overruns in Public Projects. *International Journal of Project Management*, 3(4), 218–225.
- AusVet Animal Health Services, (2014). <http://epitools.ausvet.com.au/content.php> [Accessed: 18 August 2014].
- Avots, I., (1983). Cost-Relevance Analysis for Overrun Control. *International Journal of Project Management*, Vol.1 No.3, 142-148.
- Azhar, N., Farooqui, R.U. and Ahmed, S.M., (2008). Cost Overrun Factors in Construction Industry in Pakistan. *First International Conference on Construction In Developing Countries (ICCIDC-I, advancing and integrating construction education, research and practice)*

- Baloi, D., and Price, A.D.F., (2003) Modelling Global Risk Factors Affecting Construction Cost Performance, *International Journal of Project Management*, 21, pp. 261- 269.
- Baloyi L., and Bekker M., (2011). Causes Of Construction Cost and Time Overruns: The 2010 FIFA World Cup stadia in South Africa, *Acta Structilia* 2011: 18(1), 52- 67.
- Chalabi, F.A., and Camp, D., (1984). Causes of Delays and Overruns of Construction Projects in Developing Countries, *CIB Proc.*, W-65, Vol. 2, 723-734
- Chan A. P.C., (2001). Time Cost Relationship of Public Sector Projects in Malaysia. *International Journal of Project Management*, Vol. 19, No.4, pp. 223-229.
- Chandra, H. (1990). Management of Construction in Developing Countries: Indian Experience, *CIB 90 Joint Symposium on Building Economics and Construction Management, Sydney (14-21 March)*, vol.5, pp. 211-224.
- Choudhury I. and Phatak O., (2004). Correlates of Time Overrun in Commercial Construction, *ASC proceeding of 4th Annual Conference, Brigham Young*
- Cooke, B. and Williams, P., (2009). *Construction Planning, Programming and Control (3<sup>rd</sup>ed.)*, Wiley-Blackwell publishing, Oxford.
- Danso H. and Antwi J. K., (2012). Evaluation of the Factors Influencing Time and Cost Overruns in Telecom Tower Construction in Ghana *International Journal of the Institute for Science, Technology and Education (IISTE)*, Vol 2, No.6, pp. 15-24.
- Dubai Architecture, (2014). 'Burj Dubai'. [www.dubai-architecture.info/DUB-004.htm](http://www.dubai-architecture.info/DUB-004.htm) [Accessed: 22 June 2014].
- Endut, I.R., A. Akintoye and J. Kelly, (2009). Cost and Time Overrun Projects in Malaysia. Retrieved from <http://www.irbnet.de/daten/iconda/CIB10633.pdf>.
- Flyvbjerg, B., Holm, M.K.S. and Buhl, S.L., (2002). Underestimating Cost in Public Works. Error or Lie? *Journal of the American Planning Association*, Vol. 68, No. 3, pp. 279-295.
- Flyvbjerg, B., Holm, M.K.S. and Buhl, S.L., (2003). How Common and How Large Are Cost Overruns in Transport Infrastructure Projects? *Transport Reviews*, Vol. 23, No. 1, pp. 71-88.
- Frame, J.D., (1997). *Establishing Project Risk Assessment Teams, Managing Risks in Projects*. E and F. N. Spon, London.
- Frimpongs Y., Oluwoye J., and Crawford L., (2003). Causes of Delay and Cost Overruns in Construction of Groundwater Projects in a Developing Countries; Ghana as a Case Study. *International Journal of Project Management*, Vol. 21, No.5, pp. 321-326.
- Fugar, F. D. K ., and Agyakwah-Baah, A. B., (2010). Delays in Building Construction Projects in Ghana, *Australasian Journal of Construction Economics and Building*, 10 (1/2) 103-116
- Ghana Statistical Service, (2012). 'National Accounts Statistics – Revised Gross Domestic Product 2012'
- Hall, Peter (1982): *Great Planning Disasters*. London: Weidenfeld and Nicholson.
- Hassanein, Amr A.G. and Nemr W. El, (2009). Change Order Claims in the Egyptian Industrial Construction Sector: Causes and Cost/Time Overruns', *Journal of Cost Engineering*, Vol. 51/No. 11, pp. 21-29.
- Hill, M., (2008). 2010 FIFA World Cup Stadiums to Cost Extra R2bn, *Engineering News*, 13 August 2010. Available from: <http://www.engineeringnews.co.za/print-version/2010-fifa-world-cup-stadiumsto-cost-extra-R2bn/> [Accessed: 22 June 2014].
- Hussin, J. M., Rahman I. A. and Memon A. H., (2013). The Way Forward in Sustainable Construction: Issues and Challenges, *International Journal of Advances in Applied Sciences (IJAAS)*, Vol.2, No.1, March 2013, pp. 31- 42
- Jackson, S. (2002). Project Cost Overrun and Risk Management. *Proceedings of Association of Researchers in Construction Management 18th Annual ARCOM Conference, Newcastle, Northumber University, UK, 2nd September, 2002*
- Kaliba, C., Muya, M. and Mumba, K., (2009). Cost Escalation and Schedule Delays in Road Construction Projects in Zambia, *International Journal of Project Management*, 27, 522-531
- Kaming P., Olomolaiye P., Holt G., and Harris F. C., (1997). Factors Influencing Construction Time and Cost Overruns on High-Rise Projects in Indonesia, *Journal of Construction Management and Economic*. Vol.

- 15, No.1, pp. 83-94.
- Mansfield, N.R., Ugwu, O.O., Doran, T., (1994). Causes of Delay and Cost Overruns in Nigeria Construction Projects, *International Journal of Project Management*.12 (4):254–60.
- Mbachu, J. I. C. & Nkado, R. N. (2004). Reducing Building Construction Costs: The Views of Consultants and Contractors. COBRA, Dublin, Leeds Metropolitan University.
- Morris, P. and Hough, G.H., (1991). *The Anatomy of Major Projects: A Study of the Reality of Project Management*. New York, John Wiley and Sons.
- Moura, H.P., J.C. Teixeira and B. Pires, (2007). Dealing With Cost and Time in the Portuguese Construction Industry. *CIB World Building Congress*, pp: 1252-1265.
- Naoum, S. G.,(2007). *Dissertation Research and Writing for Construction Students- 2<sup>nd</sup> Edition*, Oxford: Butterworth-Heinemann.
- Oko, J.A., Aliu, A.S. & Koleola, T.O.,(2010). Significant Factors Causing Cost Overruns in Telecommunication Projects in Nigeria. *Journal of Construction in Developing Countries*, 15 (2), 49-67
- Omoriegie A. and Radford D.,(2006). Infrastructure Delays and Cost Escalation: Causes and Effects in Nigeria," in proceeding of sixth international postgraduate research conference Netherlands: Delft University of Technology and TNO, pp. 79-93.
- Randolph, D.A., Rajandra, K. and Campfield, J.J.,(1990). Using Risk Management Techniques to Control Construction Contract Costs. *ASCE Journal of Construction Engineering and Management*, Vol. 116, No.3, Sept., pp. 548-552.
- Reichelt KS, Lyneis JM. (1999). *The Dynamics Of Project Performance: Benchmarking The Drivers of Cost And Schedule Overrun*. *European Management Journal* 17(2): 000–000.
- Ritz, G. (1994). *Total Construction Project Management*. McGraw-Hill.
- Rowland, H.J., (1981). *The Causes and Effects of Change Orders on the Construction Process*. Thesis. Georgia Institute of Technology, Atlanta, Georgia, 1981.
- Vidalis, M.S and Najafi, T.F., (2002). Cost and Time Overruns in Highway Construction, 4th transportation specially conference of the Canadian Society for Civil Engineering, Montreal, Quebec, Canada June 5-8 (2002).
- World Bank Report, (2012). Status of On-Going World Bank Financed Projects in Ghana as at December 2012- [www.worldbank.org/ghana](http://www.worldbank.org/ghana) [Accessed: 22 June 2014].
- Zhu. K. and Lin.L., (2004). A Stage – By – Stage Factor Control Frame Work for Cost Estimation of Construction Projects, Owners Driving Innovation International Conference. [http:// flybjerg. Plan.aau.dk / JAPAASPUBLISHED.pelf](http://flybjerg.Plan.aau.dk/JAPAASPUBLISHED.pelf).
- Zujo, V., Car-Pusic, D. and Brkan-Vejzovic, A. (2010). Contracted Price Overrun as Contracted Construction Time Overrun Function, *Technical Gazette*, vol. 17, pp. 23-29,