Jurnal Teknologi

Full Paper

RISK VARIABLE ON CONTRACTOR'S TENDER FIGURE IN MALAYSIA

Sabihah Saaidin[a*], Intan Rohani Endut[a], Siti Akmar Abu Samah[b], Ahmad Ruslan Mohd Ridzuan[a,c], Nur Nabihah Abd Razak[a]

[a]Faculty of Civil Engineering, Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia
[b]Academy of Language Studies, Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia
[c]Institute for Infrastructure Engineering and Sustainable Management, Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia

Article history
Received
15 June 2015
Received in revised form
29 September 2015
Accepted
14 December 2015

*Corresponding author
sabihah@ymail.com

Graphical abstract

Respondents	DBB	DB	Z	Asymp. Sig (2-tailed)
Risk involved in the project	4.260	3.980	-2.135	0.033
Financial capability of client	4.12	4.090	-0.426	0.670
Labour productivity basis	3.48	3.020	-2.364	0.018
Profile of other competitors	2.980	2.640	-1.667	0.096

Abstract

Construction industry like other industries is subject to risks due to the unique and complexity of the construction industries. It shows the risk exposure at highest level during the tendering process. The objective of this paper is to evaluate risk variable on contractor's tender figure in Malaysia. To achieve the objective, questionnaire survey was conducted on G7 contractor in Malaysia. A total of 120 usable postal questionnaires was received. The findings have shown *quality expectation, price inflation of construction materials, the risk involved in the project* and *financial capability of the client are* most significant factors to be considered by contractors *when estimating the pricing risks.* The study recommended that competent contractors should be allowed to tender project as to see the risk variable inherent during tendering process that will affect project performance.

Keywords: Construction industry, risk variable, tender

1.0 INTRODUCTION

Risk is identified as chance or argument that creates an impact on possibility of deprivation or wound in terms of cost, time, and quality of the project [1], [2], [3]. It can be unknown and will produce positive and negative impacts of the tendering operation. It can either occur during the design concept or construction stage [6]. Unknown risk makes a situation where a contractor or client justify the risk by estimation and make provisional sum to cover back the uncertainty value [9], [21].

The construction industries are wide open to high risk, such as costing, time constrains, quality expectation, and contractual disputes in tender contract. Thus, construction industries are interesting, risky and changeable fields [4].

Contractors should rethink their approach to treated risk in the organizations. [5]. It is very important for the contractor to identify risk and cost estimation before stipulating the prices during the tendering process [7]. The price must be acceptable to win and generate profit for the company in return [8].

Therefore, proper evaluation and estimation of the impact of risk need to be accessed and justified in the tender price before the contractor tender the project.

2.0 TYPES OF CONTRACT

Selection type of contract will specify the degree of risk that depends on the size and value of the project, which creates different layers of risk in the contract [10]. Design Bid Build (DBB) contracts are suitable for

the project which requires future concept design [11]. The client is responsible to decide what type of design of building, explain how it is to be built. Meanwhile, the contractor should only demand to coordinate work among involved sub-contractor of the labour team. This type of contract can create a risk to the relative parties include client, architect, and contractor because the construction budget must not exceed the overall budget. Potential delay and cost increasing due to redesign and changes of drawings to the contractor because they are not involved during the conception phase of the task. DBB contract generates a different view on total project cost before the construction starts due to all ideas on the concept design. Therefore, the competitive DBB delivery method is a good choice for residential projects like a high rise project, which design and budget are unlikely to change [11].

Design Build (DB) contract has an essential point that reflects a better overall projects for the client. DB projects can vary depending on the extent of the contractor's design responsibility and how much initial design is included in the employer's requirements. The budget has been determined based on the conception design and comparing the similarity of other completed project. Unexpected cost cannot occur because the budget is set and knowledge of cost has been captured earlier. Utilizing this type of contact creates a big risk to the contractor because the contractor must fully be responsible for the faults in design and construction. The contractor needs to ensure that all proposals to the design concept are approved by the client to avoid alterations in the future. Research and communication for exchange information need to be managed to minimize the cost impact and maximize profit margin of the company [12]. Strong financial background is also another risk that needs to be identified by clients who can minimize delay to the completion of the project. Capability of contractor, asset liabilities, time constrain and the quality issue are risk criteria that need to be ensured before awarding the contract. This type of contract is normally used by the government for the project that requires specialized building like hospital and airport. For an owner who has very tight budget constraints or lacks experience in the construction industry, the lump sum contract is suitable. Lump Sum (LS) contract is when a party promises to complete the task accordingly with the fixed amount of money payable by the guest or owner. It may contain a mutual agreement allowing changes of the contract sum for contingencies like modifications, payment for extended preliminaries and such. Agreement by both parties upon a lump sum price to be paid for a defined scope/quantity of work to be undertaken. It should be mentioned that most of the common Standard Forms of Contract are used in the nation such as the JKR Forms, IEM Forms, and the like. This type of contract is usually developed by estimating labour cost, material costs, and adding a specific amount that will cover contractor's overhead and profit margin. Using this type of contracts can increase the risk and lack of projects quality. With limitation of the budget, the contractors will use every alternative way to reduce their cost by using unskilled workers and poor materials to complete the project. LS contracts are a great tool for smaller jobs and quite simple projects such as housing and shop lot projects.

Thus, selection of the contracts is important in decreasing the cost overrun, schedule delay and quality expectation. In addition, it is also to reduce the misunderstanding and miscommunication in design and specification issues during tendering process. DBB contract creates more risk than DBB and LS during tendering process. It is because contractors tender the price base on the conceptual design given by the client. Lack of information and specification will give an impact on the contractors.

3.0 RESEARCH METHODOLOGY

This study uses quantitative methods in analyzing the data. The survey needs to be structured in order to control and standardize the information intended to be collected from the respondents. This is important to ensure the data needed are collected and extracted from the survey questionnaire effectively. Therefore, the structured survey questionnaire is designed to suit its purpose.

The respondents were asked on the risk variable consists of 21 risk classifications being structured based on previous journal. The questions are based on a Likert-scale. The ranking was from 1 to 5, where 1 represents rare and 5 represents almost certain. The classification of the factor will be determined in accordance with feedback from the respondents. The selection of the population is critical in the case of ensuring a reliable and adequate data could be generated and analyzed by statistical tool. The population of interest in this paper is G7 construction companies registered with the Construction Industry Development Board (CIDB). The population is limited to the state of Selangor and Kuala Lumpur only. The requirements for selection of the firm were organizational size, knowledge, comprehension, experience and reputation in the construction industry are the main focus on the questionnaire survey. The data were used to create a result, in order to achieve the research objective. Hundred and twenty sets of questionnaire survey were responded and resulting in (80%) of response rate. The survey questionnaire collected from respondents was analyzed by using several methods such as Relative Important Index (RII) and Statistical Package for Social Sciences (SPSS) software.

4.0 RESULTS AND DISCUSSION

4.1 Rank of Risk Variable on Contractor's Tender Figure

From the questionnaire drawn, the risk variables were shown in 1, all 21 numbers of risk variable analyzed and

ranked accordingly based on calculated RII scoring to fulfill the objective of this study.

Quality expectation was ranked highest with (RII) 4.63. This is followed by the *price inflation of construction materials* ranked second with (RII) 4.08, *risk involved in the project* ranked third with (RII) 4.08 and *Financial capability of client* ranked fourth with (RII) 4.05. From these results, it can be concluded that from 21 risks variable asked, four were regarded as "High" and were impacts on the contractor's tender figure. The other risks (RII) 3.00 to 4.00 were considered as "Moderate" and risks (RII) 2.50 to 3.00 were considered as "Low".

The quality expectation involves more money to spend by contractor to achieve the quality. Client needs to clarify the quality during project briefing in order for contractor to allocate additional cost to achieve the quality standard [13].

The price increases in government-controlled materials and would be reflected in the payment. However, the forecast of economy is an advantage to the contractor to minimize the impact of price inflation. Supply and demand will increase the price of construction material such as steel bars and raw material. It was agreed that stock pile construction materials will reduce the impact of price inflation [14].

Risk involved in the project can be separated into five categories such as risk with client (time constrain, quality and budget cost), risk with consultant (design changes, drawing discrepancy and variation) risk with sub-contractor (quality, manpower, time constrain), risk with local authorities and government policies (changes of government, biro-racy issue, local authorities policy) [15], [16], [17].

Client capabilities will be able to make payment in time to allow a smooth flow of payment to the contractor and the related sub-contractor [17].

Table 1 Risk variable RII scoring on contractor's tender figure as perceived by the respondent

Risk Variable	RII Scoring	Ranking
Quality expectation	4.63	1
Price inflation of construction materials	4.08	2
Risk involved in the project	4.08	3
Financial capability of client	4.05	4
Payment condition attached to the project	3.83	5
Design Variation	3.68	6
Incomplete or inaccurate cost estimate	3.63	7
Fluctuation and non-fluctuation contract	3.60	8
Variation by the client	3.57	9
Unsuitable construction program	3.57	10
Type of client	3.53	11
Material availability	3.48	12
Unavailability of sufficient amount of unskilled labour	3.32	13
Labour productivity basis	3.28	14
Technical man power and equipment of the company	3.27	15
Excessive approval procedure in administrative government department	3.16	16
Low management competency subcontractor	3.11	17
Wages rates over the period of the contract	3.11	18
Profile of other competitors	2.91	19
Total number of bidders	2.82	20
Bureaucracy of government	2.67	21

4.2 Comparing of Risk Variable on Type of Contracts

Kruskal–Wallis test is a test to compute the score on some continuous variable to three or more groups [18][20]. Kruskal–Wallis test is used under the following circumstances; a) there are three or more conditions to be compared, b) each condition is performed by a different group of participants and c) the data do not meet the requirement for a parametric test. Table 2 shows the result of Kruskal–Wallis test for the risk variable on contractor's tender figure with different types of contract.

Table 2 Comparing risk variable on type of contract of respondents

Item	Risk Variable	Mean			Kruskal - Wallis	
		DBB	DB	LS	Chi-square	Sig p>0.05
1	Quality expectation	4.140	5.470	4.12	5.831	0.054
2	Price inflation of construction materials	4.120	4.070	3.940	.888	0.641
3	Risk involved in the project	4.260	3.980	3.710	9.570	0.008*
4	Financial capability of client	4.120	4.090	3.710	6.077	0.049*
5	Payment condition attached to the project	3.810	3.890	3.710	1.129	0.569
6	Design Variation	3.720	3.600	3.760	0.723	0.697
7	Incomplete or inaccurate cost estimate	3.740	3.490	3.650	3.328	0.189
8	Fluctuation and non-fluctuation contract	3.530	3.640	3.710	0.440	0.803

Item	Risk Variable	Mean			Kruskal - Wallis	
		DBB	DB	LS	Chi-square	Sig p>0.05
9	Variation by the client	3.600	3.580	3.410	1.173	0.556
10	Unsuitable construction program	3.550	3.580	3.590	0.012	0.994
11	Type of client	3.380	3.640	3.710	1.400	0.496
12	Material availability	3.600	3.360	3.350	1.872	0.392
13	Unavailability of sufficient amount of unskilled labour	3.360	3.160	3.590	3.120	0.210
14	Labour productivity basis	3.480	3.020	3.290	6.044	0.049*
15	Technical man power and equipment of the company	3.470	3.040	3.180	5.372	0.068
16	Excessive approval procedure in administrative government department	3.240	3.070	3.120	1.478	0.478
17	Low management competency subcontractor	3.170	2.910	3.410	5.061	0.080
18	Wages rates over the period of the contract	3.280	2.960	2.940	2.579	0.275
19	Profile of other competitors	2.980	2.640	3.350	7.224	0.027*
20	Total number of bidders	3.020	2.560	2.820	3.847	0.146
21	Bureaucracy of government	2.780	2.490	2.760	2.208	0.332

The result has shown that the *p* value is higher than 0.05, except the four that has value lower than 0.05 which is *risk involved in the project, financial capability of client, labour productivity basis,* and *profile of other competitors.* There is significant difference in perception in the group. Therefore, the Mann–Whitney U test was conducted in between four dependent groups. Table 3 shows the result of significant factor using Mann – Whitney U test. From the result, the *risk involved in the project* and *labour productivity basis* was shown statistically significant difference between the groups.

Table 3 Mann-Whitney Test

Respondents	DBB	DB	Z	Asymp Sig (2-tailed)
Risk involved in the project	4.260	3.980	-2.135	0.033
Financial capability of client	4.12	4.090	-0.426	0.670
Labour productivity basis	3.48	3.020	-2.364	0.018
Profile of other competitors	2.980	2.640	-1.667	0.096

5.0 CONCLUSION

The study managed to identify all 21 risk variables on contractor's tender figure based on literature review. From the analysis on risk variables listed that the quality expectation was the higher ranked. This was followed by price inflation of construction materials, risk involved in the project and financial capability of client.

Analyzing and comparing questionnaire survey shows that quality is the most highly ranked that needs to be aware and considered. High quality demands required more budget to be allocated during tendering process. Improving quality is the best way to enhance customer satisfaction, reduce construction cost and increase productivity. Since quality is a continuous improvement programme, it needs a proper focus during construction stages to avoid defect occurring and unforeseen cost that lead to contractors profit. Implementation of company policy on quality can be the best way to minimize the risks and maximize profit.

Price stability is also the principal economic goals in any economy. It is desirable that the overall price level for goods and services remain relatively constant. The price of construction materials is always changing in response to the inflation and the relation between supply and demand in the construction material market. As this risk is usually unavoidable, clients should choose an appropriate type of contract such as lump-sum contract to transfer the risk to other parties; while contractor should always avoid using fixed price contracts to bear the risk. One fair way to deal with the potential price fluctuation is to add the contingency price during tendering process.

Unforeseen risk can be defined as one that is related to client such as tight project schedule. As time and money are always closely collerated, variations can directly result in changes of the planning, design and construction. Incomplete approval due to bureaucracy of government usually occurs and preparation of documentation must be done effectively and efficiently.

Risks that are related to designer such as defective designs need to be fully understood during project briefing. Selecting experienced designers can help to minimize the difference between the proposed and practical programme schedules [19]. Therefore, it can help to illuminate the black box and minimize the inaccuracy.

Acknowledgement

The authors would like to express their gratitude to the Faculty of Civil Engineering, Universiti Teknologi MARA (UiTM), Malaysia.

References

[1] Merriam-Webster. 2012. Free Online Dictionary. Retrieved January 23. from http://www.merriam-webster.com/dictionary.
[2] AS/NZS 4360. 2004. Risk Management. The Joint Standard Australia/New Zealand Standard.
[3] Royal Society. 199. Report of Study Group on Risk: Analysis, Perception, Management, The Royal Society, London.
[4] Mills. 2001. A System Approach to Risk Management for Construction. *Structural Survey*. 19(5): 245-252.
[5] Ajayi, O. M., Ogunsanmi, O. E., Salako, O. A., and Mafimidiwo B. A. 2012. Impact of Risk on Performance of Design and Build Projects in Lagos State, Nigeria. In.: Laryea, S., Agyepong, S.A., Leiringer, R., and Hugles, W. (Eds). *Procs 4th West Africa Built Environmental Research (WABER) Conference, 24-26 July, Auja, Nigeria*. 203-215.
[6] Baloi, D. and Price, A. D. F. 2003. Modeling Global Risk Factors Affecting Construction Cost Performance. *International Journal of Project Management*. 21: 261-269.
[7] Bajaj, D. Oluwoye, J. and Lenard, D. 1997. An Analysis of Contractor's approaches to Risk Identification in New South Wales, Australia. *Construction Management and Economics*. 15: 363-369.
[8] Kim, D. Y., Han, S. H. H., and Kim, H. 2008. Discriminant Analysis for Predicting Ranges of Cost Variance in International Construction Projects. *Journal of Construction Journal of Construction Engineering and Management*. 134(6): 398-410.
[9] Raftery, J. 1994a. *Risk Analysis in Project Management*. E & FN Spoon, An Imprint of Chapman & Hall, 2-6, Boundry Row, London, UK.
[10] Laryea, S. and Hughes, W. 2009. How Contractor in Ghana Include Risk in Their Bid Price. In Dainty, A. September 2009, Nottingham, UK, Association of Researchers in Construction Management. 1295-1304.
[11] Laryea, S. and Hughes, W. 2008. How Contractors Price Risk in Bid: Theory and Practice. *Construction Management and Economics*. 26: 911-924.
[12] Okpala, D. C. and Aiekwu, E. N. 1988. Causes of High Costs of Construction in Nigeria. *Journal of Construction Engineering and Management*. 114(2): 233-244.
[13] Adenuga, Alumide Afolarin. 2013. Factor Afecting Quality in the Delivery of Public Housing Projects in Lagos State, Nigeria. *International Journal of Engineering and Technology*. 3(3).
[14] Perera. B. A. K. S. and Kuganesan, H. 2007. Construction Project Risks: A Consideration of Contractor's Pricing in Sri LAngka. University of Moratuwa, Sri Lanka.
[15] Mark, W., Cohen, P. E. and Glen, R. P. 2004 Project Risk Identification and Management. AACE. Internet Trans. INT.01. 1-5.
[16] Zou, P. X. W., Zhang, G. and Wang, J. 2007. Understanding The Key Risks In Construction Projects In China. *Int. J. Project Manage*. 25(6): 601-614.
[17] Flanagan, R. and Norman, G. 1993. *Risk Management and Construction*. Blackwell Scientific, Oxford.
[18] Pallant, J. 2010. *SPSS Survival Manual*. 4th Ed. New York: Mc Graw Hill.
[19] Smith, N. J., Merna, T. and Jobling, P. 2006. *Managing Risk in Construction Projects*. Blackwell, Oxford.
[20] Spurrier, J. D. 2003. On the Null Distribution of the Kruskal-Wallis Statistic. *Journal of Nonparametric Statistics*. 6: 685-691.
[21] Smith, G. R. and Bohn, C. M. 1999. Small to Medium Contractor Contingency and Assumption of Risk. *Journal of Construction Engineering and Management*. 125(2): 101-108.