

Investigation of Construction Cost Overrun Issues and Management: Evidence from a Public University in Ghana

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Abstract: This study investigated the issues and management of construction cost overruns in a public university in Ghana. Specifically, the study answered the following research questions: (1) What types of project experience construction cost overrun? (2) What are the causes of project construction cost overruns? (3) How are project construction cost overruns managed? The study used the qualitative research approach. Documentary reviews and participant observation were the research methods employed for the data collection. The study showed that all types of construction project irrespective of the source of funding (i.e., internally generated funded, Ghana Education Trust Funded and externally funded project) experienced cost overruns. Also, it was established that contractors, location of the project, project consultants and funders were responsible for construction cost overrun in the university. In terms of the management of projects with cost overrun, they were based on the circumstances surrounding each project. The study recommends that due diligence should be done before awarding construction project contracts to avoid contractual stalemates in the future. Also, the income statement of contractors should be thoroughly analyzed to ensure they are not concurrently executing numerous projects and have the financial capacity to execute the project. Other resources like human resources and machinery should also be thoroughly analyzed to ensure their adequacy. Additionally, project consultants should ensure that their roles in projects that have been awarded for construction are effectively and efficiently carried out.

Keywords: physical development; construction project; cost overrun; project management; budgeting

I. Introduction

Construction is the process of building an infrastructure. It involves the collaboration of many different disciplines, including project management, sustainability, risk management, engineering, and management of the architectural design (Alshihri et al., 2022). All countries place a great deal of importance on the construction sector since it is responsible for building the foundation for many of the key social and economic changes that take place in these nations (Asiedu & Adaku, 2019; Enshassi et al., 2009). Ghana's overall industrial development is significantly aided by the construction industry (Famiyeh et al., 2017). Notably, the sector is frequently vulnerable to a variety of risks, including changes in the scope of the project, financial difficulty and cash flow issues, unstable ground conditions, and labour and material shortages with associated costs and timeline implications (Asiedu & Adaku, 2019).

Targets and uncertainty are a burden on all projects, regardless of size, as a result of the growing complexity of construction projects. The complexity of construction projects is rising, placing more pressure on construction managers to complete projects on time, under budget, and to a high standard. Cost overruns are a persistent issue that most nations' building industries must contend with (Vaardini et al., 2016). Cost is one of the key indicators of a project's success, therefore this is worrying (Olupitan et al., 2021). The centrality of cost to a project's success is echoed by Asiedu and Adaku (2019). According to them, the cost criterion has featured prominently in most definitions of project management performance, particularly success. They add that although other variables have been added to the definition of project success, the cost aspect still plays a crucial role. It is important to note that project time overruns go hand in hand with cost overruns as projects that exceed their timelines almost always experience cost overruns.

According to Asiedu and Adaku, (2019), the success of projects in the construction industry must be closely monitored to ensure the effective use of money, as the majority of developing countries spend relatively sizable percentages of their gross domestic products on building projects. Construction projects still have cost overruns today despite project managers having known for more than half a century that cost is essential to project success (Asiedu & Adaku, 2019). A cost overrun, also known as a cost increase or budget overrun, refers to unanticipated expenses that exceed the amount projected to be expended in the budget created for the project (Vaardini et al., 2016). In terms of construction cost overrun, Amoah-Abban and Allotey (2014) view it as the difference between the total cost of a building project after its completion and the sum specified in the contract, as agreed upon by the client and the contractor at the time of signing the contract. Olupitan et al. (2021) put it as the ratio of the difference between the initial contract award amount and the contract amount after completion of the project. Enshassi et al. (2009) add that

by dividing the changed contract value by the initial contract award amount, the degree of cost overruns can be compared. It is worthy to mention that construction cost overrun is situated in the evolution theory

Despite the fact that construction professionals have access to new technologies, there doesn't appear to be any significant advancements in the accuracy of preliminary cost estimates or the predictability of ultimate costs (Ahiaga-Dagbui et al., 2015). Because of this, cost overruns in the construction industry continue to be a major worry for all parties involved in projects (Asiedu & Adaku, 2019; Enhassi et al., 2009; Olupitan et al., 2021). This has led to a number of studies on the construction cost in the civil engineering literature. Despite the overwhelming data supporting the prevalence of cost overruns, scholars and industry experts are divided over the root causes of this unfavorable global phenomenon. The triggers of this risk appear to be numerous, dynamic and country as well as sector specific (Asiedu & Adaku, 2019). Alshihri et al. (2022) also indicated that the risk factors for construction cost overruns vary from project to project and rely on the nation, the procurement process, and the nature of the construction project. Alshihri and colleagues go on to say that different projects have different reasons for cost and time overruns.

Some universities in Ghana have had abandoned projects in the past that has led to construction cost overruns. In one university, it was reported that some domestically funded projects amounting to about GH¢ 80 million had been left unfinished for years. Further, some of the projects which were close to completion had severely deteriorated fittings because of the delays in completion. Similarly, the institution paid about 75% more than the original contract sum for the construction of a project. The foregoing seems to indicate that universities in Ghana battle with cost overruns of their construction projects. This notwithstanding, no study has been conducted to dissect the construction cost overruns universities in Ghana. This study, therefore, sets out to investigate construction cost overrun issues drawing on evidence from a public university. Specifically, the study answered the following research questions:

- RQ1. What types of projects experience construction cost overrun?
- RQ2. What are the causes of project construction cost overruns?
- RQ3. How are project construction cost overruns managed?

II. Literature Review

Theoretical underpinning

The theory that underpins this study is the evolution theory. According to Love et al. (2016), evolution theory is a dominant theory in the construction cost overrun discourse. As the name suggests, evolution is the observed changes that occur in a phenomenon. Within the context of construction cost overrun, evolution theory explains the changes that the scope of construction works go through from what was planned at the inception of the project through till its completion is responsible for cost overruns (Love et al., 2016; Simushi & Wium, 2020). Simushi and Wium (2020) add that a criticism of this theory in explaining cost overrun by scholars is the inaccuracy of the schedule and cost plan at the inception of the project. This criticism can, however, be contested on the premise that forces beyond the control of the direct stakeholders causes the scope of the project to change. More importantly, the construction industry is saddled with uncertainties which make changes at the different stages of the project inevitable.

Review of Empirical Studies

Many empirical studies have been conducted on construction cost overruns in the construction management literature. A study by Niazi and Painting (2017) demonstrated that the main factors that could lead to construction cost overruns in Afghanistan are: corruption, owner delays in making progress payments, contractor financial challenges, security, owner order changes made during construction, and market inflation. Subramani et al. (2014) also evinced that the main causes of cost overrun are slow decision-making, poor schedule management, rising material and machine prices, poor contract management, delay in providing design, rework due to incorrect work, issues with land acquisition, incorrect estimation, and a long gap between design and the time of tendering. Additionally, according to a study by Memon et al. (2011), the most frequent and significant causes of cost overruns in the Malaysian construction industry were poor design and delays in design, unrealistic contract duration and requirements imposed, lack of experience, late delivery of materials and equipment, relationships between management and labor, delay in preparation and approval of drawings, inadequate planning and scheduling, poor site management and supervision, and mistakes made during construction.

Another study by Habibi and Renu (2020) indicated that security, corruption, low technical personnel qualifications, client payment delays, and inadequate site management and contractor oversight are the primary key issues that lead to building delays in Afghanistan. Alshihri et al. (2022) on their part discovered that the contractor's financial difficulties, the owner's failure

to make progress payments for completed work, contracts given to the lowest bidder, order changes during construction and the contractor's ineffective project planning and scheduling. Other findings by Alshihri and colleagues were lack of manpower, and the contractor's poor site management and supervision are the most important risk factors that delay the completion of building construction projects. The most important risk factors for budget overruns include contracts given to the lowest bidder and order changes made during construction. Strikes and border closures, material-related difficulties, a scarcity of materials in the markets, and delays in the transportation of materials to the site, inflation, contractor delays in delivering goods and equipment, and pricing changes for building products were among the top reasons for time and cost overruns in Israel according to Enshassi et al. (2009). Simushi and Wium (2020) demonstrated that the external environment, which in turn had an impact on the organization and the project surroundings, was the primary cause of schedule and expense overruns for large projects. The project team's lack of project-specific experience, previous external and organizational decisions, community resistance and pressure on the project team, and stakeholder demand for a scope adjustment were all identified as the primary causes.

The main causes of construction time and cost overrun in educational institutions in Ghana, according to Famiyeh et al. (2017), were financial issues, irrational contract durations imposed by clients, inadequately defined project scope, client-initiated variations, under-estimation of project cost by consultants, and subpar project supervision by consultants. Other contributing problems included contractors' underestimate of the project's complexity, poor site management, contractors' use of improper building techniques, and delays in the delivery of licenses by governmental bodies. The client's financial difficulties, the delays in receiving payment for finished work, design changes, a lack of communication strategies, inadequate feasibility and project analysis, poor financial management on site, and changes in material prices. According to Olupitan et al.'s study (2021), variation orders, changes to the project's scope, cash flow and financial difficulties faced by contractors, and delays in decision-making and insufficient planning were the main causes of the most significant cost overruns. According to the data, time overruns, project cost increases owing to time extensions, disagreements between the owner and the contractor, bankruptcies, and the waste of tax payer money are among the significant effects of cost overruns. Additionally, the use of experienced contractors, proper project planning, the appointment of highly experienced committed design teams, effective strategic planning, and proper project scheduling were measures for minimizing cost overruns in public sector construction projects in Nigeria. Meanwhile, the critical success factors for public sector construction projects were the experience of the project manager, the experience of the contractor, the commitment of project.

III. Methods

This study used the qualitative research approach. Documentary reviews and observations were conducted. In the documentary reviews, documents related to the construction of building projects were reviewed and analysed. Even though the validity and reliability of documents used in documentary reviews are thought to be questionable, documents reviewed in this study can be said to be valid and reliable. This was because the documents used were not created because of this study; they were documents that already existed. Also, the nature of the documents, largely contractual documents, make them authentic and credible (Ahmed, 2010; Cohen et al., 2007; Mogalakwe, 2006).

Observation was also used as a complementary research method to obtain more information to answer the research questions. The observation enabled the collection of data that the documents did not cover and confirm information obtained from the documentary review. Though observer bias and error could affect the validity and reliability of the observations, the documentary reviews could compensate for these limitations (Cohen et al., 2007; Rugg & Petre, 2007; Sarantakos, 1998; Saunders et al., 2012).

IV. Results and Discussion

RQ1: What types of project experience construction cost overrun?

In answering RQ1, three types of construction projects were identified based on their type of funding. The projects were internally generated funded (IGF), Ghana Education Trust Fund (GETFund), and externally funded projects. There were eight (8) IGF projects, six (6) GETFund project and one (1) externally funded project. In total, 15 construction projects that had exceeded their contract period and yet to be completed were identified. Specifically, one IGF project which was started in 2011 is yet to be completed. Works on the project stalled for three years and the contract was subsequently terminated. Even so, it is yet to be completed although it is in its final stages. Also, for more than 10 years, a three-storey GET Fund project has not moved beyond the ground floor. Works on the project has completely stalled. There are other IGF projects for which works have stalled for years. Thus, construction projects, irrespective of the type of funding experienced cost overruns. This is consistent with the findings of Famiyeh et al. (2017) who established that construction projects in the educational sector of Ghana experience cost overruns.

RQ2: What are the causes of construction cost overrun?

The causes of construction cost overruns were observed from four perspectives. They were the perspectives of the contractors, location of the project, project consultants and funders. From the viewpoint of the project contractors, the observation made was mainly inadequacy of the resource capacity of the contractors. These inadequacies covered human resources (requisite skill level and quantity of workforce required to execute the project); financial resources to pre-finance the project for which contracts have been awarded; and the inadequacy of machinery (tools and equipment) required to execute the contract. There have been instances where projects have stalled because the contractor was out of finances to proceed with the project. Similar findings were made in this regard by Alshihri et al. (2022). In the said study, the authors found that contractors had financial difficulties and lacked manpower for projects. Also, Habibi and Renu (2020) and Niazi and Painting (2017) found low technical personnel qualifications and contractor financial challenges respectively as factors for cost overrun. It is probable that contractor financial challenges in executing projects may not be a case of the contractor not having enough money but rather a case of executing multiple projects concurrently.

From the position of the project consultants, the study observed that factors that lead to project cost overruns include poor supervision leading to re-works on aspects of projects, delay in project manager giving written instruction and responding to contractors' requests; inadequate preparation of working drawings; inadequate analyses of contractors' finances for the awarded project. Numerous reference points exist to back this claim. The tiling of a project was poorly supervised and the tiles in every floor of the three-storey building have severe cracks that require re-works. The foregoing was in line with the study of Alshihri et al. (2022) who established poor site management and supervision as a factor delaying the completion of building construction projects. Likewise, Subramani et al. (2014) found that the main causes of cost overrun are slow decision-making, delay in providing design, and rework due to incorrect work. Again, Famiyeh et al. (2017) discovered subpar project supervision by consultants as a cost overrun factor.

The location the project is being constructed is another factor that causes construction cost overruns. Projects that are constructed outside the university campus have always struggled to get the needed materials for the works. For instance, getting chippings for the construction of some satellite campuses has proved a daunting task for the contractor. Again, other construction works outside campus are usually at locations that are very far from the main township which makes the conveyance of materials to the project site delay because of the reluctance of people whom aspects of the project have been outsourced to. This corroborates the findings made by Enshassi et al. (2009) about the scarcity of materials in the markets and delays in the transportation of materials to the site. Memon et al. (2011) similarly discovered late delivery of materials and equipment as a cause of cost overrun.

Lastly, funders of the projects have also been observed as contributors to cost overruns. There were instances the funds for the total cost of the project were not readily available and during the project, the funds anticipated to be available for the project becomes unavailable hence, the project stalls. In addition, it is observed that several projects are awarded to run concurrently and when funding all of them becomes difficult, prioritization of the projects is now done, thus, leaving some projects to overrun their original cost. This reflects Famiyeh et al.'s (2017) indication of financial difficulties faced by funders of the project as well as Niazi and Painting's (2017) discovery of delays on the part of project funders in making progress payments. More so, a change in leadership is seen as a cost overrun contributory factor. In this case, a change in leadership has been seen to divert attention from an ongoing project to another (sometimes new, sometimes existing). For instance, a project which was scheduled to complete in two years was completed in about 12 years because the leaders who succeeded the one who started it were not so keen about the project. It took a fourth leader to complete the project.

RQ3: How are construction cost overrun managed?

In managing projects with cost overruns, it was observed that there are no blanket strategies. Projects are treated on a case by case basis. In a project that stalled for three years due to contractual issues, for example, the contract was terminated and re-awarded to another contractor. This is an instance of poor contract management which was revealed by Subramani et al. (2014). In this instance, the bill of quantities was reviewed to reflect the prevailing market prices, concurrent re-approval from the relevant boards and committees sought. For projects that are not funded internally, the university mobilizes funds to complete particularly, those projects that are closer to completion and the extent of the need for the project. Likewise, depending on the extent of completion and need for IGF projects, funds are mobilized internally from other sources like sanctioning contributions from other departments to see them completed. Again, the university leadership relentlessly lobbies the GETFund leadership to commit more to projects they have already started. As found by Olupitan et al.'s (2021), study strategic planning and commitment to project were means of reducing cost overrun of projects.

V. Conclusions

This study was conducted to answer three research questions. The questions were (1) What types of project experience construction cost overrun? (2) What are the causes of project construction cost overruns? (3) How are project construction cost

overruns managed? The study concluded that all types of construction project irrespective of the source of funding experienced cost overruns. It also noted that contractors, location of the project, project consultants and funders are the major contributors to construction cost overrun in the university. Also, management of projects with cost overrun is based on the circumstances surrounding the project. More so, while the findings of this study are in line with the evolution theory because of the cost overrun issues, it could be said that the criticism against the theory in the context of construction cost overrun is valid to some extent. This is because the factors that contributed to construction cost overruns are largely not out of the control of the stakeholders.

VI. Recommendations

Based on the results of the study, it is recommended that:

1. Due diligence should be done before awarding construction project contracts to avoid contractual stalemates in the future.
2. The income statement of contractors should be thoroughly analyzed to ensure that they are not concurrently executing numerous projects and have the financial capacity to execute the project. Other resources like human resources and machinery should also be thoroughly analyzed to ensure their adequacy.
3. Leadership should ensure that they start projects that can be completed during their tenure and where a project cannot be completed in the initiator's tenure, a clear plan including finances are made available to the successor so that they can conveniently complete such projects to avoid being abandoned.
4. There should be a clear and centralized plan for the construction of projects to avoid the construction of numerous projects concurrently.
5. Project consultants should ensure that their roles in projects that have been awarded for construction are effectively and efficiently carried out.

Limitations and direction for future studies

The research methods employed in this study could be a limitation to the study. Even though both documentary reviews and observations were conducted, the researcher as the lone person around which the study revolved could lead to biases and being blind to some findings. Future studies should be conducted where multiple data is drawn from multiple people to overcome the possible weakness that has been highlighted. In this regard, interviews should be conducted to collect data from all stakeholders in building construction projects to have a more balanced study.

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