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Where Are We? The Level of Risk Management in Malaysian Construction Industries

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Abstract— Over the decade, the level of risk management has always been lingering in every construction industry sectors. Therefore, this research deeply investigated the level of risk management among Kuantan Malaysian construction industries to better promote effectiveness on risk management implementation within the industry. To address this issues, this study makes use of statistical package for the social sciences (SPSS) approach to validate construction risk management (CRM) as a construct from registered Grade-7 contractors operating in Malaysia point of view. With a cross-sectional survey and proportionate stratified random sampling techniques, data were gathered from 87 G-7 contractors through a structured questionnaire. Methodologically, this research perhaps might be the first to determine the level of risk management where Kuantan Malaysian construction industries belong to. Using the five-point Likert scale categories (very low, low, medium, high and very high) of risk management from previous studies, statistical analysis affirmed that the overall level of risk management among Kuantan Malaysian construction industries is at the high level.

Keywords- *Construction Risk Management, Contractors, Construction Industries, Malaysia.*

1. Introduction

Malaysia is a fast developing country in the Asian region and has undergone rapid economic growth since the seventies. The construction industry (CI) has played an important role in the Malaysia economic growth. The industry has been consistently contributed approximately 7.2 per cent to RM 204.4 billion as compared to 2015, RM177.9 billion as an annual growth rate (AGR) [18].

The growth in construction has been increased from 6% to 15% since the seventies until the middle nineties [44]. There are two main sectors for construction projects in Malaysia; the public and private sector. Most of the public sector projects are handled by the Public Works Department (PWD). In Malaysia, the Construction Industry Development Board (CIDB) is a body with the main function of improving, developing and expanding the Malaysian construction industry and is involved with the public and private sectors project development which are not free from risk occurrence during project execution [1, 49, 50]. Risk often varies in the likelihood of its occurrence and its impacts from one project to another and risk changes its nature during the project life cycle [46]. A lack of project information, particularly in the early stage of a construction project, always leads to a higher degree of risk associated with cost, time and quality. The level of risk, however, may decrease with project development. When risks are being realized as the project progresses, the increased level of certainty reduces the level of risk in the project [12, 58].

Project risks often tend to be interrelated, but they can sometimes be considered in isolation. Risks can not only affect the achievement of project objectives but also influence the occurrence of one another. According to Loosemore and McCarthy [29], the perception of risk varies at both individual and organizational levels because different people hold different views and have different understandings of a particular risk's components, sources, probabilities, consequences and preferred actions. People's beliefs, attitudes, judgments and feelings are believed to influence risk perception to a certain degree with efficient risk management process [3, 51, 22]. Risk management is mostly known as one of the most important capability and procedure within the project management arena [11, 47]. The genuineness still continues because of the uniqueness and the dynamic nature of each construction project, environments, construction operation that constitute the diverse techniques, divergent multiple uncertainties and intricacies. Again, managing and determining the possible risk elements that may meaningfully vary from a project to other with several conditions, and performs a significant part in ameliorating the execution and achieving the productive outcome of a project [52, 26].

In the same vein, Adeleke et al., [2]; Aibinu and Jagboro [8] also confirmed that companies that refuse to utilize construction services on a casual case will fail to conceive the implementation of risk management practices in projects. However, this assertion has opined a considerable

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negative consequence on projects performance. Also in line with the study of Ojo [35] on contract claims and disputes in some of construction projects, which have revealed the degree of risks natural events that were not well analyzed or integrated by either the clients or contractors as one of the genuine reasons behind claims and disputes on construction projects proves that the levels of risk management are low within the project. This paper aims to ascertain the level of risk management among construction industries operating in Kuantan, Malaysia. However, this effort could help to ratify whether the construction industries in Kuantan, Malaysia are efficient in terms of risk management and what is their current state in risk management implementation with the affirmation that the level of risk management in construction industries is low or high compared to other industries is not uncommon among industries and other entities.

This paper address the following research question: What is the level of risk management among Kuantan, Malaysia construction industries? Likewise, the argument on the suitable methodology and the accurate scale to be used in assessing effective and efficient risk management in construction industries has frequently been a basis of controversy. In that case, Adeleke et al., [1] Bassioni et al., [13] requested for a valid and reliable scale for risk management that is robust enough and void of the weaknesses that have been identified in the existing scales. Despite the tremendous breadth of literature on risk management [15], the issue of construction industries efficient and effective risk management implementation has not received considerable attention [12, 53, 20].

2. Literature review

2.1 Construction risk management

Risks which have not been identified and managed are undoubtedly unchecked threats to a project's objectives, which in turn may lead to considerable overruns in cost and schedule. For this reason, a systematic approach must be taken to manage risks throughout the development of a project [31]. Risk management is a proactive decision-making process, which involves accepting a known risk and/or taking steps to mitigate the impact and likelihood of the occurrence of risks, to minimize the threats and maximize the opportunities [29]. Despite numerous risk management processes proposed in the literature [38, 48], the five main steps in the risk management process are, generally, risk planning, risk identification, risk analysis, risk response and risk monitoring and control. Over the years, research on risk management within the construction industry has grown considerably [16]. As a result of that, construction projects are permanently vulnerable to risks and are perceived as projects with greater inherent risk due to the participation of many stakeholders. It is conceivable to investigate project risks from two different points of view. From the client's perspectives, who is bound to decision-making in the project, and from the contractor's point of view, who traditionally increases costs to avoid risks occurrence in the project, but given that the marginal utility is getting lower, is facing a practice that has become unprofitable [10]. Wang et al., [55] perceived these two groups to have different behaviors against the risks interpretation and the possibilities of transferring risks to the best party to manage them. Presently, the state of risk management implementation is reactive, semi-permanent, unstructured and casual within the construction industry, leading to a lack of capacity for proper risk management. The main stumbling blocks behind effective risk management implementation system were the shortage of formality of the system and the shortage of integrative mechanisms of risk management among project parties [17]. An effective risk management implementation system not only brings a higher level of awareness of the consequences of risk but also focuses on a more structured approach, more effective centralized control and better transfer of risk information between parties. It can reduce long-term loss expenses and project time overruns [21]. Risk management can help assess and ascertain the viability of a project to ensure that it is worthwhile [46].

Statistical data concerning past projects can be used to model risks more effectively for future projects [39,45]. However, it does not completely remove all risks from a project. It only reduces the probability of occurrence and induced impacts to ensure that the risks are managed in the most efficient and effective manner [14]. Successful risk management should convert uncertainty to risk and convert risk to opportunity. The project and organization would hence achieve more gains by maximizing opportunity, minimizing risk and reducing uncertainty. The first stage in the risk management process, risk planning, involves planning how to approach and perform risk management to ensure that the level, type and visibility of risk management are commensurate with both the size of the risk and the importance of the project. The project objectives are established and the responsibilities are assigned to the relevant parties in the risk planning stage [38]. Risk identification, the second stage in risk management, identifies potential risks by recognizing, filtering and ranking the risks in a risk profile. According to Zou et al., [57], risk classification is an integral part of risk identification. Different types of risks were placed in different categories by considering their predetermined characteristics.

The third step is risk analysis, which captures all feasible options and assesses the various outcomes of any decision [34, 54]. There are three approaches used in risk analysis, qualitative risk analysis, semi-quantitative risk analysis and quantitative risk analysis. The choice of approach depends on the type and size of the project, information available, the cost and time available, the expertise of the analysts, the extent of innovation and the ultimate use of the results [46]. Qualitative risk analysis is a simplistic technique describing risks in linguistic variables, subjectively, making a quick assessment, or it may be of specific use in identifying attitudes to risk [32, 40]. A risk-scoring matrix (or a probability/impact matrix) is a tool commonly used in qualitative risk analysis. Semi-quantitative risk analysis makes a subjective assessment of the frequency of risk and an objective assessment of risk consequences. Additionally, quantitative risk analysis represents risks in mathematical form to quantify them in terms of performance in quality, time and cost. Risk response, the fourth stage of risk management, is the establishment of a strategy to mitigate the potential threats and maximize the potential opportunities [38]. Six typical risk responses are retention, reduction, control, sharing, transfer and avoidance [29].

The selection of response must be appropriate to the significance of the risk; it must be cost-effective and realistic with regard to the timing of the project; it also must be agreed upon by other involved parties. Risk retention involves acknowledging that a particular risk situation exists and making a conscious decision to accept the associated level of risk, without engaging in any special efforts to control it [27]. Risk reduction is an approach used to bring the probability and impact of the risk down below an acceptable threshold and risk sharing is principally achieved through a contractual mechanism to develop a sense of collective responsibility among the project stakeholders [29]. Risk control does not attempt to remove the source of the risk but seeks to reduce the risk itself. Risk avoidance is a refusal to accept the risk, or action taken to ensure that the risk is not going to happen. Risk transfer shifts and reallocates, along with ownership, from one party to another third party, without changing the total amount of risk or reducing the criticality of risk sources [30, 46]. In the risk monitoring and control stage, it is essential to ensure that the desired effects of the implementation of risk responses are achieved throughout the project life cycle. Risk management documentation is reviewed and updated from time to time and the outputs of risk monitoring and control can provide lessons for future decision makers [32]. The effectiveness of risk response is evaluated on an on-going basis throughout the project to correct any inappropriateness of the implemented strategy and to realign it with the project objectives. Feedback is necessary to review the treatment plan. It may loop back to the risk identification stage; whenever new risks arise or risks change their nature during the course of the project.

3. Methodology

3.1 Design of the study

A cross-sectional design was employed in this research, which indicated that the data was collected one time through a structured questionnaire [24, 42]. The data for this research was gathered among the registered Grade-7 contractors in Kuantan Malaysian construction industries with stratified sampling techniques. Kuantan as the state capital of Pahang was chosen as the research area. It is located close to the mouth of the Kuantan River and faces the South China Sea. Lately, the National Physical Plan 2005 acknowledged Kuantan as one of the future growth centers and a hub for commerce, trade, tourism and transportation. Kuantan is also regarded as the economic, social and commercial hub for the East Coast of Peninsular Malaysia because of its strategic location. It was affirmed that rapid development has transformed and modernized Kuantan which calls for more advance building projects to aid more tourist attraction for the indigene and visitors [40-56]. The sample population of 107 was selected from the construction industry development board database (CIDB) Malaysia published in 2018.

3.2 Data collection

Based on Krejcei and Morgan [28] sample size assumption, a sample size of 85 should be sufficient for the population of 107 construction industries. In an attempt to fit the expected sample size, the return rate of similar risk management studies in Malaysia was considered. Likewise, Chan et al., [15] conducted a face-to-face survey of risk factors in China construction industries and resulted in an effective response rate of 47 per cent. Similarly, the study of Sambasivan and Soon [41] that studied risk factors in Malaysian construction industry had only a 2% response rate. Therefore, 107 questionnaires were distributed. Based on [9, 25], a single representative (contractor) from each industry was adequate to complete the questionnaire for this research. Therefore, out of 107 distributed questionnaires, only 87 valid and useable questionnaires were retained, amounting to (81%) response rate. Hence, this response was considered high when compared with prior studies [24].

3.3 Statistical Analysis

Statistical Package for Social Science (SPSS) version 24.0 for MS Window was used to analyze the gathered data. More so, the demographic profile of the industries and

respondents were analyzed with descriptive statistics. In the same vein, the goodness of fit was ascertained by the reliability test. Descriptive statistics like the standard deviation, percentage and mean score were analyzed. Using [37] scale categories interpretation, values (range) was ascribed to the 5-point Likert scale used in the questionnaire in ascending order as follows: 1= very low (1.0-1.49); 2= low (1.5- 2.49); 3= medium (2.5-3.49); 4= high (3.5-4.49); 5 = very high (4.5-5.00). This was used to show the level of risk management in the Kuantan Malaysia construction industries respectively. A risk may occur from different sections of the industries like management, material, design, finance, labour and equipment risk. Lastly, to know how efficient and effective risk management was, in line with the values assigned to the various risk in the industries and from range that correspond to the mean score for each value from the SPSS output was ascertained.

3.4 Reliability Analysis

Cronbach's alpha coefficient threshold was used to ascertain the reliability of all the items in this study. This was done in order to ensure that the scales adopted in this study were not ambiguous and that the items within a component were measuring that same fundamental component. Consequently, higher Cronbach's alpha coefficient is a sign of greater consistency among the items for each component and the assurance that the measurements are reliable. This study followed the minimum reliability threshold level [33] where 0.7 is considered acceptable. However, all the Cronbach's alpha coefficient values received in this study were above the 0.7 minimum threshold. 4.0 Results and discussion. Amongst the 87 industries representatives that participated in this survey, 17.2% were contract manager, 5.7% executive director, 4.6% marketing managers, 40.2% project manager, 26.4% engineer and 5.7% other employees. Their years of working experience were rated from 3 to 55. Relating to the gender of respondents, the percentage of male respondents was 87.3% compared with 12.6% female respectively. Table 1 shows the features of the respondents that partake in the study.

Table 1. Demographic profile of the respondents

Respondents	Frequency	Percentage (%)
Position in the company		
Contract manager	15	17.2
Executive director	5	5.7
Marketing manager	4	4.6
Project manager	35	40.2
Engineer	23	26.4
Other employees	5	5.7
Working experience (Years)		
Lowest working experience	3	0.7
Highest working experience	55	8.7
Gender		
Male	76	87.3
Female	11	12.6

Table 2 shows the features of the industries that took part in this research. A total of 35.6% of the industries specialized in building apartment. More so, 44.8% of the industries specialized in roads construction, 16.0% of the industries specialized in bridges constructions, while 3.4% of them are other specializations. The industries' ownership was from local and national industries, with 78.1% and 21.8% respectively. In the same vein, Table 3 depicts the level of risk management among Kuantan Malaysia construction industries

Table 2. Demographic profile of the industries

Parameters	Frequency	Percentage (%)
Industry Specialization		
Apartment buildings	31	35.6
Roads	39	44.8
Bridges	14	16.0
Others	3	3.4
Industry ownership type		
National	19	21.8
Local	68	78.1
Industry business location		
Local market areas	15	17.2
Within a few states	7	8.0
Regional	3	3.4

Table 3. Overall level of risk management among Kuantan Malaysia construction industries

Construction Risk management level	Frequency	Percentage	Mean	Median	Mode	SD
Very low	_	_				
Low	_	_				
Medium	6	6.9				
High	77	88.3	3.8118	3.7680	3.60	0.268
Very high	4	4.6				

Table 3 depicts the frequency and percentage scores for the level of construction risk management among Kuantan Malaysia construction industries. The group with high scored the highest frequency (77) with 88.3%. However, the mean score (3.8118) signifies that the level of construction risk management among Kuantan Malaysia construction industries is at the high level, this signifies that risk management measures are well implemented within these industries but not at the peak of very high which is the target of every industry. This is also in line with the study of Adeleke et al., [6] and Yusuwan et al., [56], it was affirmed that risk management measures are well implemented in Malaysian industries especially in construction industries. However, the industry aims to attain very high-risk management implementation in every aspect of Kuantan Malaysia construction industries projects. Table 4 shows the level of risk from the management point of view among Kuantan Malaysia construction industries

Table 4. Level of risk from the management view among Kuantan Malaysia construction industries

Management risk	Frequency	Percentage	Mean
Very low	_	_	
Low	_	_	
Medium	_	_	
High	87	100	4.0805
Very high	_	_	

Table 4 explains the frequency and percentage score for risk within the management point of view in Kuantan Malaysia construction industries. The score with the highest frequency (87) and percentage (100%) is high.

The mean score (4.0805) implies that risk management from the management perspectives of Kuantan Malaysia construction industries is at the high level which is in line with the study of [36, 6, 56]. Table 5 shows the level of risk from the aspect of material among Kuantan Malaysia construction industries.

Table 5. Level of material risk among Kuantan Malaysia construction industries

Material risk	Frequency	Percentage	Mean
Very low	–	–	
Low	_	_	
Medium	19	21.8	
High	62	71.1	3.7042
Very high	6	6.9	

Table 5 shows the frequency and percentage score for the risk that occurred from the material point of view in Kuantan Malaysia construction industries. The score with the highest frequency (62) and percentage (71.1%) is high. The mean score (3.7042) explains that risk management through qualities of materials from Kuantan Malaysia construction industries is at the high level, which means that every material to be used in Malaysians construction industries must undergo proper testing stages. Table 6 shows the level of risk from a design point of view among Kuantan Malaysia construction industries.

Table 6. Level of design risk among Kuantan Malaysia construction industries

Design risk	Frequency	Percentage	Mean
Very low	_	_	
Low	_	_	
Medium	17	19.5	
High	53	60.9	3.9885
Very high	17	19.5	

From Table 6 portrays the frequency and percentage score for risk from the design point of view among Kuantan Malaysia construction industries. The score with the highest frequency (53) and percentage (60.9%) is high. The mean score (3.9885) signifies that risk management through design is at high level because preventive measures are given to design in Malaysian construction industries and that is why less risk is bound to occur within this stage, as also perceived by [4, 19].

4. Conclusion and recommendation

The aims behind the investigation in this study were to determine the level of risk management and how efficient and effective is risk management is within the construction industries operating in Kuantan Malaysia. The results of the statistical analysis show that the overall mean for effective construction risk management is 3.8118, which falls within the high level. This is in line with the study of Adeleke et al., [5] whose findings affirmed that risk management implementation within Nigerian construction industries is at the medium level. Also, the risk from management perspectives exhibited a higher mean score of (4.805) compare to the material (3.7042), and design (3.9885).

Similarly, the level of effective risk management in Kuantan construction industries presented in the study has been determined by the interpretation of the scale adopted. While the same mean scores discovered in this study can also be found in similar studies, the corresponding level of effective construction risk management will depend on the scale interpretation adopted. For instance, if another scale different from 3.5 – 3.49 for the medium level is used, the level of effective construction risk management could differ from what this study opined. This study is significant to all the relevant stakeholders in the construction industry such as the Ministry of Housing and Local Government in Malaysia, the Construction Industry Development Board (CIDB), Housing Developers Association (HAD), Real Estate and the House Buyers Association (REHBA). Furthermore, this study constitutes both the theoretical and empirical evidence regarding the level of the effective construction risk management in construction industries operating Kuantan Malaysia. Therefore, this research provides a ground for future researchers with interest in this field, to further investigate the relationship between the constructs in this study and to also expand the scope of this study such as the sample size and population for better generalization. Hence, this research provides a theoretical basis for understanding risk management in the construction industry.

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References

[1] Adeleke, A. Q. and Bahaudin, A. Y. and Kamaruddeen, A. M. and Bamgbaded, J. A. and M., Waris and Panda, Sitansu and Afolabi, Yakibi Ayodele (2019) An Empirical Analysis of Organizational External Factors on Construction

Risk Management. International Journal of Supply Chain Management (IJSCM), 8 (1). pp. 932-940

[2] Adeleke, A. Q., Bamgbade, J. A., Salimon, M. G., & Lee, C. K. (2019). Project Management Performance and Its Influence on Malaysian Building Projects. KnE Social Sciences, 313-329.

[3] Adeleke, A. Q., Windapo, A. O., Khan, M. W. A., Bamgbade, J. A., Salimon, M. G.,& Nawanir, G. (2018). Validating the Influence of Effective Communication, Team Competency and Skills, Active Leadership on Construction Risk Management Practices of Nigerian Construction Companies. The Journal of Social Sciences Research, 460-465.

[4] Adeleke, A. Q., Bahaudin, A. Y., & Kamaruddeen, A. M. (2018). Organizational Internal factors and construction risk management among nigerian construction companies. Global Business Review, 19(4), 921-938.

[5] Adeleke, A. Q., Nasidi, Y., & Bamgbade, J. A. (2016). Assessing the Extent of Effective Construction Risk Management in Nigerian Construction Companies. Journal of Advanced Research in Business and Management Studies, 3(1), 1-10.

[6] Adeleke[1], A. Q., Bahaudin, A. Y., & Kamaruddeen, A. M. (2015). A Partial Least Square Structural Equation Modeling (PLS SEM) Preliminary Analysis on Organizational Internal and External Factors Influencing Effective Construction Risk Management among Nigerian Construction Industries. Rev. Téc. Ing. Univ. Zulia, 38(143), 143-55.

[7] Adeleke, A., Bahaudin, A., & Kamaruddeen, (2015) A Level of Risk Management Practice in Nigeria Construction Industry-From a Knowledge Based Approach. Journal of Management Marketing and Logistics, 2(1), 12-23.

[8] Aibinu, Ajibade Ayodeji, and Henry Agboola Odeyinka. "Construction delays and their causative factors in Nigeria." Journal of construction engineering and management 132, no. 7 (2006): 667-677.

[9] Azman, N. A. S. M., & Adeleke, A. Q. (2018). Effect of Time Overruns on Apartment Building among Kuantan Malaysian Construction Industries. Journal of Advanced Research in Applied Sciences and Engineering Technology, 10 (1), 41-47.

[10] Baloi, D., & Price, A. D. (2003). Modelling global risk factors affecting construction cost performance. International journal of project management, 21(4), 261-269.

[11] Bamgbade, J. A., Salimon, M. G., Adeleke, A. Q., & Nasidi, Y. (2019). Contractor's Technology Acceptance for Firm Sustainability Performance. KnE Social Sciences, 1084-1101.

[12] Bamgbade, J. A., Nawi, M. N. M., Kamaruddeen, A. M., Adeleke, A. Q., & Salimon, M. G. (2019). Building sustainability in the construction industry through firm capabilities, technology and business innovativeness: empirical evidence from Malaysia. International Journal of Construction Management, 1-16.

[13] Bassioni, H. A., Price, A. D., & Hassan, T. M. (2004). Performance measurement in construction. Journal of management in engineering, 20(2), 42-50.

[14] Capper, D. R. (1995). Overview of risk in construction. Risk, management and procurement in construction. London: Centre of construction law and management.

[15] Chan, Daniel WM, Albert PC Chan, Patrick TI Lam, John FY Yeung, and Joseph HL Chan. "Risk ranking and analysis in target cost contracts: Empirical evidence from the construction industry." International Journal of Project Management 29, no. 6 (2011): 751-763.

[16] Chapman, C., & Ward, S. (2011). How to manage project opportunity and risk: Why uncertainty management can be a much better approach than risk management. John Wiley & Sons.

[17] Choudhry, R. M., & Iqbal, K. (2012). Identification of risk management system in construction industry in Pakistan. Journal of Management in Engineering, 29(1), 42-49.

[18] Department of Statistics Malaysia, 2019, bulletin. [Accessed on 10/12/2019].

[19] Dzazali, S., Sulaiman, A., & Zolait, A. H. (2009). Information security landscape and maturity level: Case study of Malaysian Public Service (MPS) organizations. Government Information Quarterly, 26(4), 584-593.

[20] Eaves, S., Gyi, D. E., & Gibb, A. G. (2016). Building healthy construction workers: Their views on health, wellbeing and better workplace design. Applied ergonomics, 54, 10-18.

[21] Edwards, L., & Edwards, L. J. (1995). Practical risk management in the construction industry. Thomas Telford.

[22] Endut, I. R., Akintoye, A., & Kelly, J. (2009). Cost and time overruns of projects in Malaysia. retrieved on August, 21, 243-252.

[23] Hassan, A. K., & Adeleke, A. Q. (2019). The Effects of Project Triple Constraint on Malaysia Building

Projects. Social Science and Humanities Journal, 1222-1238.
[24] Hassan, A. K., Adeleke, A. Q., & Hussain, S. (2019). Partial Least Square Structural Equation Modeling: An Approach to the Influence of Project Triple Constraint on Building Projects among Malaysian Construction Industries. Social Science and Humanities Journal, 1445-1464.
[25] Hilmi, M. F., Ramayah, T., Mustapha, Y., Pawanchik, S., & Ayub, M. A. (2010). Strategic and Behavioral Innovativeness of Malaysian SMEs: Preliminary Results from a First Wave Data Collection. International Journal of Interdisciplinary Social Sciences, 5(8).
[26] Jarkas, A. M., & Haupt, T. C. (2015). Major construction risk factors considered by general contractors in Qatar. Journal of Engineering, Design and Technology, 13(1), 165-194.
[27] Kerzner, H. (2003). Strategic planning for a project office. Project Management Journal, 34(2), 13-25.
[28] Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. Educational and psychological measurement, 30(3), 607-610.
[29] Loosemore, M., & McCarthy, C. S. (2008). Perceptions of contractual risk allocation in construction supply chains. Journal of professional issues in engineering education and practice, 134(1), 95-105.
[30] Malik, N. S. A., & Adeleke, A. Q. (2018). The Effect of Organizational Culture on Material Risk among Malaysian Construction Industries. Journal of Advanced Research in Applied Sciences and Engineering Technology, 10 (1), 34-40.
[31] Mills, A. (2001). A systematic approach to risk management for construction. Structural survey, 19(5), 245-252.
[32] Morledge, R., & Smith, A. J. (2013). Building procurement. John Wiley & Sons.
[33] Nunnally, J. C., Bernstein, I. H., & Berge, J. M. T. (1967). Psychometric.
[34] Odeyinka, H. A., Lowe, J., & Kaka, A. (2008). An evaluation of risk factors impacting construction cash flow forecast. Journal of Financial Management of Property and Construction, 13(1), 5-17.
[35] Ojo, G. (2010, July). An assessment of the construction site risk-related factors. In Proceedings of the 40 th Annual General Meeting/Conference of the Nigerian Institute of Building (pp. 9-14).
[36] Omer, M. S., & Adeleke, A. (2019). Systematic Critical Review of Risk Management in Malaysian Construction Companies. Journal of Humanities and Social Sciences Studies (JHSSS) Vol, 1.
[37] PMBoK, A. (2013). A guide to the project management body of knowledge (PMBOK guide). Project Management Institute, Inc.
[38] PMI, A. (2004). Guide to the Project Management Body of Knowledge (PMBOK). In Project Management Institute.
[39] Rahman, N. F. A., & Adeleke, A. Q. (2018). The Relationship between Effective Communication and Construction Risk Management among Kuantan Malaysian Construction Industries. Journal of Advanced Research in Applied Sciences and Engineering Technology, 10 (1), 18-24.
[40] Sabodin, N., & Adeleke, A. Q. (2018). The Influence of Government Regulation on Waste Reduction Among Kuantan Malaysian Construction Industry. Journal of Advanced Research in Applied Sciences and Engineering Technology, 10 (1), 72-76.
[41] Sambasivan, M., & Soon, Y. W. (2007). Causes and effects of delays in Malaysian construction industry. International Journal of project management, 25(5), 517-526.
[42] Sekaran, U., & Bougie, R. (2013). Research Methods for Business. Edisi enam. Jakarta: Salemba Empat.
[43] Serpell, A., Ferrada, X., Rubio, L., & Arauzo, S. (2015). Evaluating risk management practices in construction organizations. Procedia-Social and Behavioral Sciences, 194, 201-210.
[44] Shari, I. (2000). Economic growth and income inequality in Malaysia, 1971 95. Journal of the Asia Pacific Economy, 5(1-2), 112-124.
[45] Simister, S. J. (1994). Usage and benefits of project risk analysis and management. International Journal of Project Management, 12(1), 5-8.
[46] Smith, N. J., Merna, T., & Jobling, P. (2006). Managing risk in Construction Projects Oxford: Blackwell.
[47] Tadayon, M., Jaafar, M., & Nasri, E. (2012). An assessment of risk identification in large construction projects in Iran. Journal of Construction in Developing Countries, 17.
[48] Tah, J. H. M., & Carr, V. (2001). Towards a framework for project risk knowledge management in the construction supply chain. Advances in Engineering Software, 32(10-11), 835-846.
[49] Takim, R. (2005). A framework for successful construction project performance (Doctoral dissertation, Glasgow Caledonian University).
[50] Taofeeq, D. M., Adeleke, A. Q., & Hassan, A. K. (2019). Factors Affecting Contractors risk attitude from Malaysia construction industry perspective. Social Science and Humanities Journal, 1281-1298.

[51] Taofeeq, D. M., Adeleke, A. Q., & Hassan, A. K. (2019). The Moderating Role of Government Policy on Contractors' Risk Attitudes in Malaysia Construction Companies. Social Science and Humanities Journal, 1261-1280.

[52] Taofeeq, D. M., & Adeleke, A. Q. (2019). Factor's Influencing Contractors Risk Attitude in the Malaysian Construction Industry. Journal of Construction Business and Management, 3(2), 59-67.

[53] Taofeeq, D. M., Adeleke, A. Q., & Lee, C. K. (2020). The synergy between human factors and risk attitudes of Malaysian contractors': Moderating effect of government policy. Safety science, 121, 331-347.

[54] Taofeeq, D. M., Adeleke, A. Q., & Lee, C. K. (2019). Individual factors influencing contractors' risk attitudes among Malaysian construction industries: the moderating role of government policy. International Journal of Construction Management, 1-20.

[55] [Wang, D., Dai, F., & Ning, X. (2015). Risk assessment of work-related musculoskeletal disorders in construction: State-of-the-art review. Journal of construction engineering and management, 141(6), 04015008.

[56] Yusuwan, N. M., Adnan, H., Omar, A. F., & Kamaruzaman, J. (2008). Clients' perspectives of risk management practice in Malaysian construction industry. J. Pol. & L., 1, 121.

[57] Zou, P. X., Zhang, G., & Wang, J. (2007). Understanding the key risks in construction projects in China. International Journal of Project Management, 25(6), 601-614.

[58] Bamgbade, J. A., Kamaruddeen, A.M., & Nawi, M.N.M. (2015). Factors Influencing Sustainable Construction among Construction Firms in Malaysia: A Preliminary Study using PLS-SEM. Revista Tecnica de la Facultad de Ingenieria Universidad del Zulia. 38(3), 132 - 142.