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To cite this article: R A Bahamid *et al* 2020 *IOP Conf. Ser.: Mater. Sci. Eng.* **712** 012007

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240th ECS Meeting ORLANDO, FL

Orange County Convention Center Oct 10-14, 2021



Abstract submission due: April 9

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Risk Factors Influencing the Construction Projects in Yemen from Expert's Perspective

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Abstract. This purpose of this study is to validate the important risk factors influencing the construction projects in a developing country of Yemen by using experts' evaluations and literature review. These factors influence the project's quality, time and cost. The semi-structured interviews were employed through online means using thirteen experts to achieve the set objective. Depending on the expert's overviews, out of 56 considered factors, 42 factors were assigned as the most related risk factors influencing the construction projects in Yemen. The obtained outcomes from this study can serve as the risk factors for building blocks in establishing a conceptual model to manage risks of the construction projects in Yemen.

1. Introduction

Risk management in a construction project is very essential to achieve the objectives of the projects without any cost overrun or delay in order to attain achievement of high quality based on the design and planning of the project. The risk management system assists project managers in prioritizing resource allocation and helps them obtain reliable decision-making, which contributes to achieving the objectives and success in the project [1]. Implementing a risk management not only result in an enormous degree of awareness of the corollaries of risk but pivot on more structured strategy, improved conduct of risk data between parties and more efficient centralized control [2]. Furthermore, the construction industries play an essential responsibility in the economic state of the nation [3]. No construction project can be without a risk; this risk can either be managed and controlled, reallocation and shared, accepted or transferred, minimized; however, it cannot be overlooked [4]. Construction projects are exposed to external and internal risks. All these risks can be affected by quality, schedule or cost of the project in gloomy ways [5]. Just like other developing countries, the construction projects in Yemen are dramatically experiencing a high risk prone due to their dynamic and complex environments. Hence, such nature is creating an atmosphere of high risks and uncertainties [6]. The construction project in Yemen is the fourth substantially employer of personnel in the nation; this equivalent to 9-10% of the working population, the average annual growth rate of the sector is about 5.4% which contribute to the nation's economic growth. The service demand in this sector is bounded to improve evenly. Nonetheless, the actual output in terms of quality, progress and fun utilization is reduced primarily because of the lack of proper project



management, efficient monitoring and supervision and greatly depend on the contractors [6]. Therefore, it is very infrequent that the construction project will be finished using the allocated cost and time [7]. Several construction projects in Yemen are suffering from a delay in completion or mostly suffer abandonment or suspension. Continuing in this type of situation can cause a widened practices and construction costs between the developed and developing countries; resulting in enormously difficult for construction workers in Yemen to implement, adopt and afford the implementation of modern sustainable construction technology [8]. Thus, the risk management needs to be well identified and managed as an integrated function of the project management at project lifecycle. Here lies the importance of this study in identifying the risks facing the construction projects in Yemen to benefit the construction industry and the Yemeni economy at large.

2. Methods

The first step is the identification of risk factors affecting the construction projects in developing nations; this was carried out through the literature review [9]. The aim is to recognize the important factors influencing the construction projects of the developing countries. In the previous study, we extracted the factors from the literature [9]. About 43 research articles that studied the factors and current relevant parts that affect the construction projects were identified. hence, 56 factors were identified and categorized out of 111, depending on the most common and related factors that were explained in the previous findings [9]. Next is the validation of the recognized factors obtained from the literature review to the construction projects in Yemen; this was done by carrying out the semi-structured email interviews. Meho [10] had reported that the email interview can be a suitable alternative in place of face-to-face and telephone interview because the availability to individuals is easy especially those that cannot interview because of the location or time. Moreover, it removes the challenges of fixing appointments to transcribe the interviews; this makes the interview to be easier with multiple participants [10]. In addition, an email interview gives the participants the opportunity to review and provide adequate responses. Also, this type of interview helps the careful presentation of equal materials and questions to every participant which can potentially yield excellent outcomes. Other benefits of email interview are cost saving of travelling and organization [11]. In order to stimulate the participants to take part in this study, they were contacted through the email invitations; the interview questions and consent forms were sent across to them through email. About 13 experts were chosen to rank and reconfirm the factors extracted from previous findings. These experts were from local construction industries situated in Yemen with about 15 years of working experience in their respective fields. Table 1 comprises the detailed information of all the participants. The identities of the participants were removed and the peculiar ID of identifying individual quotes was provided because of confidentiality.

Table1. Experts' profiles

Code	Organization Type	Profession	Years of Experience	Experience of construction project types
EXP1	Private	Civil engineer	Above 20	-Housing -Administrative and commercial -Infrastructure
EXP2	Government	Quantity survey	16-20	-Administrative and commercial - Infrastructure
EXP3	Private	Civil engineer	16-20	-Housing -Administrative and commercial

EXP4	Private	Civil engineer	Above 20	Industrial
EXP5	Government	Quantity survey	Above 20	-Administrative and commercial -Industrial -Infrastructure
EXP6	Government	Mechanical engineer	Above 20	-Housing -Administrative and commercial -Industrial
EXP7	Private	Architect	16-20	-Housing -Infrastructure -Infrastructure
EXP8	International	Architect	16-20	-Administrative and commercial -Industrial
EXP9	Private	Electrical engineer	Above 20	-Housing -Administrative and commercial -Industrial
EXP10	Private	Quantity survey	16-20	-Housing -Administrative and commercial
EXP11	Government	Civil engineer	Above 20	-Housing -Administrative and commercial -Infrastructure
EXP12	Private	Architect	Above 20	-Administrative and commercial
EXP13	Private	Civil engineer	16-20	-Housing -Administrative and commercial -Infrastructure

The interview questions were generated using previous studies. In order to identify the risks that affect construction projects, the anticipated responses were meant to authenticate and pinpoint the utmost vital risk factors that influence time, cost and quality of the construction projects in Yemen. For each question, the responses were weighted using a 7-point Likert scale (1 = Not at all Important, 2 = Low Importance, 3 = Slightly Important, 4 = Neutral, 5 = Moderately Important, 6 = Very Important, 7 = Extremely Important). Moreover, open-ended questions were provided within the interview survey to generate the lists of verification benchmark, obtain more factors other than the identified ones and obtain the indirect details from the participants. Notwithstanding, there were no new factors established from the interview survey, but the experts suggested that some factors must be merge as one factor; this includes war and political instability, exchange rate and inflation. Median rank was used as the basis of establishing the priority. The median was taken over mean because of its strength to the skewed distribution of the priority ratings. Based on the participants' views, the values allocated to individual factor were from a ratio scale of 1 to 7, where 1 and 7 indicate the lowest and highest importance, respectively.

3. Result and discussion

In Table 2, the greater score in the precedence was the most imperative factor based on the considered criteria. The results show that the participants recognised the greatest risk factors influencing the construction projects in Yemen to be inflation and exchange rate fluctuation, war and political instability,

inadequate program scheduling, late handing over of the site, and insufficient resource availability. Conceivably, exchange rate fluctuation and inflation, war and political instability are the greatest risk factors whereby the mean was 6.08 and 5.77 because of the current situation in Yemen, which has affected the construction industry. Moreover, labour disputes and strikes, changes in laws and regulations, environment regulations procedures, public relationship, and culture difference did not play the important role for the construction projects in Yemen; thus, they have been neglected. The participants also recommended merging some factors which are: inflation and exchange rate fluctuation, war and political instability, defective work and quality of work.

Table 2. Means, standard deviation and rank of factors depending on of respondents' interviews.

Factors	Mean	S.D.	Rank	%
Turnover of skilled labour	4.77	1.36	23	68.13
Labour and equipment productivity	4.92	1.50	19	70.33
Accidents /safety	4.00	1.41	40	57.14
Defective materials	4.85	1.28	22	69.23
Damage to equipment	4.69	1.18	25	67.03
Damage to structure	3.62	1.26	47	51.65
Adverse weather conditions	3.38	1.26	48	48.35
Environment regulations procedures	2.69	1.33	54	36.26
Environmental hazards of the project	3.00	1.41	51	42.86
Force majeure/act of god	3.69	1.32	44	52.75
Difficulty to access the site	3.92	1.12	41	56.04
Different site conditions	4.85	1.46	20	69.23
Conflict of document	4.62	1.45	27	65.93
Defective design	4.77	1.01	24	68.13
Incomplete design scope	4.23	1.09	34	60.44
Unqualified designers	4.31	1.80	30	61.54
Design complexity	4.00	1.00	39	57.14
Inaccurate cost estimate	5.00	1.35	12	71.43
Contractors competition in bids	5.00	1.08	13	71.43
Inadequate program scheduling	5.69	1.32	4	81.32
Insufficient resource availability	5.46	0.88	6	78.02
Lack of Scope of work definition	4.15	0.99	37	59.34
Technology issues	4.62	0.77	28	65.93
Inflation/ Price fluctuation	6.00	0.71	2	85.71
Client's financial failure	4.23	1.74	35	60.44
Delayed payment on contract	5.00	1.29	14	71.43
Exchange rate fluctuation	6.08	0.76	1	86.81
Financial default of contractor	4.92	1.12	15	70.33
Labour disputes and strikes	2.92	1.19	52	41.76
Legal disputes	3.69	1.32	45	52.75
Delayed dispute resolutions	4.92	1.50	16	70.33
Owner demand changes and intervention	4.15	1.41	38	59.34
Requirement or delay for permits and approval	3.85	1.34	43	54.95
Changes in laws and regulations	2.69	1.55	53	38.46
Taxes and tax burdens	3.08	1.38	50	43.96
Conflict between actual quantities and contract quantities	4.92	1.80	18	70.33

Gaps between the Implementation and the specifications	4.62	1.89	29	65.93
Design changes	3.92	1.32	42	56.04
Quality of work	4.23	1.36	36	60.44
Defective work	4.31	1.32	31	6.54
Contractor competence	5.15	1.07	8	73.63
Change order negotiations	4.31	1.60	32	61.54
Corruption and bribery	4.92	1.55	17	70.33
Criminal acts	3.08	1.44	49	43.96
War and civil disorder	5.77	1.17	3	82.42
Government acts and intervention	3.69	1.49	46	52.75
Political instability	4.85	1.28	21	69.23
Economic instability	5.08	1.12	11	72.53
Construction Methods	5.08	1.55	10	72.53
Poor project planning & control	5.15	1.77	7	73.63
Poor communication between involved parties	5.08	2.06	9	72.53
Poor site management and supervision	4.62	1.56	26	65.93
culture difference	1.92	0.86	56	27.47
Public relationship	2.31	1.44	55	32.97
High performance or quality expectations	4.31	1.60	33	6.54
Late handing over of the site	5.54	1.13	5	79.12

Table 3 Risk factors influencing the construction projects in Yemen.

Risk category	Risk factors	Risk category	Risk factors
Environmental	Adverse weather conditions		Delayed payment on contract
	Environmental hazards of the project		Exchange rate fluctuation and Inflation
	Force majeure/act of god		Financial default of contractor
	Difficulty to access the site	Legal*	Legal disputes
Physical	Different site conditions		Delayed dispute resolutions
	Accidents /safety		Requirement or delay for permits & approval
	Defective materials		Taxes and tax burdens
	Damage to equipment	Political*	War and Political instability
	Labour and equipment productivity		Government acts and intervention
	Damage to structure		Economic instability
Logistic*	criminal acts		corruption and bribery
	Turnover of skilled labour	Construction*	Conflict between actual quantities and contract quantities
	Conflict of document		Gaps between the Implementation and the specifications
	Contractors competition		Defective work

	in bids		
	Inadequate program scheduling		Change order negotiations
	Insufficient resource availability		Construction Methods
	Lack of scope of work definition		Late handing over of the site
Design	Defective design	Management	Technology issues
	Incomplete design scope		Owner demand changes and intervention
	Unqualified designers		Contractor competence
	Design complexity		Poor project planning and control
	Design changes		Poor communication between involved parties
Financial*	inaccurate cost estimate		Poor site management and supervision
	Client's financial failure		High performance expectations

4. Conclusion

The identification of risk factors influencing the construction projects in Yemen is crucial it can help in achieving the set goals of projects which are time, cost and quality. Based on the review of literature which assisted in the identification of 111 factors influencing the construction projects in developing countries, 56 factors were selected using the highest frequency in the previous studies [9]. In order to validate and reconfirm the factors and select the most appropriate to Yemen construction industry, a semi-structured interview using 13 experts was employed. The validation result as provided in Table 3 with 48 factors are the risk factors influencing the construction projects in Yemen. These factors were grouped based on adoption from the previous studies [12-15]. Thus, the results of this study can give an improved understanding of the factors influencing the construction projects in Yemen. Additionally, the outcomes from this study can contribute to the construction projects in developing countries including the Yemen construction industry; the important risk factors that can influence the success of a project.

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Acknowledgement

The support provided by Malaysian Ministry of Higher Education and Universiti Malaysia Pahang in the form of a research grant (RDU/UMP) vote number RDU190151 for this study is highly appreciated.