MASTER'S DEGREE RESEARCH PROPOSAL

Factors affecting cost performance and risk in the building industry in Ghana: A case study of project contractors

By

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Abstract

The construction industry plays a key role in national development. A number of studies have established that the sector is a good gauge of the performance of an economy, showing robustness in times of upturns, and generally bearish in down turns. A key element of the construction industry is risk, which can plague large scale infrastructure projects to the minutest design concept. The risk in turn is imbedded in not only the quality and quantity of materials, human and other environmental factors, but also non-human factors, psychological traits that have a magnifying effect on both the inception and completion costs, and its evolution through the project life cycle. The literature has so far focused mostly on the measureable aspects of cost and its performance, and the quantifying components of risk. Even the economist conception of opportunity cost rarely features in the discussion of cost performance. The vast majority of literature on the subject has been published by writers who have not had direct contact with an actual construction project as both contractors and project managers. This dissertation is a departure. The contributions are twofold. First, the author starts from the world of a contractor and a project manager with unlimited resources. The entire idea of risk and costs are assessed from a practical point of view. The balance between conception and completion costs is redefined when project manager psychological traits, funder's largess and a variety of non-human factors are accounted for. Second, the study adopts a cross-section design which allows for an overall picture of the research, and the personal experience in project management, engineering and construction to flourish.

The researcher uses an actual building project, designed to be a multipurpose facility serving as a house, an academic institution and a business complex. Specifically, the project to which the cost performance and risk is being assessed in this study is the headquarters of the Nile Valley Multiversity and its affiliated companies and networks. All the cost and risk associated with the project and

how the balance between the two is structured is analyzed using a real time building project. This makes the work both novel and academically sound, in that it moves beyond the traditional textbook understanding of risk and its determinants, cost and its impact on risk, and tackles the issue head one via a project manager, and a contractor's perspective. The sample employed are the project managers, contractors and project team members.

The major contribution of the study is to provide a better understanding of alternative channels to cost performance and risk management. It is expected that this will introduce new paradigms in reducing risk in the building industry.

Keywords: **Cost over runs; Cost performance; Risk; Project management.**

1.1. Background of the study

The construction industry is multifaceted in any modern economy. It drives the economic performance of countries, and it is a major employment of labor in both the formal and informal sector. As argued by Alagidede and Mensah (2017), the construction industry is a key barometer of the health of an economy because of its strong linkage to output fluctuations. By entering directly to GDP, it counts as fixed investment, and hence the capital stock of a country. As part of aggregate output, it helps explain business cycle fluctuations and ultimately long run economic growth. The size of the construction industry in relation to national income is in the order of 7% to 15 % for most economies, and close to a tenth of global output. This trend is mimicked locally by many countries. For example, in Ghana, the construction sector contributes about 13% to GDP. In 2014 the nominal amount attributed to the sector was US$3.8 billion, representing about 12.7% of GDP. In 2013, the sector accounted for 11.8% of GDP and employed 320,000 people (Institute of Statistical, Social and Economics Research [ISSER] 2013, Ghana Statistical Service [GSS] 2013).

One major trend that has characterized global construction, especially in developed capitalist economies and emerging ones is the strength of mergers and acquisition (M&A) in the sector. The more vibrant and active the sector is, especially in times of robust economic growth, the stronger the pace of M&A activity, and the period 2013-2018 has been one of the most active in recent time. The year 2018 alone accounted for 484 M&A deals. Regionally, North America, Europe, and Asia (mostly in China) are the key players in terms of number of deals (see Delliot, 2019).

Although the nominal number of deals went up, the average deal value dropped slightly to US$ 203 million in 2018, down from $222 million in 2017. One can argue without contradiction that the turning points of these deals also signal significant shifts in the local and global economy. As shown by the Delliot (2019) survey of

the global construction industry, investments in physical capital such as residential and commercial buildings, roads, tend to fluctuate with fluctuating fortunes of the global economy. Since the current global economic shut down in late March 2020, the sector has taken a deep hit. This worrying phenomenon started in the first half of 2019 when dominating downside risks, geopolitical headwinds and economic uncertainty coupled with subdued growth signaled a recalibration in the sector even long before the global lockdown of 2020.

Although the distribution of M&A activity highly favors the developed economies, the demand for, and supply of the most robust construction activities occur in developing and emerging economies. The deficit in infrastructure such as roads, residential and commercial property, aesthetics and uncompromising designs, unparallel built environment, as well as youthful and virile populations coupled with abundant natural resources makes the sector in these economies the strongest globally, even if the statistics are not reflected in the global M&A data. To this end, understanding the nature of the construction industry locally, holds important lessons for understanding the global picture. Moreover, a clear insight into the industry from the point of view of the contractors and project managers is important in understanding the intrinsic and quantifiable factors that impact the performance and uptake of construction activity.

An important consideration in all construction projects is risk, whether defined in terms of uncertain outcomes in projects, or a set of measurable probabilities that ultimately impact on the final cost, quality and flavor of the project. Construction risk is all pervasive, from project conception, to design, building and fabrication to completion and renovations. The timing of the project as well as changes in the global and local economy all impact on construction risk and cost. Similarly, the management of construction projects and the factors employed in that process influences the terminal expenditure on the project. It is therefore imperative to disentangle the intricacies of construction risk in a

localized environment where they are properly understood and modelled, and to account for the psycho-social factors that drive costs and risk in the construction industry.

1.2. Statements of the problem

Cost performance of construction projects is reported as a major problem globally (see Zarina et al, 2014; Chen et al, 2016). Defined as the percentage difference in cost between final contract amount and the initial contract amount (Mckim, 2000), the cost of a building project can be measured in terms of unit cost, or percentage of net variation over the final cost (Chan and Chan, 2004). A number of researchers have used this criterion to measure building project success and cost performance of projects in the developed countries (Alkinson, 1999; Chan, 2001; Koelmans, 2004; Cooke-Davis, 2002).

Most often building projects are finished within estimated project cost. If the building cost is not well estimated, it affects a lot of activities since the project contractor will have to source extra funds to see the completion of the project. Depending on the owner specification, a project can exceed its estimated cost and getting funds after an agreed budget is always a complex maneuver to do. When the actual construction cost of a project is less than the estimated cost, the building project is adjudged to be successful thus meeting all project specification.

In many settings, this may have two meanings; either the contractor used the best quality materials and arrived at the objective cost of the project, or the contractor used less quality materials which have an effect on price, and/ or engaged the services of inexperienced artisans whose work may affect the total quality of the project, and there is a great of different permutations between quality and not so quality work, and costly and reasonably priced projects between these two polar propositions. It is therefore not an understatement that cost performance of

a project is very paramount to the success of the project by all parties. As Laryea and Huges (2008a; 2008b) argue, adopting different models to estimate cost and price construction risk at the initial stages is not a wise thing to do. The key is how to estimate and account for such costs and the associated risks. In order to improve cost performance, it is necessary to identify the various factors affecting the project initiation, execution and completion.

In the construction industry in Ghana and several emerging economies, contractors use clever techniques to internalize risks, especially given the revelation in studies such as Olatunji (2008) that cost over runs can be in excess of 100% of the anticipated cost of building construction in Nigeria. Some project managers and contractors and other industry participants adopt several *ad hoc* measures to account for deviations between inception cost and final cost to ameliorate the risks involved in undue cost over runs. Using the 10% rule as a guide, some contractors stay within or go slightly above this benchmark to account for cost over runs. Although not exceptionally rigorous, it is the most common approach employed in many constructions works.

However, in environments where microeconomic conditions are volatile and financial systems are unable to properly monitor and estimate the risk of funds, such costs can be passed on to the project financing process, and they can be large. From the myriad of players who have different definitions of costs, risks and project execution, it would be interesting to study the key drivers of costs and risks. More specifically, these conjectures raise a number of interesting questions in need of answers such as what factors affect the risk and cost performance of a building project? How are these costs estimated and mitigated by contractors and other industry players? What accounts for the differential risk and cost performance between project inception and completion? What mechanisms exist for mitigating project cost over runs? These and many other questions face the typical contractor in any construction venture.

Answers to these questions will not only open up the debate on managing construction risk at the local level but will also contribute to a good understanding of risk from a multiplicity of perspectives, especially in environments that are more complex, inherently lacking in previous research on the matter, and abundant in resources to fine tune construction activity to a higher level. This is a study of the factors affecting the risk of construction projects in the Bono East region. The study specifically looks at the phenomena from the point of view of the contractors and project managers to gauge the real factors behind cost performance of a real time project. This study seeks to lay a solid foundation for looking at construction generally, and the building industry.

1.3. Aim and Objectives of the study

The main aim of the study is to assess the factors affecting cost performance and the risk in the building industry of Ghana. The study will provide project managers a better understanding of cost performance and risk component in building construction and how they can mitigate these risks.

Specifically, the study seeks:

1. To examine the factors that affect the construction cost performance among contractors in the Bono East Region, Ghana.
2. To analyze mitigating measures for addressing cost over runs and construction risk

1.4. Research methodology

The path of every research is defined by the study design. In the same vein, the method and techniques employed by a researcher depend to a large extent on the research design. Kumar (1999) depicted that the most used research design for social science is cross-sectional research design. The cross-sectional design is best suited for studies aimed at finding out the prevalence of a phenomenon by

taking cross-section of the population. It will give an overall picture of the phenomenon as it stands.

The focus of the study is assessing the factors affecting cost performance and the risk in building industry.

Also, it will involve a literature review to capture the existing body of knowledge about factors affecting cost performance and risk in the building industry. A desktop identification of the factors will be carried out in relation to a specific building project in the Techiman area.

In addition to this, a survey of construction project managers, contractors, designers, and engineers using questionnaire designed to capture firsthand information which will be useful to the study.

Subsequently, Secondary data will be sourced from journals, website, and articles written under the building construction industry.

Finally, data will be collected and analyzed qualitatively through descriptive exploration and quantitatively through content analysis techniques and will be coded for entering the computer using statistical package for social science (SPSS) version 20.

1.5. Scope of the study

In relation to national income, the construction industry is in order of 7-15% for most economies and close to 10% of global output, this trend is represented locally by many countries. For instance, Ghana's construction industry contributes about 13% to GDP.

The above justification shows vividly that the construction industry is very broad, involves different players at different levels of a project. However, this study will focus on the building construction with emphasis on cost performance, cost over runs and risk associated in the building industry.

Both qualitative and quantitative data will be use to give better understanding of the factors affecting cost performance and risk in the building industry.

Indeed, the researcher is working on a building project at Techiman, the capital of Bono East Region, Ghana which will be the main focus of this study.

A survey questionnaire will be use to collect data from project managers, contractors, project team members in the Bono East Region.

1.6. Review of Related Literature

1.6.1. Cost performance and Risk of building industry

In every project, there are indicators which determines the success or failure of the project. These indicators provide information to measure the performance and compare them with project outcome, goals and objectives and are chosen to reflect the critical success factors of the project.

Cost is defined as the extent to which the general conditions promote the completion of a project within the estimated budget (Budashait and Almohawis (1994).

Cost is also defined as the amount spent on a project. The total cost of a project is the expense incurred from the inception up to completion of the project. Chan and chan (2004), opine that cost can be measured in terms of unit cost, percentage of net variation over the final cost. The performance of a project, however, rest on actual cost, time and quality, therefore the success or failure depends on whether it meets expected requirement. Other important considerations are the project owner's perception towards actual construction cost and estimated cost. These are critical in determining the project success or failure.

These definitions, and many others found in the construction literature, typically considers costs as the measureable, and actionable items and processes in the project. While this is a good place to start, the definition of cost, which includes opportunity cost of using project funds and materials in numerous other ways must be accounted for. Even if such an exercise seems daunting, and hence easily by-passed, a good analysis should reflect a discussion on such costs.

Additionally, the psychological traits, the availability of resources via alternative channels and the maturity and integrity of the project manager, contractor and all the team members involved in a piece of work impacts cost performance and risk assessment, yet they are rarely discussed.

Majority of the literature on this subject is done at a distance and not from practical and multiple faceted viewpoints of actual practice.
Obviously, to determine the cost performance of a project; there is a need to compare the contract sum and total cost of project to establish whether there is cost savings or cost over runs. What we present here is a model where both savings and overruns either don't exist, and /or are one. In such a world, we premise our model on unlimited and unfettered resources. This is a new paradigm. And we have evidence in place.

Certainly, the cost performance of a project is of importance to project managers and owners as well. A project that is completed within the appropriate time, ensuring quality, and cost efficient is adjudge success and the vice versa.
An unsuccessful project cause's cost overrun because the stakeholders fail to do budget analysis and risk factorization.
Risk is seen as the chances of something happening that will have an impact on the objective of the project.

Project managers acquires knowledge through education and experience, and they rely on their experience, knowledge and expert judgement to make decisions.

The absence of risk component of building budget possesses a great deal of uncertainty to the project.

Risk is something that needs to be manage strategically throughout the building construction process because it is the responsibility of the project managers to mitigate it to the barest minimum in other to achieve the set objective.

When project managers are not able to manage project effectively, there are consequences in terms of project quality, trying to meet timeline therefore all these has cost effect on the project budget; eventually, this leads cost over runs

Cost overruns is when cost is excess of budgeted amount due to an underestimation of the actual cost during budgeting.

An average of 43 and 71 percent of projects respectively came in over budgeted, exceeded time estimates and had narrow scope with total estimated waste of $55 billion per year in the U.S alone. Standish group (2004)

Cost overrun can be a result of inadequate data which leads to imperfect forecasting, optimism bias with forecasting where the requirement target rise or is understated during the project budget preparation and misinterpretation of the scope of the budget.

1.7. Significance of the study

The study will outline possible application of research findings and its possible contribution to the study area and the country.

The research will uncover the factors affecting cost performance and risk in the building industry. It will also add to the existing literature and serve as a benchmark for further studies in the area.

Furthermore, the recommendations will serve as a guide for project managers, contractors on the management of cost performance and suggest risk mitigation measures in the building industry.

In addition to this, the study will provide a succinct project budget analysis for the consumption of stakeholders in the building industry.

Finally, the research will serve as an evaluation framework for controlling cost over runs.

The evidence so far indicates that the largest contributor to the sector is almost always at the local level where the needs and deficits are very great.

1.8. Definition of terms

Cost performance: is the percentage in cost between the final contract amount and the initial contract amount.

Project manager: the project manager is an individual who co-ordinates programs of a project by ensuring that the intended objective of the project is achieved within the right time frame. Gido and Clements (2003).

The project manager is responsible for resource allocation, monitoring of material usage, and the physical project progress as well as motivating and inspiring the project team members to achieve project objective.

The ability to supervise the project process is the responsibility of the project manager and determines the success of a project manager.

Risk: Is the probability of the outcome of something that will have an impact of the objective of a project. The completion of a project is meaningless without considering the risk aspect of the particular project. For the construction industry, risk could be the probability of the occurrence of a definite event or factor or a combination of events or factors which occur

during the whole process of construction to the detriment of the project. Faber, (1979)

Risk can be categorized into internal and external risk in project construction or political, intellectual, financial, market, social and security risk. Sunger et al., (1997)

The categorization of risk may depend whether a project is domestic/local or an international project. The internal risk of a project is relevant irrespective of the type of project *whether local or international.*

In other to understand and have a clear picture about risk on international construction or projects, a good understanding of the country's political, economic, socio-cultural, technological, legal or regulatory framework would be essential in mitigating the risk associated with the project.

Cost: Cost is define as the degree to which the general conditions promote the completion of a project within the estimated budget. Bubashait and Almoshawis, (1994). Laterally, cost is define as the amount spent on a particular project

The cost of a project fall into three categories, these are direct cost, general condition cost and profits & overheads cost.

i. Direct cost; these are all the expense which can be directly attributed to the project or construction on site. They include cost of heavy equipment, construction materials and labor.

ii. General condition cost; these cost are sometimes referred to as soft cost and are all invisible or indirect cost needed for a project. It can also be sub-divided into three; pre-construction cost, construction cost and project operation cost.

a. Pre-construction cost; these cost are related to the planning that takes place before the actual construction start. They include document review

cost, estimating, contract negotiation, scheduling and project managers cost.

b. Construction organization; these are cost incurred through the construction phase. It includes cost of consultancy, safe officers or directors, engineers.
c. Project operation cost; these are also other cost related to the project operations. They include temporary toilet facility, temporary water service cost, cost of permits, job trailers; if any, telephone charges, vehicle and equipment usage fee.

iii. Overhead cost; these are also operating expenses associated with building construction that cannot be linked to any specific activity in the project or construction. It include rent or mortgage, utility cost, administration and legal expense, office supplies, employee training , business development, insurance cost and any expenses related to office administration.

Cost overrun:

Cost over runs involves unexpected cost increase or when cost are in excess of a budgeted amount as a result of underestimation of the actual cost during budgeting.

Cost over runs are very common in the construction, building projects industry.

Standish group 2004 reported 43 percent and 71 percent of projects came in over budget, exceeded time estimates and had estimates too narrow a scope; and total waste and estimated at $55 billion per year in the U.S alone.

1.9. Organization of work

The study will be organized into five chapters.

Chapter one forms the introduction. This consists of a general background of the study, problem statement, objectives and research questions, and the significance of the study.

Chapter two focuses on literature on cost performance in the building construction space and what other writers have done with regard to the topic. The chapter takes a broad view of the literature from the global to the local level. It examines the nature of the construction industry in Ghana and the Bono East Region. It appraises the various factors and arguments, and examines the triple constraint of scope, time and budget. This establishes a common ground upon which further research can be undertaken. The chapter ends with reflections on the best practice for the construction industry in the Bono East Region of Ghana.

Chapter three is on research methodology of the study. It specifies the data collection process, the soundness and reliability of the methods, and the execution of the study. The chapter also explores the qualitative and quantitative tools relevant for the study via interviews, surveys and questionnaire.

The findings of the study and discussion of the findings of the research will be presented in **Chapter four**. Here, a thorough examination of the three research objectives is carried out to ascertain the performance of cost, and the key risk elements in the construction industry. This section of the study juxtaposes the results with extant literature and presents specific and unique instances in which the originality of the study can be looked at. The chapter further discusses the usefulness of the results for various industry players.

Chapter five offers a summary of the findings, and recommendations for best practice in the construction industry. The chapter also opens further questions, and points out the direction in which further research on the topic can be initiated and executed.

1.10. Research Schedule

No	Research Activity	Date Execution	Date Completion	Responsibility
1	Writing of research proposal	10/02/2020	17/04/2020	Researcher
2	Literature review	25/04/2020	29/06/2020	Researcher
3	Designing Questionnaire	31/08/2020	30/09/2020	Researcher
4	Pilot testing of questionnaire	07/10/2020	21/10/2020	Researcher
5	Administering questionnaire	22/10/2020	30/11/2020	Researcher
6	Data analysis	03/12/2020	30/1/2021	Researcher
7	Writing up stage	01/2/2021	30/3/2021	Researcher

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