EFFECTS OF PROJECT RISK FACTORS ON CONSTRUCTION PROJECT COMPLETION TIME IN NIGERIA

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Abstract
Completion time is an important criterion for determining construction project success. Yet, so many construction projects fail to meet up their completion time target because of the amount of risks involved in construction projects. This study assessed the effects of project risk factors on completion time of construction projects. Data was collected using structured questionnaire. **192** questionnaires were distributed to construction practitioners (Architects, Builders, Civil Engineers, Services Engineers, Project Managers and Quantity Surveyors) out of which 138 were duly completed and returned. **114** were found fit for analysis representing 59.38% valid responses. Descriptive statistics was used to analyse the data. The study identified nineteen (19) risk factors as having severe effects on construction projects completion time. These risk factors include delay in progress payments by owner/client having normalised risk factor criticality value of (1.00), financial difficulty of clients (0.91), bribery and corruption (0.84), delay in payment to suppliers/ sub-contractors (0.83), poor cash flow management (0.77), poor labour productivity (0.77), shortage of skilled labour (0.71), change in the scope of work (0.70). The study recommends that, clients should always ensure that, funds are available and released when due so that the projects are completed at the required time. Furthermore, government should develop a mechanism that will curtail unethical practices such as bribery and corrupt acts in the construction projects supply chain.

Keywords: Completion time, Construction projects, Effects, **Nigeria,** Risk factors

INTRODUCTION

The construction industry, perhaps more than many others, is overwhelmed with risks (Deviprasad, 2007; Laryea, 2008). According to Ehsan, Alam, Mirza, and Ishaque (2010), construction industry is highly risk prone, having complex and dynamic project environments creating an atmosphere of high uncertainty and risk. The industry is vulnerable to various technical, socio-political and business risks. Deviprasad, (2007) further stated that too often, these risks are not dealt with satisfactorily and the industry continues to suffer poor performance as a result.

According to Pritchard (2001), most of the decisions in the sector, including the simplestones, involve risks. The procedure of taking a project from inception to completion, and then into use is a complexone that entails time-consuming design and production processes or stages and these pose a significant amount of risks that must be properly managed (Adeleke, Bahaudin & Kamaruddeen, 2015).

In construction projects, risk is a combination of activities that affect the project objectives (POs) of time, cost, quality and scope (Ehsan, et al., 2010). Chieng, Wu and Huang (2014) argued that, the size and complexity of construction projects (CPs) are increasing, thereby increasing risk. However, the main role of project

management activities is to drive the construction operations in order to reach or achieve the expectations of stakeholders who decided to invest (Monetti, Rosa da Silva & Rocha, 2006). Risk management is fundamental to accomplish those objectives, not only trying to keep away from bad results caused by some special events or uncertain conditions, but also acting as a guide in order to maximize the positive results.

Risk Management (RM) is a management tool that aims at identifying sources of risk and uncertainty, determining their impact, and developing appropriate management responses. RM in construction projects has become an increasingly challenging activity because of the complexity of the processes involved (Azevedo, Ensslin, & Jungles, 2014). RM can be sophisticated and complicated; however, the starting point of RM should always be a simple assessment of the problem and possible solutions (Nnadi & Ugwu, 2013). RM in Nigerian construction projects has been carried out in a very limited and ineffective way (Adeleke, et al., 2015).

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. Nonetheless, risk management implementation should be emphasised and improved (Adeleke, *et al.*, 2015). 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 and hence, the industry continues to suffer poor performance, with many projects failing to meet their completion time targets.

Aftab, Ismail, Muhammad and Nornashima (2014) stated that completion time is one of the major determinants of construction project success. Al-Momani (2000) opined that construction time overrun, which is a critical function in construction projects, has been of great interest to construction researchers. Time overrun in construction projects causes multitude of negative effects on the projects and its stakeholders. Therefore, this aspect has been constantly investigated by researchers across the world with great enthusiasm (Dolage & Rathnamali, 2013). Time overrun reduces the efficiency of available economic resources, limit the growth potential and reduce competitiveness of the economy (Singh, 2010). Adam, Josephson and Lindahl (2014) claimed that due to the magnitude and frequency of this time overruns, they pose a significant financial risk to both clients and contractors. Ameh and Osegbo (2011) stated that time overrun affects the project owners, contractors and other project participants. Project owners may be affected through loss of benefits that could have accrued from the completed facility, while contractors may have to spend more on labour and plant, pay penalties as per contract or even loose other profitable contracts because resources for the next job are tied upon delayed projects.

In the same vein, Ashwini and Rahul (2014) also emphasized that time overruns are always measured as expensive to all parties concerned in projects and very often it will result in clash and claims. Furthermore, according to Saleh, Abdelnaser and Abdul (2009) the impacts of time overrun on construction projects are loss of interest

by stakeholders, blacklist by authorities, waste of money and time and declination of reputation. Hamzah, Khoiry, Arshada, Tawil and Che (2011) mentioned that time overrun often causes disorder in workflow and reduces productivity.

According to Ashwini and Rahul (2014) about 57% of Indian construction projects are experiencing time overrun. Sweis (2013) opined that most construction projects in developing countries are characterized by overrun in time and that time overrun is a very frequent phenomenon and is almost associated with nearly all projects in the construction industry. Sweis (2013) further stressed that time overrun is considered to be one of the most recurring problem in the construction industry as 65% of the projects understudied has time overrun. Similarly in a study conducted by Dolage and Rathnamali (2013) it was revealed that 80% of construction projects are not completed within the agreed contract period.

The history of the construction industry worldwide is full of projects that were completed with significant time overrun and the problem of time overrun is of international concern (Ameh & Osegbo, 2011). Adam *et al.*, (2014) states that for decades, the construction industry has been characterized by completion times reaching further than what was set out initially. Ismail *et al.*, (2014) described time overrun in the construction projects as one of the chronic problems facing the construction industry in recent times. Adam *et al.*, (2014) also considered time overrun as having long been regarded a common occurrence.

Risks and Delays occur inmost construction projects, either simple or complex (Ashwini and Rahul, 2014). Hence, projects risks and construction time overruns are integrated parts, none of them can be separated from the other. Researchers (Laryea, Agyepong, Leiringer & Hughes, 2012; Enshassi & Mosa, 2008; Aliyu, 2013; Baba, 2014; Hedaya & Saad, 2017) identified the risk factors that affects construction projects success to include changes in scope of work onsite, incomplete design at the time of tender, contractual claims, financial difficulty of owner, delay in progress payments by clients, lack of cost planning and monitoring of funds, variations and additional works among others. Ashwini and Rahul (2014) also stated that time overrun result in clashes, claims and also it slows the growth of construction sector. Time overrun results in the growth of adversarial relationships, litigation, arbitration, cash flow problems and a general feeling of apprehension between project participants (Ameh & Osegbo, 2011). These led to researchers' submission that time overrun in construction projects has become one of the commonest problems in the industry that causes multitude of negative effects on the projects and its stakeholders. Thus, to make the benefit of risk management to the participants of construction projects, it becomes necessary to assess the effects of project risk factors (PRFs) on construction projects completion time. This is due to the fact that the risk factors may have varying effects therefore, it is important to assess and determine the level of significance of effects these risk factors have on construction projects completion time in order to improve construction project delivery

METHODOLOGY

Quantitative research approach was adopted. Data was collected using structured closed ended questionnaire. The questionnaire consist of three sections each seeking for background information of respondents, likelihood of occurrence of the risk factors and impact of the risk factors on construction projects completion time respectively. The respondents were asked to rate the likelihood of occurrence of the risk factors on a 5-point scale. Similar scale has been adopted in previous researches on risk assessment by Abd El-Karim, El Nawawy and Abdel-Alim, (2015) and Abdulrahman (2018).

The impact of risk factors on project completion time was rated using the PMI 2004 risk impact assessment guide on a 5 point scale where 1= Negligible (<5% time increase), 2= Low (5-10% time increase), 3= Moderate (10-15% time increase), 4= High (15-20% time increase), 5= Very High (>20% time increase). The 5-point scale has been adopted in previous researches on risk assessment by Baba (2014); Dodo (2017); Nnadi and Ugwu (2013) and Abd El-Karim *et al.*, (2015).

Face and content validity of the questionnaire were determined through review and critique by some academics and construction practitioners. Reliability of the instrument was assessed by running internal consistency test (Cronbach alpha coefficient).

The population of the study is the construction practitioners with construction background. Thus the population is infinite because the total number of construction practitioners cannot be established. Sample size formula for infinite population by Cochran (1977) was used to determine the sample size at 10% (0.1) Confidence interval (e), 95% (0.95) Confidence level, Z-score of 1.96 for (95% confidence level), 50% (0.5) degree of variability (p) since the population is not homogeneous. The sample size was computed to be approximately 96 Practitioners. According to Glenn (1992) some percentage can be added to account for non-responses and incomplete responses. However, considering the large number of variables contained in the data collection instrument and the response rate obtained from similar studies containing large number of variables in the survey instrument, this study assumed a valid response rate of at least 50% of the total number of questionnaires distributed. Therefore 100% of the estimated sample size was added. Hence, 192 questionnaires were distributed to Architects, Builders, Engineers, Quantity Surveyors and Project Managers using convenience sampling technique. 138 questionnaires were duly completed and returned but only 114 were found fit for analysis, representing 59.38% valid responses.

The data obtained were analysed using SPSS software. Percentages and frequencies were determined in order express important characteristics of the respondents. The likelihood of occurrence (LO) of the project risk factors in construction projects as well as the impact of the risk factors on project completion time were analysed using mean and standard deviation. For the likelihood of occurrence of the risk factors in construction projects, the mean was used to interpret the results in accordance with the 5-point rating scale; 1 represents very low frequency on one

end while 5 represents very high frequency on the other end. The impact of the risk factors on time were also interpreted using a similar scale; 1 represents very low impact on one end while 5 represents very high impact on the other end.

In addition, Risk Factor Criticality (RFC) index was used to evaluate the effects of the risk factors on projects completion time. *RFC* has been widely recognized as the function of the Likelihood of Occurrence (*LO*) and Magnitude of Impact (MI) (Shen, Wu & Ng 2001; Hwang, Zhao, Wei, & Chin, 2017; Abd El-Karim *et al.,* 2015). Thus, the Risk Criticality of a risk factor can be computed as follows (Shen, Wu & Ng 2001):

$RFC^i_j = LO^i_j \times MI^i_j$..... Eqn. (1)
$RFC_i = 1/n \sum RC^i_j$..... Eqn. (2)

Where
n = the number of the respondents
RFC^i_j= Risk criticality of the risk "*i*" by respondent "*j*"
RFC_i= the risk criticality of risk *i*.

Moreover, to obtain the significance of the effects of the risk factors, the Risk factors were subjected to further analysis by normalization of the RFC values. The process of normalization of the RFC can be found in the works of Salawu (2016); Abdulrahman (2018) and was also used for this study. Normalization of the RFC values for the identified risk factors was carried out using equation (3) (Salawu 2016).

$N = (I_{ai} - I_{mi}) \times (I_{ma} - I_{mi})^{-1}$..... Eqn. (3)

Where
N = Normalized
RC value, I_{ai}= Average Actual RFC value,
I_{ma}= Average Maximum RFC value,
I_{mi}= Average Minimum RFC value

Risk factors with normalized values greater than or equal to 0.50 are considered as having significant/critical effects and values less than 0.5 are considered as not having significant/critical effects.

RESULTS AND DISCUSSION

Reliability of Respondents' Ratings

The reliability of respondents' ratings was assessed to determine the internal consistency. Cronbach alpha test was used for this study. Questionnaire items measuring likelihood of occurrence of risk factors in construction projects and magnitude of impact on completion time were both assessed for internal consistency and the results are presented in Table.1.

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Table 1: Internal consistency test for the measurement items

Test	No. of items	Cronbach Alpha Coefficient
Likelihood of occurrence of the risk factors in construction projects	65	0.932
Impact of the risk factors on projects completion time	65	0.893

From Table 1, all the Cronbach Alpha values are above the minimum acceptable value of 0.7 as suggested by Nunnally and Bernstein (1994). Therefore, the internal consistency of the data obtained through the questionnaire can be considered as reliable.

Assessment of Likelihood of Occurrence of the Risk Factors in Construction projects

Respondents were presented with 65 risk factors affecting construction projects and were asked to rate the likelihood of occurrence of the risk factors in construction projects on a 5 point scale (1= very low and 5= very high). The result is presented in Table 2.

Table 2: Likelihood of occurrence of the risk factors in construction projects.

S/N	Risk Factors	Mean	SD	Rank
1	Bribery and Corruption	4.14	.930	1
2	Delay in progress payment by owner/client	3.89	.849	2
3	Delay in payment to supplier/subcontractor	3.69	.856	3
4	High Competition in Bids	3.69	.970	4
5	Financial difficulties of owner	3.54	.843	5
6	Poor cash flow management	3.50	.841	6
7	Change in the scope of the work	3.42	.977	7
8	Poor communication between stakeholders	3.33	.977	8
9	Poor labour productivity	3.26	.825	9
10	Slow information flow between stakeholders	3.18	1.077	10
11	Poor financial control on site	3.15	.598	11
12	Shortage of skilled labour	3.14	1.003	12
13	Mistakes/ errors in design	3.13	1.077	13
14	Schedule delay	3.12	.933	14
15	Shortage of technical personnel	3.07	1.019	15
16	Frequent design changes	3.06	1.128	16
17	Lack of coordination between stakeholders	3.04	.931	17
18	Financial failure of contractor	3.01	.648	18
19	Late delivery of materials	2.99	.807	19
20	Legal disputes during construction phase among contract parties	2.97	.854	20
21	Difficulty of obtaining permits from regulatory authorities	2.93	.884	21
22	Poor site management	2.92	1.006	22
23	Increase in prices of materials	2.91	1.052	23
24	Poor project management	2.90	.845	24
25	Delay in decision making	2.89	1.076	25
26	Poor site supervision	2.88	.894	26
27	Incomplete design at the time of tender	2.88	1.220	27
28	Delay in approval of design	2.87	.973	28
29	Inaccurate quantity take-off	2.86	.789	29

S/N	Risk Factors	Mean	SD	Rank
30	Materials wastage	2.85	.879	30
31	Contractual claims	2.83	.734	31
32	Deviating from specifications due to misunderstanding of drawings and specifications	2.83	.925	32
33	Inadequate cost estimate	2.81	.861	33
34	Inadequate project monitoring	2.77	.831	34
35	Inadequate time estimate	2.75	.796	35
36	Inadequate project control	2.75	.965	36
37	Shortage of materials	2.74	.729	37
38	Late delivery of equipment	2.74	.998	38
39	Undefined scope of work	2.74	1.081	39
40	Mistakes during construction	2.73	.801	40
41	Increase in exchange rates	2.73	1.016	41
42	Incompetent subcontractors	2.70	.789	42
43	High cost of labour	2.68	.877	43
44	Materials theft	2.66	.884	44
45	Difficulty in training new labour	2.61	.945	45
46	Poor design	2.60	.773	46
47	Shortage of unskilled labour	2.60	1.154	47
48	Equipment failure	2.56	.903	48
49	Increase in cost of labour	2.54	.766	49
50	Inadequate experience by project team	2.54	.838	50
51	Undocumented change orders	2.54	.858	51
52	Increase in interest rates	2.52	.980	52
53	Lack of specialised arbitrators to help settle dispute fast	2.48	.790	53
54	Equipment unavailability	2.45	.873	54
55	Delay in design	2.34	.891	55
56	Effects of weather	2.32	1.108	56
57	Labour accident	2.29	.918	57
58	Increase in fuel/oil Prices	2.27	1.123	58
59	Ambiguity of work legislations	2.25	1.005	59
60	Changes in governmental Laws	2.09	.922	60
61	Unfavourable Governmental policies	2.03	.977	61
62	Political crises/Civil unrest	1.96	1.093	62
63	Labour absenteeism	1.89	.938	63
64	Unfavourable project location	1.89	.966	64
65	Force majeure (earthquake, flood etc.)	1.40	.795	65

Table 2 present the likelihood of occurrence of the 65 risk factors considered in this study. As seen in the Table, the first five risk factors with the highest mean scores are bribery and corruption (4.14), delay in progress payment by owner/client (3.89), delay in payment to supplier/subcontractor (3.69), high competition in bids (3.69) and financial difficulties of owner (3.54). These risk factors are ranked 1st to 5th, respectively. This implies that contractors usually experience delay in payment for work executed. This may likely affect the contractors' profitability especially if the contractors' source of finance is credit from commercial banks because interest will accumulate as a result of the delay. Furthermore by extension, the suppliers and subcontractors will also experience a delay in receiving their payments once the contractor is not paid by the client

On the other hand the last five risk factors having the lowest mean score are unfavourable governmental policies having a mean value of (2.03), political crises/civil unrest (1.96), labour

absenteeism (1.89), unfavourable project location (1.89) and force majeure (earthquake, flood etc.) (1.40) and are therefore ranked 61st to 65th respectively. Furthermore, out of the 65 risk factors considered in the study, six risk factor (those ranked 1st to 6th) have a mean value ranging from (3.5 to 4.49) and are therefore considered to have high likelihood of occurrence (LO) in construction projects. Also, 46 risk factors (those ranked 7th to 46th) have a mean score ranging from (2.5 to 3.49) hence, can be considered as having moderate LO. Risk factors ranked 53rd to 64th have a mean score ranging from (1.5 to 2.49) hence considered as having low LO. The risk factor ranked 65th has a mean score <1.5 thus considered as a risk factor with a very low LO in construction project.

Assessment of Impact of the Risk Factors on Project Completion Time (PCT)

Respondents were presented with 65 risk factors affecting construction projects and were asked to rate the impact of the risk factors on project completion time on a 5-point scale. (1= negligible to 5= very high). Table 3 presents the impact of the risk factors on project completion time in descending order of their mean values.

Table 3: Impact of the risk factors on projects completion time

S/N	Risk Factors	Mean	SD	Rank
1	Financial difficulties of owner	4.35	.741	1
2	Inadequate time estimate	4.33	.772	2
3	Delay in progress payment by owner/client	4.23	.679	3
4	Poor labour productivity	4.22	.890	4
5	Shortage of skilled labour	4.18	.878	5
6	Frequent design changes	4.05	.891	6
7	Mistakes/ errors in design	3.99	.785	7
8	Poor project management	3.98	.872	8
9	Poor cash flow management	3.96	.813	9
10	Political crises/Civil unrest	3.96	1.052	10
11	Delay in payment to supplier/subcontractor	3.94	.672	11
12	Financial failure of contractor	3.94	.998	12
13	Inadequate experience by project team	3.90	.852	13
14	Change in the scope of the work	3.81	.797	14
15	Mistakes during construction	3.79	.860	15
16	Poor design	3.78	1.079	16
17	Schedule delay	3.75	.807	17
18	Deviating from specifications due to misunderstanding of drawings and specifications	3.71	.952	18
19	Shortage of materials	3.70	.531	19
20	Incomplete design at the time of tender	3.69	.783	20
21	Shortage of unskilled labour	3.67	.816	21
22	Poor financial control on site	3.66	.739	22
23	Late delivery of materials	3.59	.752	23
24	Inadequate cost estimate	3.58	.842	24
25	Late delivery of equipment	3.54	.807	25
26	Bribery and Corruption	3.54	.854	26
27	Unfavourable project location	3.54	.879	27
28	Force majeure (earthquake, flood etc.)	3.48	1.322	28
29	Inadequate project monitoring	3.46	1.006	29
30	Poor site management	3.46	.720	30

hence, can be considered as having moderate impact on project completion time. This means that, these risk factors could result to 10-15% project time increase. Meanwhile, only one risk factor (material wastage) has a mean score ranging from (1.5 to 2.49) hence considered as having low impact and implies that, the risk factor may likely lead to <5% time increase.

Evaluation of the Criticality of the Effects of the Risk Factors on Project Completion Time

Risk Factor Criticality (RFC) index was used to evaluate the effects of the risk factors on projects completion time. As discussed in section 2.0, *RFC* has been widely known as the function of the likelihood of occurrence (LO) and Magnitude of Impact. Furthermore, to obtain the significance of the effects of the risk factors, the risk factors were subjected to further analysis by normalization of the RFC values. Risk factors with normalized values greater than or equal to 0.50 are considered as having significant/critical effects and values less than 0.5 are considered as not having significant/critical effects. The result of the evaluation is presented in Table 4.

Table 4: Criticality of the Effects of the Risk Factors on Project Completion Time

S/N	Risk factors	LO	Impact	Risk Factor Criticality	Normali RFC Va
1	Delay in progress payment by owner/client	3.89	4.23	16.46	**1.00**
2	Financial difficulties of owner	3.54	4.35	15.38	**0.91**
3	Bribery and Corruption	4.14	3.54	14.64	**0.84**
4	Delay in payment to supplier/subcontractor	3.69	3.94	14.53	**0.83**
5	Poor cash flow management	3.50	3.96	13.83	**0.77**
6	Poor labour productivity	3.26	4.22	13.75	**0.77**
7	Shortage of skilled labour	3.14	4.18	13.14	**0.71**
8	Change in the scope of the work	3.42	3.81	13.02	**0.70**
9	High Competition in Bids	3.69	3.39	12.54	**0.66**
10	Mistakes/ errors in design	3.13	3.99	12.50	**0.66**
11	Frequent design changes	3.06	4.05	12.41	**0.65**
12	Inadequate time estimate	2.75	4.33	11.90	**0.61**
13	Financial failure of contractor	3.01	3.94	11.85	**0.60**
14	Schedule delay	3.12	3.75	11.70	**0.59**
15	Poor project management	2.90	3.98	11.56	**0.58**
16	Poor financial control on site	3.15	3.66	11.52	**0.57**
17	Poor communication between stakeholders	3.33	3.27	10.89	**0.52**
18	Slow information flow between stakeholders	3.18	3.39	10.78	**0.51**
19	Late delivery of materials	2.99	3.59	10.75	**0.51**
20	Incomplete design at the time of tender	2.88	3.69	10.61	0.49
21	Deviating from specifications due to misunderstanding of drawings and specifications	2.83	3.71	10.50	0.49
22	Shortage of technical personnel	3.07	3.38	10.37	0.47
23	Mistakes during construction	2.73	3.79	10.33	0.47
24	Shortage of materials	2.74	3.70	10.13	0.45
25	Poor site management	2.92	3.46	10.11	0.45
26	Inadequate cost estimate	2.81	3.58	10.06	0.45
27	Poor site supervision	2.88	3.45	9.92	0.43

S/N	Risk factors	LO	Impact	Risk Factor Criticality	Normalised RFC Value
28	Inadequate experience by project team	2.54	3.90	9.90	0.43
29	Poor design	2.60	3.78	9.82	0.43
30	Lack of coordination between stakeholders	3.04	3.22	9.77	0.42
31	Delay in decision making	2.89	3.37	9.75	0.42
32	Late delivery of equipment	2.74	3.54	9.71	0.42
33	Inadequate project monitoring	2.77	3.46	9.60	0.41
34	Shortage of unskilled labour	2.60	3.67	9.54	0.40
35	Inadequate project control	2.75	3.44	9.47	0.40
36	Difficulty of obtaining permits from regulatory authorities	2.93	3.18	9.30	0.38
37	Inaccurate quantity take-off	2.86	3.24	9.26	0.38
38	Increase in prices of materials	2.91	3.16	9.20	0.37
39	Contractual claims	2.83	3.25	9.20	0.37
40	Undefined scope of work	2.74	3.33	9.12	0.37
41	Legal disputes during construction phase among contract parties	2.97	3.06	9.10	0.36
42	Increase in exchange rates	2.73	3.25	8.85	0.34
43	Delay in approval of design	2.87	3.01	8.63	0.32
44	Incompetent subcontractors	2.70	3.18	8.58	0.32
45	Equipment unavailability	2.45	3.44	8.42	0.30
56	Equipment failure	2.56	3.20	8.20	0.29
47	Undocumented change orders	2.54	3.18	8.10	0.28
48	Increase in interest rates	2.52	3.19	8.04	0.27
49	Political crises/Civil unrest	1.96	3.96	7.79	0.25
50	Increase in cost of labour	2.54	3.04	7.72	0.24
51	Effects of weather	2.32	3.33	7.71	0.24
52	High cost of labour	2.68	2.85	7.64	0.24
53	Lack of specialised arbitrators to help settle dispute fast	2.48	3.07	7.60	0.23
54	Delay in design	2.34	3.25	7.60	0.23
55	Difficulty in training new labour	2.61	2.90	7.59	0.23
56	Materials theft	2.66	2.84	7.56	0.23
57	Materials wastage	2.85	2.42	6.90	0.17
58	Unfavourable project location	1.89	3.54	6.67	0.15
59	Unfavourable Governmental policies	2.03	3.06	6.21	0.11
60	Increase in fuel/oil Prices	2.27	2.72	6.18	0.11
61	Labour accident	2.29	2.56	5.86	0.08
62	Changes in governmental Laws	2.09	2.74	5.73	0.07
63	Labour absenteeism	1.89	3.03	5.71	0.07
64	Ambiguity of work legislations	2.25	2.50	5.62	0.06
65	Force majeure (earthquake, flood etc.)	1.40	3.48	4.89	0.00

Table 4 presents the result of evaluation of the effects of the risk factors on project completion time. 65 risk factors were evaluated and the RFC and NRFC values were computed. As seen in the Table, out of the 65 risk factors, nineteen (19) of them have a normalised risk factor criticality (NRFC) value ranging from (0.5 to 1.00) thus considered as having significant/critical effects on project completion time. The NRFC values of all the risk factors having critical/significant

effects are presented in bold. These risk factors include but are not limited to delay in progress payment by the client with NRFC value of (1.00), financial difficulty of owner (0.91), bribery and corruption (0.84), delay in payment to suppliers/subcontractors (0.83), poor cash flow management (0.77), poor labour productivity (0.77), Shortage of skilled labour (0.71) and change in scope of work (0.70). This is an indication that, these risk factors are likely to frequently occur in construction projects and also have high impact on projects completion time when they do occur. The findings agree with Faridi and El-Sayegh, (2006); El-Sayegh, (2008); Motaleb and Kishk, (2010); that, shortage of manpower, changing design by owners during construction are among the topmost causes of delay in United Arab Emirates (UAE). Aibinu, (2008); Olupolola *et al.*, (2010) also found shortage of manpower and poor productivity to be among the topmost causes of delay in Nigeria. The findings also is in agreement with Al-Momani, (2000); Odeh and Battaineh, (2002); Abu Hammad *et al.*, (2008); who found that Delay of main contractors' progress payments by owners, delay of subcontractors' and suppliers' progress payments by main contractor to be among the topmost causes of delay in Jordan. The finding is also in agreement with Al-Najjar (2008); Enshassi and Mosa, (2008) and Enshassi *et al.*, (2009) who found late supply and delivery of materials to be among the topmost causes of delay in Palestine. Furthermore, Mezher and Tawil (1998) also found poor site management to be among the topmost causes of delay in Lebanon. Therefore, stakeholders organisation have to put more attention on these risk factors so as to minimise both their rate of occurrence and impact especially if completion time is a priority so as to complete the projects within the required time frame.

On the other hand, forty six (46) of the risk factors have NRFC value below 0.5, thus considered as not having significant/critical effects. These risk factors include but are not limited to increase in fuel/ oil prises having NRFC value of (0.11), labour accident (0.08), changes in governmental laws (0.07), labour absenteeism (0.07), ambiguity of work legislations (0.06) and force majeure (earthquake, flood etc.) (0.00). This is an indication that, some of these risk factors either rarely occur in construction projects or have minimal impact on project completion time when they occur. The risk factors with NRFC values <0.5 do not require the same level of attention as risk factors with high NRFC value. However, despite having NRFC values of <0.5, the risk factors with high impact need to be closely monitored even if their probability of occurrence is low. However, comparing the findings to previous study, increase in interest rate with NRFC value (0.22) was ranked 48 in the context of this study and this is in contrary to the findings of Majid, (2006) who found same factor to be among the topmost risk factor in Indonesia. This could be attributed to the difference in the economic prosperity of the countries. It could also be because of the difference in methodology employed in the assessment of the risks.

CONCLUSION

This paper sought to evaluate the effects of project risk factors on completion time of construction projects. The likelihood of occurrence and impact of 65 risk factors on project completion time were assessed. The data obtained was evaluated to determine the severity of the

effects the risk factors on project completion time. This was done by obtaining the normalised risk factor criticality index Based on the findings of the study, it was established that five out of the six risk factors with high likelihood of occurrence are financially related. This implies that stakeholders need to be conscious about challenges related to adequate and timely financing of projects, which could negatively affect completion time. In addition, it has been established that a large number of risk factors (27) could have high impact on project completion time. Moreover, the risk factors assessed have varying degree of severity of effects on construction projects completion time. Furthermore, the study established that only nineteen (19) risk factors have severe effects on construction projects completion time.

The study recommends that, clients should always ensure that, funds are available and released when due so that the projects are completed at the required time. This is because any delay in release of payments due to the contractor by the client will definitely affect the contractors' ability to also pay for other services rendered to him e.g., labour, subcontracts and supplies. Clients should also as much as possible try to minimise changes in the scope of work by ensuring that, the extend of work to be executed is clearly specified in the feasibility and design stage of the project before commencement of construction work in order to enable the contractor make adequate work planning based on the initial project information available. Furthermore, all stakeholders need to work towards curtailing unethical practices such as bribery and corrupt acts in the construction projects supply chain.

Contractors need to monitor the labour productivity by identifying any discrepancies in the planned output and taking appropriate measure to achieve optimal productivity. Contractors should also ensure the availability of skilled labour to perform a particular task when needed. Contractors' construction program should be carefully prepared to determine reasonable completion time by considering some factors that are generally outside their control.

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