COST ESCALATION ISSUES IN CONSTRUCTION PROJECTS

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ABSTRACT

Objective: Cost escalation is a common issue, particularly in public projects which has a significant effect on cost overrun. These escalations are caused by several factors which are important to control. This study identified various factors of cost escalation and assessed their level of significance. To complete the project successfully, it is imperative to identify these factors and then take the necessary steps to control or mitigate them.

Research Method: A questionnaire survey was conducted for collecting data and analysis involved the weighted average method for raking the factors. A total of 52 questionnaire forms were collected from clients, consultants, and contractors.

Findings: Top five factors affecting cost escalation are that fluctuation in prices of construction materials, cash flow and financial difficulties, lack of timely decision-making, slow payments, and inflation.

Originality: This study will help the practitioners to understand the significant issues which will help in controlling the cost escalation in construction projects

Keywords: Cost escalation, construction projects, Significance Level

1. INTRODUCTION

A change in the price of a particular good or service over a predetermined time period in a particular economy is referred to as cost escalation (Ahmed et al. 2018). In Pakistan, cost growth is a recurring problem, particularly in government organizations. The Pakistan Engineering Council (PEC) permits cost escalation in construction projects with contract costs of more than Rs 25 Million under clause 70 of the standard form of bidding documents. This implies that there is always a chance that the issue of cost escalation will arise. The risk of rising construction material, labour, equipment, and energy costs, among other risk factors, which could result in delays and financial instability, makes cost escalation inevitable in large construction projects. It's critical to remember that construction projects require meticulous planning and design. Any project's success depends on careful planning and accurate cost estimates. This should be continuously reviewed and tracked to make sure the project is completed on time and within budget. Today's construction project managers frequently disregard these fundamental principles, which leads to cost increases and time-consuming issues.

Cost escalation, which includes labour, supplies for construction, and equipment, is the adjustment or settlement of the contract component's unit price (Broto et al. 2017). The cost growth frequently offsets the industry's contribution to the economy. Escalation and contingency expenses, which are seen as risky funds and need to be ready to deal with the problem in the future (Muya et al. 2013) include unnecessary costs as a result of underestimating the actual cost, which is greater than the budget amount. To complete the project successfully, it is essential to identify the factors that contribute to cost escalation and then take the necessary actions to control or mitigate them. Customer satisfaction and planned objectives are always impacted by cost overruns and schedule changes. As a result, research is necessary to address the crucial problem of rising costs (Kaliba et al. 2008). Although the problem of cost

growth has traditionally been described as omnipresent, its importance varies, especially in projects that are funded by governments internationally (Muya et al. (2013). Only 20% of Pakistani projects, it has been reported, were able to be completed on time and within the contracted budgets (Haseeb et al. 2011a).

2. LITERATURE REVIEW

Cost escalation is attributed to poor cost behavior in the construction industry. Poor cost behviour is a global issue (Rahman et al. 2019). Various researchers have conducted numerous studies on the topic of cost escalation. System dynamic approach-based models for project cost escalation prediction were studied by (Broto et al., 2017). To validate the model, a seven-year Indonesian multi-project was considered. The result shows that the suggested model can predict cost escalation with an accuracy of 91.21%. The primary causes of cost escalation in Indonesia are changes in the scope of the work, inflation, the unpredictable nature of the weather and other environmental factors, flawed contracts, and schedule delays (Broto et al. 2017). The research was done on a road construction project in Zambia by (Kaliba et al., 2008). The main contributors to the cost increase, according to the study's findings, are flooding and bad weather. One of the main reasons for this issue, according to reports, was the clients' tardy payments to contractors. According to the researchers, there is no simple way to stop the increase in costs and schedule slippage. With good project management, it is manageable, though (Kaliba et al. 2008). The reasons for rising construction project costs, overtime, and poor project quality in Zambia were examined by (Muya et al., 2013). A total of 17 factors were identified by the literature and interviews. The five main reasons for low-quality construction projects in Zambia were poor financial management by the contractor, delayed project funding delivery by the contractor, poor supervision by the contractor, incompetence, and insufficient contractor capabilities (Muya et al. 2013).

Cost escalation in Nigerian construction projects has been linked to unstable material prices and price changes (Muhammad et al. 2015). The main contributors to cost increases, according to research conducted in the Pakistani market, are customer behaviours like having unstable finances, making slow decisions, and not participating in the project planning phase (Abas et al. 2016). Another investigation into Pakistani building projects using a poll of significant parties turned up an increase in the cost of materials and a break in funding. The researchers argued that proper planning must start as soon as possible in the time estimation process. Additionally, sufficient contingency funds need to be kept on hand to pay for the rise in material costs [6]. Internal cost-escalation factors, which the agency or owner can directly control, and external cost-escalation factors, which the owner cannot directly control, are divided into two categories. In the USA, 50% of transportation projects required additional funding, according to a report on those projects (Shane and Molenaar 2009).

According to a study to determine the factors influencing project costs, fluctuating raw material prices, unstable manufactured material costs, high machine costs, lowest bidder procurement procedures, subpar project management, and subpar cost control are the key factors (Azhar et al. 2008). When it came to identifying the issues with Pakistani construction projects, it was discovered that money and payment problems, poor planning, poor site management, a lack of experience, and a lack of supplies and equipment were the main roadblocks (Haseeb et al. 2011b). Given the rise in the cost of construction contracts, policies must be improved. It has been suggested that the tendering information needs to be more exact. To prevent project cost escalation, a deduction rate should be added to price increases (Choi et al. 2006). The main reasons for the rising cost of the construction industry in Nigeria are poor contract management, poor planning, inaccurate estimates, and price fluctuations. Before starting work, it was suggested that customers give themselves enough time to prepare project documents and feasibility studies (Mansfield et al. 1994). Similar to this, a study on the cost problems of Malaysian construction projects discovered that

inadequate site management by contractors, a lack of experience, a lack of workers on the job site, and inadequate planning and scheduling by contractors are serious issues (Memon et al. 2010).

According to an analysis of the factors that affect costs in residential construction projects in Turkey, the main offenders were poor planning, underestimating costs, and utilizing resources like labour and material costs. The majority of project cost-related issues, from planning to implementation and management, are reportedly brought on by poor demand control and resource management (Durdyev et al. 2012). Major problems in Nigerian construction projects were reportedly poor site management, a lack of coordination between parties, a contractor's inexperience, and fraudulent practices. These problems could be reduced by using earned value and actual value analysis (Haruna et al. 2016). Poor planning, a lack of labour, and a lack of materials are thought to be the primary factors influencing project costs in India (Bhatia and Apte 2016). Ebrahim and Akal (2017) assert that the project's inadequate planning and execution are the primary causes of cost inflation (Ebrahim and Akal 2017). The results of a thorough analysis of many studies revealed a total of 30 top common factors that were taken into account for additional study about the local construction industry as presented in table 1.

Table 1: Cost escalation factors summarized from literature review

S.No	Factors	References
1	Fluctuation in prices of materials	Memon et al., (2010), Muhammad et al., (2015), Tejale et al., (2015), Durdyev et al., (2012), Jadhav et al., (2016), Vu et al., (2016), Hazim and Salem (2015), Lye and Campbell (1992) & Mahamid and Bruland (2011).
2	Weather conditions	Knight and Fayek (2000), Muya et al., (2013), Kaliba et al., (2008), Muhammad et al., (2015), Hazim and Salem (2015), Alhomidan (2013) & Alinaitwe et al., (2013).
3	Frequent design changes	Memon et al., (2010), Jadhav et al., (2016), Vu et al., (2016), Hazim and Salem (2015), Haruna et al., (2016) & Alhomidan (2013).
4	Cash flow and financial difficulties faced by the contractors	Memon et al., (2010), Muhammad et al., (2015), Tejale et al., (2015), Memon et al., (2014), Vu et al., (2016), Bhatia and Apte (2016) & Lye and Campbell (1992).
5	Slow payment of completed works	Memon et al., (2010), Jadhav et al., (2016), Vu et al., (2016), Lye and Campbell (1992), Alhomidan (2013) & Alinaitwe et al., (2013).
6	Lack of coordination on site	Muya et al., (2013), Memon et al., (2010), Muhammad et al., (2015), Tejale et al., (2015), Haruna et al., (2016) & Alhomidan (2013).
7	Poor site and project management	Memon et al., (2014), Haruna et al., (2016), Lye and Campbell (1992), Alhomidan (2013), Alinaitwe et al., (2013) & Subramani et al., (2014).
8	Inflation	Muya et al., (2013), Kaliba et al., (2008), Shane and Molenaar (2009), Alhomidan (2013) & Alinaitwe et al., (2013).
9	Poor contract management	Muya et al., (2013), Memon et al., (2010), Vu et al., (2016), Bhatia and Apte (2016)
10	Labour productivity	Memon et al., (2010), Tejale et al., (2015), Hazim and Salem (2015), Lye and Campbell (1992) &

		Alinaitwe et al., (2013).
11	Local government pressures	Muya et al., (2013), Kaliba et al., (2008), Vu et al., (2016) & Hazim and Salem (2015).
12	Poor tech performance	Muya et al., (2013), Memon et al., (2010), Vu et al., (2016) & Bhatia and Apte (2016).
13	Incorrect planning and scheduling by contractors	Memon et al., (2010), Durdyev et al., (2012), Haruna et al., (2016) & Subramani et al., (2014).
14	Shortage of materials	Memon et al., (2010), Tejale et al., (2015) & Lye and Campbell (1992).
15	Low speed of decision making	Memon et al.,(2010), Hazim and Salem (2015), Bhatia and Apte (2016) & Alhomidan (2013).
16	Government policies and political instability	Muhammad et al., (2015), Hazim and Salem (2015) & Alinaitwe et al., (2013).
17	Increasing of loan interest rate	Vu et al., (2016) & Alhomidan (2013).
18	Project location	Knight and Fayek (2000), Muya et al., (2013) & Vu et al., (2016).
19	Insufficient/Incomplete drawings	Knight and Fayek (2000), Muhammad et al., (2015) & Mahamid and Bruland (2011).
20	Ground conditions	Knight and Fayek (2000), Memon et al., (2010) & Hazim and Salem (2015).
21	Inaccurate estimate	Knight and Fayek (2000), Muhammad et al., (2015)
22	Unrealistic schedule	Knight and Fayek (2000), Memon et al., (2014)
23	Number of change/extra work orders	Knight and Fayek (2000), Muya et al., (2013) & Memon et al., (2010).
24	Timeliness of sub-contractors and suppliers	Knight and Fayek (2000), Memon et al., (2014)
25	Delay in Acquiring land	Muya et al., (2013), Vu et al., (2016)
26	Inadequate Constractor experience	Memon et al.,(2010), Haruna et al., (2016) & Mahamid and Bruland (2011).
27	Strikes	Kaliba et al., (2008) & Alinaitwe et. al., (2013).
28	Absence of construction cost data	Muhammad et al., (2015), Hazim and Salem (2015) & Haruna et al., (2016).
29	Unavailability of competent staff	Tejale et al., (2015), Durdyev et al., (2012) & Lye and Campbell (1992).
30	Reworks due to the errors	Jadhav et al., (2016), Hazim and Salem (2015) & Alinaitwe et al., (2013).

3. METHODOLOGY

This study was accomplished with the help of a questionnaire survey. The questionnaire form was established based on 30 common factors of cost escalation which were identified from the literature review as explained in table 1. The questionnaire survey was done through post, email, and by hand among all three groups of respondents (i.e. client, consultant, and contractor). The analysis of the data was carried out with the weighted average formula as used by Kaliba et al., (2008) as in the following equation.

$$WA = \frac{1}{5} \times \frac{\sum_1^5 F_i R_i}{\sum_1^5 F_i} \times 100$$

Where WA is the average weighted perceived significance, Ri represents the response type on likert scale with i ranging from 1 to 5 and Fi is the frequency of the total no of responses chosen from the scale 1 to 5.

4. RESULTS AND DISCUSSIONS

To collect the data, a total of 200 questionnaires were distributed randomly. As a response, 52 complete questionnaire sets were gathered which were used for analysis. Among these 52 responses, 28 respondents are contactors, 19 respondents are clients and 5 respondents are consults representatives. These respondents have experience of working for several years in the construction industry. Data revealed that 29 respondents have experience of more than 15 years in managing large projects. There are 6 respondents have experience of 11 to 15 years, 10 respondents working for 6 to 10 years, and 7 respondents have working experience of 0 to 5 years. These respondents have completed different level of education which showed that 26 respondents are graduates having BE in civil engineering degree. Other respondents have masters, PhD, and diploma level of education. The data was analyzed to assess the significance level of the factors with frequency level and Weighted Average (WA) and the results are presented in table 2.

Table 2: Significance level of factors

Factor	Frequency						WA	Rank
	1	2	3	4	5	Total		
Fluctuation in prices of construction materials	5	13	17	11	6	52	0.600	1
Cash flow and financial difficulties faced	9	8	18	10	7	52	0.592	2
Lack of decision making timely	4	19	13	11	5	52	0.577	3
Slow payments	8	14	13	11	6	52	0.573	4
Inflation	4	22	11	8	7	52	0.569	5
Frequent design changes	3	22	15	6	6	52	0.562	6
Number of change/extra work orders	4	22	15	8	3	52	0.538	7
Insufficient/incomplete drawings	4	27	9	6	6	52	0.535	8
Government policies and political instability	8	23	6	9	6	52	0.531	9
Delay in acquiring land	9	21	10	6	6	52	0.519	10
Unavailability of competent staff	8	23	10	4	7	52	0.519	10
Incorrect planning and scheduling by contractors	11	20	8	8	5	52	0.508	11
Unrealistic schedule	10	22	9	4	7	52	0.508	11
Shortage of materials	16	11	12	10	3	52	0.496	12
Poor site and project management	15	18	8	3	8	52	0.488	13
Rework due to errors	10	22	13	3	4	52	0.481	14
Timeliness of sub-contractors and suppliers	10	23	13	2	4	52	0.473	15
Poor technical skills	16	20	6	3	7	52	0.465	16

Poor contract management	15	20	7	6	4	52	0.462	17
Inaccurate estimate	15	21	6	5	5	52	0.462	17
Influence of Local government	21	13	7	5	6	52	0.454	18
Ground conditions	14	22	7	6	3	52	0.454	18
Weather conditions	17	16	11	6	2	52	0.446	19
Inadequate contractor experience	22	13	7	5	5	52	0.438	20
Strikes	26	8	5	8	5	52	0.438	20
Lack of coordination on site	19	21	4	3	5	52	0.423	21
Project location	20	15	11	3	3	52	0.423	21
Absence of contract cost data	26	14	4	3	5	52	0.396	22
Increasing of loan interest rate	25	17	3	3	4	52	0.385	23
Labour productivity	21	21	6	3	1	52	0.377	24

Note: 1= Not Significant, 2= Slightly Significant, 3= Moderately Significant, 4= Very Significant, 5= Extremely Significant

Table 2 reveals that the top five significant factors are fluctuation in prices of construction materials, cash flow and financial difficulties faced, lack of timely decision making, slow payments and inflation with weighted average value of 0.592, 0.579, 0.564, 0.563 and 0.559 respectively. In a study conducted by Memon et al. (2019), it was found that fluctuation in prices is a highly relevant issue to cost performance. In another study, Memon et al. (2020) reported also that financial difficulty faced during the project is a common issue that has a significant effect the cost performance. The respondents taking part in the data collection process were engaged in different types of projects. To compare the trend of the factors in various project types, data was analyzed based on projects as presented in table 3.

Table 3: Significance Level of Factors Based on type projects

Factor	Buildings		Roads		Social Amenity project		Others	
	WA (%)	Rank	WA (%)	Rank	WA (%)	Rank	WA (%)	Rank
Fluctuation in prices of construction materials	59.31	1	65.45	3	48	7	62.86	1
Inflation	57.24	2	52.73	9	40	9	57.14	3
Cash flow and financial difficulties faced	55.86	3	74.55	2	76	1	51.43	5
Slow payments	54.48	4	65.45	3	72	2	57.14	3
Frequent design changes	52.41	5	65.45	3	56	5	62.86	1
Number of change/extra work orders	51.72	6	54.55	8	72	2	48.57	6
Incorrect planning and scheduling by contractors	51.72	6	49.09	11	32	11	62.86	1
Lack of decision making timely	51.03	7	76.36	1	64	4	51.43	5
Insufficient/incomplete drawings	51.03	7	58.18	6	64	4	48.57	6
Unavailability of competent staff	51.03	7	50.91	10	56	5	54.29	4
Government policies and political	49.66	8	56.36	7	64	4	54.29	4

instability								
Unrealistic schedule	49.66	8	56.36	7	48	7	48.57	6
Delay in acquiring land	49.66	8	54.55	8	52	6	57.14	3
Shortage of materials	46.90	9	61.82	5	32	11	54.29	4
Rework due to errors	46.21	10	52.73	9	56	5	42.86	8
Timeliness of sub-contractors and suppliers	44.83	11	56.36	7	32	11	54.29	4
Inadequate contractor experience	44.83	11	43.64	13	52	6	42.86	8
Poor technical skills	44.14	12	40.00	14	52	6	62.86	1
Poor site and project management	43.45	13	49.09	11	72	2	54.29	4
Ground conditions	41.38	14	54.55	8	44	8	48.57	6
Strikes	40.00	15	52.73	9	32	11	54.29	4
Poor contract management	40.00	15	49.09	11	56	5	60.00	2
Absence of contract cost data	40.00	15	36.36	15	44	8	40.00	9
Project location	39.31	16	47.27	12	44	8	45.71	7
Lack of coordination on site	39.31	16	47.27	12	40	9	48.57	6
Weather conditions	38.62	17	63.64	4	40	9	42.86	8
Influence of Local government	38.62	17	52.73	9	56	5	54.29	4
Inaccurate estimate	37.93	18	54.55	8	68	3	51.43	5
Labour productivity	35.86	19	36.36	15	36	10	48.57	6
Increasing of loan interest rate	33.79	20	43.64	13	44	8	45.71	7

Table 3 reveals that the most important factor affecting the success of construction projects and other kinds of projects is the fluctuation in the cost of building materials. Although this factor is ranked third for road projects, it is ranked seventh for social amenity projects. In construction projects, inflation is listed as the second-ranked cause of cost growth. The same factor is listed as the third most important factor in the category of other projects, but it is listed as the ninth most important factor in both road and social amenity projects. While it was ranked second for road work and first for social amenity projects, cash flow and financial difficulties were reported as the third major cause of cost escalation in building projects; however, they were ranked fifth in all other categories of projects.

5. CONCLUSIONS

This study assessed the significance level of the factors causing cost escalation in construction projects of Pakistan. This study was carried out through a questionnaire survey amongst main stakeholders i.e. clients, consultants, and contractors. Analysis of gathered data showed that fluctuation in prices of construction materials, cash flow and financial difficulties faced, lack of decision-making timely, slow payments, and inflation are top five significant factors. Controlling the factors causing cost escalation will help the practitioners in reducing cost overrun and achieve the projects successfully.

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