LAUTKC1I Journal of Civil and Environmenlal Studies DOI: 10.36108/laujoces/1202.60.0270
Volume 6, Issue 2

Impact of Risk Factors on Construction Projects' Completion Cost in Nigeria

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Submitted on: 0I/02/2021 *Accepted on: 16/04/2021*

Abstract

Construction projects are prone to a number of risks due to their complexity, dynamic nature, capital intensive nature and involvement of many stakeholders. These risks if left unntanaged will negatively influence the completion cost and other primary objectives of construction projects. Numerous studies have been conducted globally to determine the potential risks that negatively impacts construction projects; however, the risks aren 't alike across all the regions and the potential degree of impact may changes with time. This study assessed the impact of risk factors on completion cost of construction projects in Nigeria. Data was collected using structured questionnaires administered to / 92 construction practitioners using convenience sampling technique. Descriptive statistics (mean and standard deviation) were used to analyse the data. The study found 'inadequate cost estimate ' (MS - 4.39), 'risk incurred due to bribery and corruption ' (4.30), 'increase in prices of materials ' (4.25), 'increase in cost of labour " (4.11), 'poor cash flow management' (4.04) 'mistakes/errors in design ' (4.04) and 'mistakes during construction ' to be the topmost risk factors that impact on project completion cost. The study concludes that 'economic', 'financial' and 'contract administration and project management' related factors group are those with high impact on project completion cost.

Keywords: Completion cost, Construction projects, Impact, Risk factors.

Introduction

The Nigerian construction industry (NCI) plays an important role in the Nigerian economy. According to National Bureau of Statistics' (NBS) 2011; 2012 and 2014, in year 2008, the Construction sector was ranked 8th out of the twelve sectors that contributed to the country's Gross Domestic Product (GDP). It maintained the same rank in 2009 but dropped to ninth position in the third quarters of 2010 through 2012 while it moved to eighth position in the third quarter of 2013. However, despite the construction sector's contribution to economic development of nations, the sector is faced with some peculiar challenges in Nigeria which pose varying amount of risk to the industry players. These include difficult business environment, dearth of technical expertise, dearth of key building materials, and constrained access to credit (Adeagbo, 2014). As a result, the sector continues to suffer poor performance with many projects failing to meet time, cost and quality targets.

The inability of the construction industry to complete the projects on time and within budget has become the major concern to various stakeholders. This could be associated to the amount of risk involved in construction projects. Osipova (2015) observed that risks are inherent in all construction projects, which may negatively affect project delivery in terms of time, cost, and quality. If risks are not properly managed, the project stakeholders may seriously suffer from cost overruns, delays, or even project failures (Wang *et al.*, 2016). Arising from this, the construction industry globally has been reported to have a poor reputation in risk management (RM) (Renuka *et al.*, 2014). In the same vein, the Nigeria construction industry has been criticized for poor RM practices (Ojo, 2010; Windapo *et al.*, 2010; Aminu, 2013). This is evident in the poor performance of the industry in recent times. In this regard, Augustine *et al.* (2013) asserted that efficiency in RM implementation can positively impact the Nigeria construction industry and the economy at large. Thus, a process

to efficiently control risks plays an important role for projects to be successful. This emphasizes the importance of RM for any construction project, irrespective of size and complexity.
Each project has many associated risks that affects it success. These risks differ between projects, depending upon technology, finance, construction site, size of project, etc. Dada and Jagboro (2007) posited that one of the major reasons that lead to poor or ineffective project delivery in Nigerian was the improper assessment of risk factors. As a result, many projects exceed their completion time and cost targets.

Cost overrun is a common problem worldwide, but it is a significant challenge in developing countries (Azhar & Farouqi, 2008). The Construction industry in developed countries, including the United Kingdom also suffer from cost overrun because about one third of employers complain that construction projects experience budget overrun (Love *et al*, 2014). Flyvbjerg *et al.* (2004) studied 258 projects in 20 nations and found that cost overruns was a common practice and happens in almost 9 out of 10 projects with an average of 28% cost escalation; the average cost overrun in Europe was 25.7%, North America 23.6% and other geographical areas was 64.6%. Ameh *et al.* (2010) and Zujo *et al.* (2010) also reported that, 63% of the 1778 construction projects financed by World Bank faced poor performance with overrun in budget at an average of 40%. In developing countries, 75% of the projects in Ghana exceeded the original project cost whereas only 25% were completed within the budget (Frimpong *et al.*, 2003). Similarly, in Malaysia also, the problem of cost overrun is a serious issue. Abdullah *et al.* (2009) mentioned that 90% of large construction projects were suffered by significant cost overrun since 1984. Cost overrun in construction projects can occur due to many reasons one of which is the amount of risks involved in each project. Therefore, to prevent poor project performance, it is necessary to determine the impact of risk factors (Cha & Shin, 2011).

Risks and cost overruns arise in simple and complex construction projects (Ashwini and Rahul, 2014). Hence, projects risks and construction cost overruns are integrated parts, none of them can be separated from the other. Researchers (Laryea *et al.*, 2012; Enshassi & Mosa, 2008; Aliyu, 2013; Baba, 2014; Hedaya & Saad, 2017) have identified the risk factors that affect construction projects success. These include changes in scope of work on site, incomplete design at the time of tender, contractual claims, financial difficulty of owner, delay in progress payments by clients, poor of cost planning and monitoring of funds, variations and additional works among others.

While previous researches have been carried out globally to determine the potential risks that negatively impact construction projects, the risks aren't alike across all the regions (Kamal *et al.*, 2019) and the potential degree of impact may change with time. For example, exchange rate may vary from country to country and so, economy related risks may have varying degree of impact across regions with different economic conditions. Nnadi & Ugwu, (2013) further stressed that, RM in construction projects has become an increasingly challenging activity because of the complexity of the processes involved. However, the starting point of RM should always be a simple assessment of the problem to come up with a possible solution. Therefore, this paper reviewed previous studies (Laryea *et al.*; Enshassi & Mosa, 2008; Aliyu, 2013; Baba, 2014; Hedaya & Saad, 2017) and came up with 65 risk factors that affect construction projects. The risk factors are grouped into 10 and were assessed to determine their impact on completion cost of construction projects.

Materials and Methods

Quantitative research method was adopted. The population of the study are construction practitioners (Architects, Builders, Engineers, Quantity Surveyors and Project Managers). Sample size was determined in accordance with sample size formula by Cochran (1977) at 95% confidence level, 10% confidence interval and 50% degree of variability. A minimum sample size of 96 was obtained. Glenn (1992) suggested increasing the sample size to account for non-responses and incomplete responses. However, considering the large number of variables contained in the data collection instrument, this study assumed a valid response rate of at least 50%. Therefore 100% of the estimated sample size (96) was added to account for non-responses and incomplete responses making a total of 192. Therefore 192 questionnaires were distributed to respondents using convenience sampling technique. 138 were duly completed and returned while only 114 were found fit for analysis representing 59.38% valid responses. The questionnaires fit for analysis exceeds the minimum sample size required.

A structured closed ended questionnaire containing 65 sets of project risk factors was designed to enable data collection. The risk factors were grouped into 10. The questionnaire was validated by experts in academia and industry prior to commencement of data collection. Respondents were asked to rate the impact of the risk factors on project completion cost (PCC) on a 5-point scale (1 very low to 5 - Very high). A risk impact assessment guide by PMI (2004) as shown in Table 1 was adopted to guide the respondents and discussion of the results. Descriptive statistics was used to analyse the data. Mean scores and standard deviation were computed and used to rank the impact of the risk factors on PCC. Risk factor having mean value within the range of 0 to 1.49 is considered as having very low impact, while risk factor with mean score 1.5 to 2.49 is considered as having low impact, risk factor with mean score 2.5 to 3.49 is considered as having moderate impact, risk factor with mean score 3.5 to 4.49 is considered as having high impact and risk factor with mean score > 4.5 is considered as having very high impact. The standard deviation was used to rank the factors where there is a tie in the mean scores.

Table 1. Risk impact assessment guide

Identified risk factor	Project objectives	Negligible 1	Low 2	Moderate 3	High 4	Very high 5
Risk factor n	COST	<5% cost increase	5-10% cost increase	10-20% cost increase	20-40% cost increase	>40% cost increase

Source: PMI (2004)

Results and Discussion

Respondents' Profile

Table 2 presents the profile of the respondents. This comprises of respondent's organisation, nature of work handled by respondent organisations, Profession, highest educational qualification and years of experience. These help to explore the quality of data obtained from the respondents.

Considering the type of respondent's organisation, out of the total number of 114 respondents, 46 (40.4%) work under contracting firms, 29 (25.5%) work under consulting firms while 39 (34.2%) work under both contracting and consulting firms. This clearly shows that the respondents have experience both as consultants and contractors and therefore it is expected that high quality data was obtained.

Nature of work handled by respondents is presented in Table 2. 58 (50.9%) of the respondents are engaged in building construction, 18 (15.8%) are engaged in civil engineering works while 38 (33.3%) are engaged in both building and civil engineering construction. This also indicates a fair representation of respondent having experience in both building and civil engineering works.

Table 2 also shows the respondents' professions. 26 (22.8 %) of them are Architects, 37 (32.5 %) are Builders, 20 (17.5%) are Civil engineers, 6 (5.3%) are Services engineers, 17 (149%) are quantity Surveyors and 8 (7.0%) are Project managers. These professionals are managing both site and office work hence have ample knowledge of risk and its significance in construction projects.

On educational qualifications, 7 (6.1%) have OND as their highest qualification, while 10 (8.8%) have HND, 58 (50.9%) obtain B.Sc., 35 (30.7%) have M.Sc., and 4 (3.5%) have PhD. It can clearly be seen that majority of the respondents (more than 50%) have B.Sc. and above as their highest educational qualification. This could be an indication of the validity of the data obtained considering the respondents knowledge of construction.

The years of experience of the respondents as indicated in Table 2 reveals that, 26 (22.8%) have between 0 to 5 years, 39 (34.2%) have between 6 to 10 years of experience, 32 (28.1) have between 11 to 15 years of experience, while 9 (7.9%) of the respondents have between 16 to 20 years of experience and 8 (7.0%) have above 20 years of experience. This spread in the experience of the respondents is an additional indication of the quality of the responses obtained.

Table 1. Respondents Profile

Characteristics	Classification	Frequency	%
Respondents' Organisation	Contracting	46	40.4
	Consulting	29	25.4
	Both Contracting and Consulting	39	34.2
	Total	**114**	**100**
Nature of work handled by respondents' organisation	Building Construction	58	50.9
	Civil Engineering Construction	18	15.8
	Both Building and Civil Engineering Construction	38	33.3
	Total	**114**	**100**
Profession	Architect	26	22.8
	Builder	37	32.5
	Civil Engineer	20	17.5
	Services Engineer	6	5.3
	Quantity Surveyor	17	14.9
	Project Manager	8	7.0
	Total	**114**	**100**
Highest Educational Qualification	OND	7	6.1
	HND	10	8.8
	B.Sc.	58	50.9
	M.Sc.	35	30.7
	PhD	4	3.5
	Total	**114**	**100**
Years of Experience	0-5	26	22.8
	6-10	39	34.2
	11-15	32	28.1
	16-20	9	7.9
	Above 20	8	7.0
	Total	**114**	**100**

Impact of the risk factors on projects' completion cost

The impact of the risk factors on project completion cost was assessed by respondents on a 5-point scale (1= negligible/very low impact to 5= very high impact). The risk factors are categorised into 10 groups and the result is presented in Tables 3.

As shown in Table 3, the first group of factors (Group A) is the contract administration and project management related factors with 7 sub factors. Risk incurred due to bribery and corruption has the highest mean value (4.30). It is therefore considered as the risk factor with the highest impact on project completion cost and is ranked 1st. Poor project management (3.83) and change in the scope of the work (3.76) are the 2nd and 3rd risk factors with highest mean value. On the other hand, the risk factor having the lowest mean value under this category is delay in decision making (2.80) thus ranked 7th. Also, it was observed in the same group (A) that, five risk factors (those ranked 1st to 5th) have a mean value within the range of 3.51 to 4.49. These were considered as having high impact on project completion cost. The remaining two risk factors (6th and 7th) under this category have mean value within the range of 2.51 to 3.49. These factors have moderate impact on project completion cost. Furthermore, this group has an overall mean value of 3.59.

The second group of factors (Group B) as shown in Table 3 is the design related risk factors. Under this category, it can be observed that, the risk factor with highest impact on project completion cost is Mistakes/ errors in design having a mean score of 4.03 and is therefore ranked 1st. Next to this is poor design (3.95) ranked 2nd and frequent design changes (3.78) ranked 3rd. On the other hand, the risk factor with the least impact on project completion cost is delay in approval of design (2.55) and therefore ranked 6th. Risk factors ranked 1st to 4th under this group have a mean value within the range of 3.50 to 4.49 and are therefore categorised as having high impact on project completion cost while the risk factors ranked 5th and 6th have a mean value within the range of 2.50 to 3.49. These have moderate impact on project completion cost. This group also has an overall mean value of 3.48.

Construction and contractors site management related factors (Group C) have 20 sub factors. Under this group, the first three risk factors with the highest mean score are inadequate cost estimate (4.39), mistakes during construction (4.01) and inadequate experience by project team (3.91). These risk factors are ranked 1st, 2nd and 3rd respectively. On the other hand, Shortage of materials (2.58), late delivery of materials (2.47) and late delivery of equipment (2.39) are the risk factors with the lowest mean value in this group. These factors ranked 18th 19th and 20th. Furthermore, out of the twenty risk factors under this category, six factors (factors ranked 1st to 6th) have a mean score within the range of 3.5 to 4.49. These factors have high impact on project completion cost. More so, risk factors ranked 7th to 18th have mean score within the range of 2.5 to 3.49 and therefore have moderate impact on project completion cost. In addition, the risk factors ranked 19th and 20th have a mean score < 2.5. These have low impact on project completion cost. This group has an overall group mean of 3.26.

Financial related factors (Group D) have 7 sub factors. Under this category, the first three risk factors with the highest mean score are poor cash flow management with mean score of (4.04), poor financial control on site (3.98) and financial difficulties of owner (3.89). These factors based on their mean scores are ranked 1st, 2nd and third respectively. On the other hand, the risk factors with lowest mean scores are delay in payment to supplier/subcontractor (3.32) and contractual claims (2.77). These are ranked 6th and 7th respectively. Furthermore, it can also be observed from the Table that risk the factors ranked 1st to 4th have mean score within the range of 3.5 to 4.49. These have high impact on project completion cost while the three risk factors ranked 5th to 7th have a mean score within the range of 2.5 to 3.49 have moderate impact on project completion cost. This group also have an overall group mean of 3.60.

Information and communication related factors (Group E) has 3 sub factors. All the risk factors have a mean score within the range of 2.5 to 3.49. These factors have moderate impact on project completion cost. The risk factor with highest mean score under this category is slow information flow between stakeholders (2.85) ranked 1st. Next to this are poor coordination between stakeholders (2.76) and poor communication between stakeholders (2.70). These factors ranked 2nd and 3rd respectively. The group also has and overall mean score of 2.77.

Legal related factors (Group F) have 4 sub factors. The risk factor with highest impact on project completion cost is legal disputes during construction phase among contract parties (2.82) ranked 1st. Next to this is shortage of specialised arbitrators to help settle dispute fast (2.57) ranked second. On the other hand, Ambiguity of work legislations have the least mean score (2.34) thus ranked 4th. Furthermore, all the risk factors under this category with the exception the risk factor ranked 4th have a mean score within the range of 2.50 to 3.49. These risk factors have moderate impact on project completion cost. The risk factor ranked 4th (Ambiguity of work legislations) have a mean score of 2.34 and have low impact on project completion cost. The group has and overall mean score of 2.57

Human resources (workforce) related factor (Group G) has 7 sub factors. Under this group, the first three risk factors with the highest mean values are shortage of skilled labour (3.85), high cost of labour (3.79) and poor labour productivity (3.75). These are ranked 1st, 2nd and 3rd respectively. On the other hand, the risk factors with lowest mean values are shortage of technical personnel (2.93), difficulty in training new labour (2.93) and labour absenteeism (2.72). The factors are ranked 5th, 6th and 7th respectively. Furthermore, the Table also shows that, under this category, the risk factors ranked 1st to 3rd have mean score within the range of 3.5 to 4.49 and have high impact on PCC while risk factors ranked 4th to 7th have a mean score within the range of 2.5 to 3.49 and have moderate impact on PCC. The group has overall mean score of 3.36.

Economic related factors (Group H) has 5 sub factors. The risk factor with highest mean score under this category is increase in prices of materials (4.25) followed by increase in cost of labour (4.11). On the other hand, the risk factor with the lowest mean score is increase in fuel/oil prices (3.27). Furthermore, the risk factors ranked 1st to 4th obtained a mean score within the range of 3.5 to 4.49. These risk factors have high impact on PCC. More so, the risk factor ranked 5th have a mean score of 3.27 and have moderate impact on PCC. The group has an overall mean value of 3.87

Political related factor (Group I) has 3 sub factors. All the risk factors under this category have a mean score within the range of 2.5 to 3.49 and have moderate impact on PCC. Political crises/civil unrest obtained a mean score of 3.41 ranked 1st. Next to this is changes in governmental Laws (2.87) and unfavourable Governmental policies (2.84). These risk factors are ranked 2nd and 3rd respectively. The group has an overall mean score of 3.04.

Environmental related factors (Group J) have 3 sub factors. The risk factor with the highest mean score under this category is unfavourable project location (3.50) ranked 1st. Force majeure (earthquake, flood etc.) (3.35) ranked second and effects of weather (3.01) ranked 3rd. the risk factor ranked 1st have a high impact on PCC while the risk factors ranked 2nd and 3rd have a moderate impact on PCC. This group has an overall mean score of 3.29.

Table 3. Impact of the risk factors on project completion cost (group wise)

S/N	Risk Factors	Mean	SD	Group Rank
A	**Contract Administration and Project Management Related**			
1	Bribery and Corruption	4.30	.830	1
2	Poor project management	3.83	.758	2
3	Change in the scope of the work	3.76	.925	3
4	Inaccurate quantity take-off	3.74	.705	4
5	High Competition in Bids	3.57	.704	5
6	Undefined scope of work	3.15	.895	6
7	Delay in decision making	2.80	1.255	7
	Group Mean/SD	**3.59**	**.867**	
B	**Design Related**	**Mean**	**SD**	**Group Rank**
1	Mistakes/ errors in design	4.03	.631	1
2	Poor design	3.95	1.181	2
3	Frequent design changes	3.88	.863	3
4	Incomplete design at the time of tender	3.87	.770	4
5	Delay in design	2.58	1.247	5
6	Delay in approval of design	2.55	1.377	6
	Group Mean/SD	**3.48**	**1.012**	

C	**Construction and Contractor's Site management Related**	**Mean**	**SD**	**Group Rank**
1	Inadequate cost estimate	4.39	.712	1
2	Mistakes during construction	4.01	.804	2
3	Inadequate experience by project team	3.91	.974	3
4	Deviating from specifications due to misunderstanding of drawings and specifications	3.81	.882	4
5	Inadequate project monitoring	3.71	1.026	5
6	Poor site management	3.63	.613	6
7	Inadequate project control	3.49	.930	7
8	Inadequate time estimate	3.46	.942	8
9	Poor site supervision	3.44	.820	9
10	Schedule delay	3.23	.704	10
11	Undocumented change orders	3.13	.664	11
12	Incompetent subcontractors	3.04	.721	12
13	Equipment unavailability	3.00	.794	13
14	Materials theft	2.99	.901	14
15	Labour accident	2.91	.937	15
16	Materials wastage	2.90	.935	16
17	Equipment failure	2.72	.713	17
18	Shortage of materials	2.58	.739	18
19	Late delivery of materials	2.47	1.103	19
20	Late delivery of equipment	2.39	.991	20
	Group Mean/SD	**3.26**	**.845**	

D	**Financial Related**	**Mean**	**SD**	**Group Rank**
1	Poor cash flow management	4.04	.819	1
2	Poor financial control on site	3.98	.941	2
3	Financial difficulties of owner	3.89	.954	3
4	Delay in progress payment by owner/client	3.79	1.156	4
5	Financial failure of contractor	3.42	.958	5
6	Delay in payment to supplier/subcontractor	3.32	.913	6
7	Contractual claims	2.77	.981	7
	Group Mean/SD	**3.60**	**.960**	

E	**Information and Communication Related**	**Mean**	**SD**	**Group Rank**
1	Slow information flow between stakeholders	2.85	1.169	1
2	poor coordination between stakeholders	2.76	.786	2
3	Poor communication between stakeholders	2.70	.928	3
	Group Mean/SD	**2.77**	**.961**	

F	**Legal Related**	**Mean**	**SD**	**Group Rank**
1	Legal disputes during construction phase among contract parties	2.82	.952	1
2	Shortage of specialised arbitrators to help settle dispute fast	2.57	.895	2
3	Difficulty of obtaining permits from regulatory authorities	2.54	1.284	3
4	Ambiguity of work legislations	2.34	1.271	4
	Group Mean/SD	**2.57**	**1.101**	

G	**Human Resource (Workforce) Related**	**Mean**	**SD**	**Group Rank**
1	Shortage of skilled labour	3.85	.722	1
2	High cost of labour	3.79	.875	2
3	Poor labour productivity	3.75	.959	3
4	Shortage of unskilled labour	3.31	.721	4
5	Shortage of technical personnel	3.16	.649	5
6	Difficulty in training new labour	2.93	1.160	6
7	Labour absenteeism	2.72	.946	7
	Group Mean/SD	**3.36**	**.862**	

H	Economic Related	Mean	SD	Group Rank
1	Increase in prices of materials	4.25	.735	1
2	Increase in cost of labour	4.11	.713	2
3	Increase in interest rates	3.96	1.003	3
4	Increase in exchange rates	3.77	1.013	4
5	Increase in fuel/oil Prices	3.27	.859	5
	Group Mean/SD	**3.87**	**.865**	
I	**Political Related**	**Mean**	**SD**	**Group Rank**
1	Political crises/Civil unrest	3.41	.855	1
2	Changes in governmental Laws	2.87	1.053	2
3	Unfavourable Governmental policies	2.84	.964	3
	Group Mean/SD	**3.04**	**.957**	
J	**Environmental Related**	**Mean**	**SD**	**Group Rank**
1	Unfavourable project location	3.50	.827	1
2	Force majeure (earthquake, flood etc.)	3.35	1.183	2
3	Effects of weather	3.01	.822	3
	Group Mean/SD	**3.29**	**.944**	

Comparison of impact of risk factors groups on project completion cost

Comparing the group mean scores of the risk factors, economic related factors has the highest group mean (3.87) and therefore ranked 1st. Next to this is financial related factors (3.60) ranked 2nd. The groups with the lowest mean scores are information and communication related factors (2.77) ranked 9th and legal related factors (2.57) ranked 10th. The result is presented in Table 4

The result of the analysis in Table 4 reveals that, three out of the ten groups of factors (group A, D and H) have a mean score within the rage of 3.5 to 4.49. These groups of factors have high impact on PCC while the remaining seven groups (B, C, E, F, G, I and J) have a mean value within the range of 2.5 to 3.49. These groups have moderate impact on PCC. Economic related factors (3.87), financial related factors (3.60) and contract administration and project management related factors (3.59) were found to have high impact on PCC; indicating that, the average overall impact of the risk factors under these groups is high. Therefore, the specific risk factors under these categories identified as having high impact on PCC should be giving more attention and priority so as to minimise the impact.

Table 4. Comparison of mean scores for the impact of the risk factors on project completion cost across the Categories of factors

Codes	Risk factors group	Group Mean	SD	Group Rank
H	Economic related factors	3.87	.865	1
D	Financial related factors	3.60	.960	2
A	Contract administration and project management related factors	3.59	.867	3
B	Design related factors	3.48	1.012	4
G	Human resources (workforce) related factors	3.36	.862	5
J	Environmental related factors	3.29	.944	6
C	Construction and contractors' site management related factors	3.26	.854	7
I	Political related factors	3.04	.957	8
E	Information and communication related factors	2.77	.961	9
F	Legal related factors	2.57	1.101	10

Impact of individual risk factors on project completion cost

Table 5 presents the impact of the respective risk factors on PCC in descending order of their mean values irrespective of the risk factors groupings., the first five risk factors with the highest mean scores are inadequate cost estimate (4.39), risk incurred due to bribery and corruption (4.30), increase in prices of materials (4.25), increase in cost of labour (4.11) and poor cash flow management (4.04). These risk factors are ranked 1st, 2nd, 3rd, 4th, and 5th, respectively. This is in agreement with the findings of Kamal (2019) where underestimation of project cost and fluctuation in material prices was respectively ranked as the 4th and 5th factors influencing project cost overruns in the construction industry of Pakistan. Furthermore, fluctuation in prices can be covered by adding material fluctuation clauses in the contract agreement. Material prices fluctuates more often in countries with weaker economy (Kamal 2019), therefore such clause should be considered important especially in countries with weaker economy so as to minimise the effect contractually transferring the risk to the contractor. More so, major items of construction projects are imported or import dependent, as such, small fluctuation in exchange rate may result to distress in local market thereby causing increase in prices.

The risk factors with lowest mean scores are delay in approval of design (2.55), difficulty of obtaining permits from regulatory authorities (2.54), late delivery of materials (2.47), late delivery of equipment (2.39) and ambiguity of work legislations (2.34). These are ranked 61st to 65th respectively. Furthermore, out of the 65 risk factors considered in the study, twenty-seven risk factor (those ranked 1st to 27th) have a mean value within the range of 3.5 to 4.49. These factors have high impact on PCC and implies that, the risk factors may likely lead to 20-40% cost increase if not properly managed. In addition, thirty-six risk factors (those ranked 28th to 63rd) have a mean score within the range of 2.5 to 3.49. These risk factors have moderate impact on PCC; and implies that, the risk factors may lead to 10-20% increase in PCC. Meanwhile the risk factors ranked 64th and 65th have a mean score within the range of 1.5 to 2.49. These risk factors have low impact on PCC and implies that, the risk factors could likely result to 5-10% increase in PCC.

Table 5: Overall impact of the risk factors on project completion cost.

S/N	Risk Factors	Mean	SD	Rank
1	Inadequate cost estimate	4.39	.712	1
2	Bribery and Corruption	4.30	.830	2
3	Increase in prices of materials	4.25	.735	3
4	Increase in cost of labour	4.11	.713	4
5	Poor cash flow management	4.04	.819	5
6	Mistakes/ errors in design	4.03	.631	6
7	Mistakes during construction	4.01	.804	7
8	Poor financial control on site	3.98	.941	8
9	Increase in interest rates	3.96	1.003	9
10	Poor design	3.95	1.181	10
11	Inadequate experience by project team	3.91	.974	11
12	Financial difficulties of owner	3.89	.954	12
13	Frequent design changes	3.88	.863	13
14	Incomplete design at the time of tender	3.87	.770	14
15	Shortage of skilled labour	3.85	.722	15
16	Poor project management	3.83	.758	16
17	Deviating from specifications due to misunderstanding of drawings and specifications	3.81	.882	17
18	High cost of labour	3.79	.875	18
19	Delay in progress payment by owner/client	3.79	1.156	19
20	Increase in exchange rates	3.77	1.013	20
21	Change in the scope of the work	3.76	.925	21
22	Poor labour productivity	3.75	.959	22
23	Inaccurate [illegible]	3.74	.705	23
24	Inadequate project monitoring	3.71	1.0[illegible]	[illegible]

25	Poor site management	3.63	.613	25
26	High Competition in Bids	3.57	.704	26
27	Unfavourable project location	3.50	.827	27
28	Inadequate project control	3.49	.930	28
29	Inadequate time estimate	3.46	.942	29
30	Poor site supervision	3.44	.820	30
31	Financial failure of contractor	3.42	.958	31
32	Political crises/Civil unrest	3.41	.855	32
33	Force majeure (earthquake, flood etc.)	3.35	1.183	33
34	Delay in payment to supplier/subcontractor	3.32	.913	34
35	Shortage of unskilled labour	3.31	.721	35
36	Increase in fuel/oil Prices	3.27	.859	36
37	Schedule delay	3.23	.704	37
38	Shortage of technical personnel	3.16	.649	38
39	Undefined scope of work	3.15	.895	39
40	Undocumented change orders	3.13	.664	40
41	Incompetent subcontractors	3.04	.721	41
42	Effects of weather	3.01	.822	42
43	Equipment unavailability	3.00	.794	43
44	Materials theft	2.99	.901	44
45	Difficulty in training new labour	2.93	1.160	45
46	Labour accident	2.91	.937	46
47	Materials wastage	2.90	.935	47
48	Changes in governmental Laws	2.87	1.053	48
49	Slow information flow between stakeholders	2.85	1.169	49
50	Unfavourable Governmental policies	2.84	.964	50
51	Legal disputes during construction phase among contract parties	2.82	.952	51
52	Delay in decision making	2.80	1.255	52
53	Contractual claims	2.77	.981	53
54	poor coordination between stakeholders	2.76	.786	54
55	Equipment failure	2.72	.713	55
56	Labour absenteeism	2.72	.946	56
57	Poor communication between stakeholders	2.70	.928	57
58	Shortage of materials	2.58	.739	58
59	Delay in design	2.58	1.247	59
60	shortage of specialised arbitrators to help settle dispute fast	2.57	.895	60
61	Delay in approval of design	2.55	1.377	61
62	Difficulty of obtaining permits from regulatory authorities	2.54	1.284	62
63	Late delivery of materials	2.47	1.103	63
64	Late delivery of equipment	2.39	.991	64
65	Ambiguity of work legislations	2.34	1.271	65

Conclusion

This study set out to assess the impact of project risk factors on completion cost of construction projects from the perspective of construction practitioners. The assessment was carried out for the 10 identified risk factor groups as well as 65 individual factors. Based on the results of the analysis, the following conclusions were drawn from the study:

i. 'Inadequate cost estimate', 'risk incurred due to bribery and corruption', 'increase in prices of materials', 'increase in cost of labour', 'poor cash flow management, 'mistakes/errors in design' and 'mistakes during construction' are the topmost risk factors that impact on completion cost.
ii. 'Economic', 'financial' and 'contract administration and project management' related factors group are those with high impact on project completion cost.
iii. For any project in which cost objective is a priority, special attention is needed to minimise occurrence of risk factors with high impact on completion cost of construction projects.

The limitation of this research is that, the frequency of occurrence of the risk factors in construction projects is not considered, however, in order to determine the significance of the effect of the risk factors on project completion cost, there is the need to consider the frequency of occurrence of the risk factors. This is because the significance of a risk factor is best determined as a product of the frequency of occurrence of the risk and its magnitude of impact.

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