

A Review on Investigate Factors Influencing Cost Overrun in the Omani Construction Projects

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ABSTRACT

Cost overrun is one of the major challenges faced in construction projects around the world due to various causes which reflect different impacts on project completion with the planned cost. This issue is also common in the Sultanate of Oman, especially in government projects and residential buildings and that will affect the development of the country. The percentage of exceeding the cost of the construction project is a variance from one project to another. The main objective of this study is to recognize the factors influencing cost overruns in the Omani construction projects, evaluate the impacts of project cost overruns in the Omani construction projects, and develop a strategy of mitigating measures for cost overruns that can be implemented in the future to control the cost overrun. The methodologies of this study are qualitative and quantitative methods, interviews with experts in the construction industry and questionnaire surveys. Also, search and collect data from secondary sources such as books, e-libraries, articles, journals, and websites. The Questionnaire survey has been distributed to private and governmental organizations related to construction projects involving engineers, contractors, consultants, and clients as well as the interviews. The expected results from this study are explore the major factors affect the cost overrun in the Omani construction projects, the impacts of project cost overrun in the Omani construction projects, strategy of mitigating measures for cost overruns. According to the results of this research, the major factors influencing cost overruns in Omani construction projects are changing the scope, error in design, poor site management, delay of delivery materials, and inflation of cost materials. The major impacts of this issue are loss of profits, disputes between parties, termination of the contracts, and delayed project completion. The recommended strategies found from this study are using proper software such as BIM, checking the rate of labor and price of materials continuously, proper planning and scheduling, and proper site management. The results of this study can assist to monitor cost overrun the future project and develop the economy of the country.

Introduction

The construction industry plays a vital role in the development and growth of the country and the achievement of the goals of society. The performance of the construction industry directly affects the economy of the country and the contractual stockholders (Dlamini & Cumberlege, 2021).

Completing projects on time, within budget, and satisfying the client's requirement is considered the important criteria for a successful project. According to that, completing construction projects within budget is more critical because the companies are working on a narrow margin even if it is a complex task. Although, there are various techniques to manage and control the cost of construction projects but still cost overruns are a common issue around the world and have significant impacts on the economy of countries (Olawale A. Yakubu and Sun Ming, 2010). (El-Ahwal et al., 2016) A cost overrun is known as a situation where the budget of the completing project is more than the initial estimated cost and that is an indication of failing the project. To come out from this issue have to realize the challenges in the planning stage to develop the strategy which helps in establishing accurate and end with achievable expectations.

From previous can observed that the factors of causing cost overruns in construction projects are different form a country to another due to the various circumstances surround the construction industry. Therefore, the main objective of this research is to investigate the major factors causes cost overruns in Omani construction projects to evaluate its impacts and develop the strategy of mitigate measures for cost overrun in Omani construction projects. That was fulfilled through the related literature review and conducted questionnaire survey and interviews with the professional in Omani construction industry in both private and public sectors such as engineers, contractors, consultancy, and owners.

Literature Review

The construction project is considered a mission taken to create unique services, products, and facilities within a specific scope, cost, time, and quality. However, some construction projects encounter delays in completion time, cost overrun, and poor performance and quality and that required investigating the factors causing the issue to improve the productivity of the construction industry (Shah, 2016). It is a common issue that found many construction projects failed in achieving their mission within the planned budget and time and while the construction industry plays a necessary role in contributing to the country's development and the national economy, this study is taken to investigate the most factors causing cost overrun in the Sultanate of Oman to reduce its impacts and develop the strategies mitigate measures of cost overrun. This chapter, presenting of the defining the cost overrun, an overview of cost overruns in Oman and GCC, the main causes of cost overruns, their impacts, and strategies to reduce their effect by presenting results from different studies through the periods of cost overruns in various construction projects in different countries.

Background of Cost Overrun

Cost overrun in the construction industry is the major issue challenges developing countries. It is a budget overrun or cost increase, which includes unexpected costs acquired in surplus of the estimated amount due to underestimating the actual cost during budgeting (Vaardini et al., 2016). Research done by (Morsy, 2014) mentioned that cost overrun is the difference between the contract amount agreed between the parties at the time of signing the contract and the final actual cost of the project at the completion stage. (Niazia, 2017) stated that, the major concern of the clients is the inability of the construction company to accomplish the projects on time within the planned budget and that is a significant challenge for developing the countries due to the significant role of the construction industry to contribute in developing the social development and the economy of the countries. A result from a review of literature reviews in different countries done by (Aljohani, 2017) found that construction industries have a poor reputation due to the inability to complete the projects on budget and those projects have the potential to become defaulted projects with a significant impact on all parties of the projects. The most famous projects that experience cost overruns around the world are the Channel Tunnel Project by increased 80% more than the forecasted cost and the Great Belt Link 54% cost overrun.

Definition of Cost Overrun

Based on the research paper prepared by (Kodwo & Seth, 2014) , the cost overrun is defined as the variance between the final cost of the completed project and the contract sum that is agreed upon by the parties during the signing of the contract. It is the amount by which the actual cost exceeds the approved costs or the baseline. A paper presented the results of a questionnaire survey conducted to evaluate the factors contributing on causing cost overruns in Gas – Oil construction industry done by (Derakhshanalavijeh & Teixeira, 2017), reported that cost overrun is a positive variance between the actual cost after completing the project and the approved valuation of the budget. (Al Adawi &

Yahia, 2021) state that, cost overrun is known as a common phenomenon causing in the construction industry affecting the development of countries and a critical issue impacting the success of the projects that need serious attention from all stockholders of the project to complete the project on time within its limited cost.

Overview of Cost Overrun in GCC

A dissertation done by (Johnson & Babu, 2020) aims to investigate, appraise and analyze the causes of time and cost overruns in the United Arab Emirates construction industry, and found that the performance of the UAE construction industry is mainly evaluated by completing the projects within estimated budget and timely completion without compromising on quality. The research implemented a concurrent mixed approach, utilizing an interview and a questionnaire with UAE construction experts to investigate the major causes of cost overruns in Emirate's construction industry. The alarming issues in the UAE construction sector caused due to cost overruns are cost performance and poor time and the majority of the projects go unreported. The top five causes of cost overruns were summarized as design variation, poor cost estimation, inappropriate procurement method, financial constraints of the owner, the clients delay in making decisions.

Moreover, a paper prepared by (Seddeeq et al., 2019) objects to studying the main reasons causing cost overruns and delays in Saudi Arabian Oil and Gas construction projects. The study conducted a questionnaire survey method to collect the data about the significant sources of cost overruns in the Saudi Arabia construction industry and the results obtained that the major five factors causing the issue are poor planning and scheduling of the projects, changing design and scope by the client during the construction stage, design errors, underestimating of cost and insufficient understanding of the scope of the work at the bidding stage.

One more study was conducted to investigate the top causes of cost overruns in the Saudi Arabia construction industry (Adam et al., 2015). The study mentioned that the cost performance of the project is usually a particularly significant deliberation for the construction parties and the cost overruns have adverse effects on the success of construction project in terms of cost, time, and performance. The concluding results of the study presented the top aspects of causing cost overruns in Saudi Arabia construction projects from the contractor's perspective are changes in design, lowest price bid, long period between design and implementation time, improper planning, and delay in payments.

Overview of Cost Overrun in Oman

Research is done by (Al Siyabi & Khaleel, 2021) to identify the vital reasons behind cost overruns in Omani construction projects and their impacts. The study conducted an interview and a questionnaire approach, and the results concluded with major effects of cost overrun in the Sultanate's construction industry were delivery of poor quality projects, time of completion, and delay of payment approval. The study had recommended some procedures to manage the cost in the future such as detailed design should be awarded of work and the employer should have a proper tender analysis of the contractor's bid.

One more research paper was conducted by (Amri & Marey-Pérez, 2020) to explore the main causes of cost overrun and time delay in Omani construction projects related to contractors, clients, and consultants. The survey targeted 100 project managers to indicate the top causes of those issues. The significant findings related to cost overrun were changing scope of the project among clients, poor planning and poor site management was the critical contractor factor and for the consultant was poor drawings is the major causes of cost overrun. Research carried out (Zahra Ahmed AL Zedjali, 2010) to identify the causes behind the cost overrun in infrastructures projects in Oman by selecting a sample project from the telecommunications industry in Oman and found that changes in the scope of the project, project scope, and customer requirements are not clear improper planning, poor risk management, long tendering process, long time between design and bidding, lacking experience of the project team, lack of communication between project parties and team and poor user input and required gathering. Also, the study found that there is insufficient evidence of the relationship between cost overruns and the size of the company.

Causes of Cost Overrun

Research is done (Niazia, 2017) to identify the major factors causing cost overruns in construction projects in Afghanistan concluded with the results that the significant factors leading to cost overruns are delay in payment by owner, corruption, security, difficulties in financing project by contractors, market inflation and change scope of the work by the owner during construction stage. A study was conducted to analyzed the main factors influencing cost overruns in the construction industry in developing counties and the United Kingdom (Hamid & Waterman, 2018). Based on the qualitative research method, the findings have been concluded that the most common causes of the concern in the mentioned countries were inflation, change in design, project complexity, increase in the material's price, inadequate contract and procurement method, and change in the project scope. The rank of cost overruns caused in construction projects in the UK by using Relative Importance Index is shown in the table below.

Table 1. Rank of cost overruns causes

Cost overruns causes	Rank	RII
Change in design	1	0.94
Risks and uncertainties	2	0.89
Inaccurate time estimation	3	0.86
Poor performance of subcontractors and suppliers	4	0.82
Works complexity	5	0.81
Conflicts and disputes between parties in the project	6	0.81
Contradictions in contract documentation	7	0.8
Misinterpretation of Contract and requirement	8	0.8
Prices inflation	9	0.79
Financial and payment issues for completed works	10	0.78
Poor training and experience of project management	11	0.77
Lack of skills of workers	12	0.69
Unexpected climate conditions	13	0.68
Dependency on imported materials	14	0.65
Poor planning	15	0.62
Fluctuation in interest rate	16	0.59
Fluctuation of exchange rate currencies	17	0.58
Weak regulations and controls	18	0.58
Project fraud and corruption	19	0.55

Research prepared by (Subramani, 2014) to explore the factors influencing the cost overruns in construction projects in Auckland mentioned that, as the cost is the key sign in measuring the success of a construction project it is the major cause of failing the project and the effects are not limited to the individual project but it occurs huge losses in public projects and affecting the growth of the country's economy. The study identified 51 factors and the results showed that the major three factors of leading failure projects due to cost overruns were scope change, procurement method, and optimism bias.

(Keng et al., 2018) a study purposed an exploration of cost overrun in building construction projects in Malaysia aimed to determine the causes of cost overrun to identify the strategies to overcome cost overrun issues in construction projects. The results of the obtained data from the questionnaire survey which were analyzed by using SPSS were projects delays and design changes are the vital causes of cost overruns in building construction projects in Malaysia. A study aimed to explore the major causes of construction cost overruns and delays by taking a case of

selected educational projects in Ghana done by (Famiyeh et al., 2017). The data was collected by surveying consultants, clients, and contractors working on projects related to government schools. The findings as the major influencing of cost overruns in school projects were variations in designs; poor project analysis, and feasibility, materials price fluctuations, poor financial management on-site, and lack of communications plans.

(Amini et al., 2022) stated that cost overrun is the most significant challenged the stakeholders in the construction industry. The research aimed to investigate the factors causing cost overruns in Iranian construction projects and this paper reviews the results of similar studies conducted in such Asian countries and quantitative method with a questionnaire survey. The collected data were analyzed using the SPSS. The results presented that improper planning, poor site management, lack of experience, poor economic condition, and fluctuation of prices of materials are the vital reasons for cost overrun in Iranian construction industry.

(Shah, 2016) conducted a study on an exploration of causes of delay and cost overruns in construction projects by taking a case study of Australia, Ghana and Malaysia. The study aimed to determine the most impelling influences causing cost overruns and delaying the project. He found that the majority of the issues causing cost overrun in Australia are methods of construction, improper planning and scheduling, and effective monitoring and feedback process, whereas in Malaysia, poor site management, improper planning by contractors, and inadequate contractor experience. However, in Ghana, delay in payment certificates, complexity and size of the project, and underestimating the cost of project is the most impelling factors causing cost overrun in a construction project. The below table is presenting all of these results data. He suggested some recommendations to reduce the influences causing this issue such as proper planning and scheduling throughout the construction project, using effective methods like BIM technology to visualize the overall project, ensuring health and safety site and contractors are paid on time, and regular meetings with suppliers and subcontractors.

Table 2. The top three critical factors were found in three different countries.

S.N	Australia	Malaysia	Ghana
1	Planning and scheduling deficiencies	Contractor's improper planning	Delay in payment certificates
2	Methods of construction	Contractor's poor site management	Underestimating of project cost
3	Effective ways of Monitoring and Feedback	Inadequate contractor experience	Underestimating the complexity of projects

Moreover, a study was conducted by (Al Adawi & Yahia, 2021) on the causes of cost overruns in road construction projects in Oman which aimed to identify the most critical reasons of causing cost overruns on road projects in the Sultanate of Oman. The results of this study found that the top five influences are contractors are not paid on time, design errors, incomplete design at tendering phase, funding difficulties, and cost underestimating. A review on causes of cost overrun in the construction project done by (Faten Albtoush et al., n.d.) stated that cost overrun is a critical issue and its required a serious attention from the project participants. The study highlights the most reasons of causing cost overruns in the construction projects which are estimation, design and contract, communication and materials. The results of this study will help to decide the best decisions to avoid or reduce the cost overruns in the construction projects. In addition, study done by (Ghule, 2020) to evaluate the causes of cost overruns in Malaysian construction industry and found that material shortage, quality standards not defined, late delivery and procurement issue, undefined scope or frequent changes in the scope.

Impacts of Cost Overrun

According to the study done by (Al Siyabi & Khaleel, 2021), it was concluded that the three major impacts of cost overrun in construction projects in the Sultanate are a delay of payment approval, time of completion, and delivery of

poor quality projects. (A.L et al., 2021) is a study aimed to find out the critical reasons and effects of cost overruns in Nigeria's public sector construction projects using structured questionnaires to collect the data, found that the critical impacts of cost overruns are time overrun, disputes between client and contractor, bankruptcy, company liability to insolvency, reduce the profit of contractor and creating stress for the contractor.

(Consortium et al., 2017) stated that cost overrun in construction a project negatively affects the construction industry and its stockholders. The study aimed to identify the level of existence and impact of cost overruns of building construction projects in Ghana and found that the most significant effects are the inability to secure project finance, less return on investment, abandonment of construction projects, failure to deliver value to clients and lost investment in the construction industry. (Asmitha, 2019) is a paper aimed to evaluate influences leading to cost overruns and their impacts on project performance by collecting data through a questionnaire survey with professionals in the construction industry. According to the findings of the study, the critical effects on construction projects were identified as unfriendly working relationships, disputes between parties, abandonment, environmental nuisances, and low quality.

In addition, (Mukuka et al., 2015) aimed to identify the effects of construction projects schedule and cost overruns: a case of the Gauteng Province, South Africa found that the poor quality of work, loss of profits, creates stress to the owners, Contractor's bad reputation, acceleration losses, disputes, the extension of time were the major effects of cost overruns in the construction filed in South Africa.

The main effects of cost overruns collected from interviews and respondents of a survey of a study conducted by (Nega, 2008) were a delay, supplementary agreement, budget shortfall, poor quality workmanship, high cost of supervision, delayed payments to contractors, unsatisfying by the owner of the projects, creates frustration on stakeholders, declines the growth of construction industry by eroding mutual faith and respect.

In addition, the results obtained from the respondents asked about the effects of cost overruns in Bhopal construction projects through a study done by (Prajapati et al., 2016) were, increased the planned cost of the project due to delay, project abandonment, contractor's liability to insolvency, tying down owners capital and liability of firms to bad debt.

Strategies of Mitigate Measures Cost Overrun

Research is done by (Riedel & Al-Keim, 2017) aimed to explore strategies to reduce the schedule delays and cost overruns in construction projects by conducting three interviews with three project managers from various construction companies. Out of 16 themes, the most centralized themes are master planning, managing the design stage, use of proper software, processes, and procedures, deciding clear scope, setting project cost and time, and procurement management. Additional to that, he mentioned that the cost overrun in construction project cause environmental and social impacts. However, this study is aimed to conduct interviews with experts in both sectors to explore the most influence causing cost overruns in Omani construction projects by developing a strategy to reduce its effects.

A research was carried out by (Prajapati et al., 2016) to collect data related to the major factors causing cost overruns during the construction phase and their impacts on the projects in Madhya Pradesh in India using a questionnaire survey with disk study to collect the information. Based on the study found, some points are recommended in order to control cost overrun and minimize its effect; conduct training courses to improve the managerial skills of projects teams, update continuously the material prices and labor rates, and time paid for progress payment, good communication between project participants during project phases and sufficient time should be given for all progress to minimize late changes. (Gawad et al., 2020) is a study was done on strategies to reduce cost overrun in construction projects by collecting data from research and questionnaire survey found that having a master plan, implementing correct procedures, completing the design stage prior to construction, risk management plan, procurement management, and using appropriate software are the effective techniques to reduce cost overruns.

(Abdussalam Shibani & Kumar Arumugam, 2015) suggested some strategies avoid cost overruns in Indian construction projects based on the study aimed to recognize the major reasons for cost overruns in Indian construction

projects and the critical techniques that are assisting in avoiding cost overruns. The suggested strategies were appropriate planning in the initial stages, a good relationship between contractor and client, skills of contractor and architects, proper planning and methods of construction, hiring proficient suppliers and subcontractors, and proper site management. (Al Siyabi & Khaleel, 2021) suggested some points to minimize the effects of cost overrun in Omani construction projects such as hiring a good supervisor team, project manager, a good cost controller, and a professional project design team, selecting the proper procurement strategy, and well planning for the pre-contract stage is crucial to reducing the cost overrun of the Omani construction project. Additional to that, he recommended some points to minimize the cost overrun such as risk assessment and control, proper tender analysis, and detailed design should be completed before award of the work. Another research achieved by (Measures et al., 2018) stated that the most significant mitigation for critical cost overruns are ensure effective planning, establish proper contract with suppliers and provide skilled project planner.

Conclusion

Cost overruns is the major issue caused in the construction industry overall the world due to various factors and lead to different impacts on the construction projects. The causes are different from one project to others and from a country to other countries as well the effects also differ from a project to others. There are various strategies can be implementing to reduce the effects of cost overruns and the suggested strategies are different from country to others and that depend on the factors of causing cost overruns in construction projects.

The construction projects in the Sultanate of Oman are also suffer from this vital dispute and there are many studies conducted to explore the factors of causing this concern and their impacts to recommend the appropriate strategies to reduce their effects. This research is focusing on examining some factors to explore if they are causing cost overruns in Omani construction projects or not and investigate their impacts and develop strategies of mitigating measures for cost overruns by using main source of collecting data which are questionnaire survey and interviews with professional experts in construction industry. In this study, the size and complexity of the project factor are considered to be examined as a significant factor that causes cost overrun in an Omani construction project or not. Evaluating the impacts of cost overruns and improving the strategy of mitigating measures for cost overruns are the objectives of this study. From the analysis of previous studies that considered to study the cost overruns disputes in different countries found that there are many factors causing cost overruns, and their impacts are differ due to the causes and the recommended strategies to reduce the impacts were suggested according to the cause of the dispute.

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