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A LITERATURE REVIEW ON RISK FACTORS ON INTERNATIONAL CONSTRUCTION PROJECTS

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Internationalization is one of the most critical decisions for construction companies. Although expanding into new markets promises several benefits such as new job opportunities, increases in market share and profit margins, etc., it is exposed to risks and difficulties, which in turn result in poor project performance in terms of delays and cost overruns. Therefore, construction companies should thoroughly recognize the potential risk factors and develop proper risk management strategies against these risk factors. This study reviews the recent studies on risk factors on international construction projects, which might cause delays and cost overruns, in order to help construction companies that mostly undertake international construction projects in recognizing risk factors and developing their risk response strategies against them. For this purpose, semi-systematic literature review was conducted, 32 journal articles from 14 academic journals reviewed in depth, and 23 different risk factors were identified. "Host government related risk", "Resource price fluctuations", "Unavailability of resources in the host market", and "Contractor's lack of managerial skills" were found to be "highly cited risk factors". On the other hand, "Adverse public attitude", "Project specification and standard problems", "Technology and proprietary information sharing problems", and "Virtual Risk" were found to be "lowly cited risk factors".

Keywords: Construction industry, Construction risks, Cost overruns, Time overruns, Risk strategies.

1 INTRODUCTION

Construction industry is getting more competitive, complex and crowded every year. Therefore, construction companies, especially from developing countries, generally aim to expand into overseas markets due to the shortage of construction projects in domestic markets and globalization. Although expanding into international markets may enable construction companies to increase their market share and benefit from growing foreign economies, doing business in foreign countries is much riskier than carrying out projects in domestic markets as there are a great number of complex and adverse conditions. Success of a construction company undertaking international projects predominantly depends on how accurately the company identifies, manages these risks and thereby protects themselves from the undesirable consequences of probable failures. Identifying the risks is the first and the most important step in the risk management process. However, identifying and managing all probable risks on a construction project is a very difficult task as it is very time-consuming and counterproductive. Therefore, discovering and managing the critical risks is crucial.

In the construction management literature, several studies have focused on risk management in international construction projects. They can be categorized into two main groups; 1) studies

aiming to identify and classify the risk factors in international construction projects and their importance levels, and 2) studies aiming to introduce a risk management approach/technique/framework. Moreover, there are only few studies that investigated how previous studies on risks in international construction projects evolved in terms of risk factors over the years. This was a research gap in the construction management literature and this study aims to fulfill this knowledge gap. It aims to review the recent studies on risk factors on international construction projects from this perspective to assist construction companies that predominantly do business in international construction markets in improving their risk response strategies.

2 METHODOLOGY

The main objective of this study is to identify the most critical risk factors that cause time and cost overruns in international construction projects through an extensive literature review. There are different types of review methodologies such as systematic, semi-systematic, integrative, etc. in order to conduct a literature review. Since reviewing every previous study that may be relevant to the research topic is impractical, a semi-systematic literature review, which aims to investigate how research on a selected topic has evolved over time (Snyder 2019), was found to be the most appropriate methodology for the objectives of this study.

In this study, databases such as Science Direct (Elsevier Journals), ASCE Journals and Proceedings (American Society of Civil Engineers), Research Gate, Scopus (Elsevier) were used. Searches were made using the keywords “risk factors”, “delays”, “cost overruns”, “international construction companies”, and “international construction projects”. Initial searches yielded both relevant and irrelevant results. To determine the most relevant results, some assumptions were made, and the results were filtered based on these assumptions. In this study, articles dealing with “the importance of risk factors on international construction projects” were included, whereas the articles dealing with “risk management”, “the effects of risk factors on the project success”, “risk models”, and “analyses between risk factors” in international construction projects were excluded.

Articles containing the specified keywords were examined, highly rated and highly cited articles were reviewed, books, reports, seminar notes and conference papers were excluded, articles written in English were reviewed, articles out of the scope of this research were excluded, and articles, which were written in and after 2012, were reviewed. The first literature search yielded a great number of articles. In order to find the most relevant articles, the abstracts of 10 randomly selected articles were reviewed and only the articles that were found to be appropriate were selected for full-text reading. This process continued until all of the articles on the research subject have been reviewed. Moreover, the references of these articles were scanned in order not to miss the potentially relevant articles. A total of 32 journal articles from 14 academic journals were selected for further review and analysis. Each article was reviewed in detail and the following information was sought in each of these articles: the name of the researcher(s), the year in which the research was published, the country in which the study was carried out, the method used in the research, and identified risk factors.

3 FINDINGS & DISCUSSION

23 different risk factors were determined from 32 articles, and they were briefly explained below:

- **R1: Macroeconomic Risks** are macroeconomic events that may cause price changes, unexpected increases in credit costs and inflation (Xiaopeng and Pheng 2013, Deng *et al.* 2014b, Al-Sabah *et al.* 2014, Liu *et al.* 2016, Chang *et al.* 2018a, Chang *et al.* 2018b, Viswanathan and Jha 2020, Wuni *et al.* 2020, Do *et al.* 2021, Hiyassat *et al.* 2022).

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- **R2: Host Government Related Risks** include factors such as government policy attitudes, change of laws and specifications, changes of government policies, legal system that will negatively affect the financial profits of the construction project (Xiaopeng and Pheng 2013, Lee and Schaufelberger 2014, Deng *et al.* 2014a, Al-Sabah *et al.* 2014, Yildiz *et al.* 2014, Asare *et al.* 2015, Liu *et al.* 2016, Kadry *et al.* 2017, Chang *et al.* 2018a, Chang *et al.* 2018b, Viswanathan and Jha 2020, Hiyassat *et al.* 2022).
- **R3: Adverse Public Attitude** include negative attitude to foreign investors in the host country (Liu *et al.* 2016, Chang *et al.* 2018b, Hiyassat *et al.* 2022).
- **R4: Legal Risk** include permit procedures, contradictions in official documents, unfamiliarity with legal processes, changes in tax laws and the lack of a fair legal process (Xiaopeng and Pheng 2013, Lee and Schaufelberger 2014, Han *et al.* 2014, Al-Sabah *et al.* 2014, Yildiz *et al.* 2014, Liu *et al.* 2016, Chang *et al.* 2018a, Chang *et al.* 2018b, Viswanathan and Jha 2020, Zhang *et al.* 2021, Hiyassat *et al.* 2022).
- **R5: Social Risk** can be defined as the difficulties that project stakeholders may encounter depending on the demographic structure of the geography where the project is carried out (Xiaopeng and Pheng 2013, Ebrat and Ghodsi 2014, Asare *et al.* 2015, Liu *et al.* 2016, Gao *et al.* 2017, Hwang *et al.* 2016, Chang *et al.* 2018b, Viswanathan and Jha 2020).
- **R6: Resource Price Fluctuations** include cost and overhead increases and delay penalties resulting from not completing the work on time. Financial losses arising from delays in the supply of materials and equipment (Subramanyan *et al.* 2012, Kuo and Lu 2013, Al-Sabah *et al.* 2014, Gunduz *et al.* 2015, Liu *et al.* 2016, Kadry *et al.* 2017, Chang *et al.* 2018a, Chang *et al.* 2018b, Viswanathan and Jha 2020, Wuni *et al.* 2020, Do *et al.* 2021, Bakri *et al.* 2021, Hiyassat *et al.* 2022).
- **R7: Unavailability of Resources in the Host Market** refers to the unavailability of all necessary resources in the host country (Li *et al.* 2013, Lee and Schaufelberger 2014, Deng *et al.* 2014b, Al-Sabah *et al.* 2014, Yildiz *et al.* 2014, Gunduz *et al.* 2015, Liu *et al.* 2016, Hwang *et al.* 2016, Kadry *et al.* 2017, Chang *et al.* 2018a, Viswanathan and Jha 2020, Do *et al.* 2021).
- **R8: Contract Problems** include unfair contract clauses (Subramanyan *et al.* 2012, Han *et al.* 2014, Liu *et al.* 2015, Liu *et al.* 2016, Viswanathan and Jha 2020, Bakri *et al.* 2021, Zhang *et al.* 2021, Hiyassat *et al.* 2022).
- **R9: Adverse Site Conditions** can be defined as negative conditions such as weather conditions, uncertain ground conditions and conditions in neighboring regions that may be encountered at the site where the project is carried out (Subramanyan *et al.* 2012, Han *et al.* 2014, Liu *et al.* 2016, Do *et al.* 2021, Hiyassat *et al.* 2022).
- **R10: Project Specification and Standard Problems** can be defined as the specifications determined by the employer for the construction project to be carried out, special material and construction restrictions, and the project in accordance with the standards in the host country (Liu *et al.* 2016, Do *et al.* 2021).
- **R11: Design Problems** can be defined as design errors seen in any of the architectural, static, electrical or mechanical projects of the project (Li *et al.* 2013, Liu *et al.* 2016, Wuni *et al.* 2020, Oyieyo *et al.* 2020, Do *et al.* 2021, Bakri *et al.* 2021, Hiyassat *et al.* 2022).
- **R12: Poor Productivity** can be defined as factors such as inefficient workmanship or inefficient material use, accidents at work, problems with workers and strike that do not allow the project to be completed in the promised time or cost due to the inefficiency of the work done on the project (Al-Sabah *et al.* 2014, Yildiz *et al.* 2014, Liu *et al.* 2016, Kadry *et al.* 2017, Viswanathan and Jha 2020, Oyieyo *et al.* 2020).

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- **R13: Interruptions in Cash Flow** can be defined as disruptions in the projected cash inflow or cash outflow. In addition, the subcontractor exceeds the specified time and cost limits (Perera *et al.* 2014, Liu *et al.* 2016, Wang *et al.* 2016, Viswanathan and Jha 2020, Hiyassat *et al.* 2022).
- **R14: Technology and Proprietary Information Sharing Problems** can be defined as problems that may occur due to the use of developing or emerging technological techniques in the project or the sharing of private information (Deng *et al.* 2014a, Liu *et al.* 2016).
- **R15: Incompetency of Other Project Participants** can be defined as the risks encountered due to the subcontractors or partners in the project being inadequate in both technical and implementation areas (Subramanyan *et al.* 2012, Liu *et al.* 2016, Wuni *et al.* 2020, Oyieyo *et al.* 2020, Do *et al.* 2021).
- **R16: Adverse Relationship Among Project Participants** can be defined as negative situations that may occur in the relations between subcontractors or partners in the project (Doloi *et al.* 2012a, Deng *et al.* 2014a, Perera *et al.* 2014, Gunduz *et al.* 2015, Liu *et al.* 2016, Hwang *et al.* 2016, Chang *et al.* 2018b, Viswanathan and Jha 2020, Wuni *et al.* 2020, Do *et al.* 2021, Hiyassat *et al.* 2022).
- **R17: Client's Incompetency** can be defined as the negative impacts on the project due to the client's inability to provide the information, lack of technique, experience or application experience (Subramanyan *et al.* 2012, Liu *et al.* 2016, Chang *et al.* 2018a, Chang *et al.* 2018b, Oyieyo *et al.* 2020, Bakri *et al.* 2021).
- **R18: Contractor's Lack of Experience** can be defined as the contractor's lack of any construction technical experience when entering into a type of project that has not been done before and will be done for the first time (Kuo and Lu 2013, Deng *et al.* 2014b, Gunduz *et al.* 2015, Liu *et al.* 2016, Kadry *et al.* 2017, Viswanathan and Jha 2020, Wuni *et al.* 2020, Do *et al.* 2021, Bakri *et al.* 2021, Hiyassat *et al.* 2022).
- **R19: Contractor's Lack of Managerial Skills** can be defined as the contractor's lack of any construction management experience when entering into a type of project that has not been done before and will be done for the first time (Subramanyan *et al.* 2012, Doloi *et al.* 2012a, Doloi *et al.* 2012b, Ebrat and Ghodsi 2014, Han *et al.* 2014, Perera *et al.* 2014, Al-Sabah *et al.* 2014, Gunduz *et al.* 2015, Liu *et al.* 2015, Liu *et al.* 2016, Gao *et al.* 2017, Chang *et al.* 2018a, Viswanathan and Jha 2020, Wuni *et al.* 2020, Do *et al.* 2021).
- **R20: Project Complexity** can be defined as any complexity encountered during the design, mobilization, permitting, construction, testing and commissioning stages during the construction phase (Xiaopeng and Pheng 2013, Ebrat and Ghodsi 2014, Yildiz *et al.* 2014, Liu *et al.* 2016, Zhao *et al.* 2017, Chang *et al.* 2018b, Viswanathan and Jha 2020, Wuni *et al.* 2020, Do *et al.* 2021).
- **R21: Virtual Risk** can be defined as the risk of disclosure of the project's sensitive data and information stored and processed in virtual environments due to security weaknesses (Chang *et al.* 2018a).
- **R22: Regional Risk** can be defined as harsh and strict rules in the region where the project is carried out and which causes various difficulties in the construction of the project (Chang *et al.* 2018a, Chang *et al.* 2018b, Do *et al.* 2021, Bakri *et al.* 2021, Hiyassat *et al.* 2022).
- **R23: Sociopolitical Stability** can be defined as an indicator of the degree to which the policies of a society and its institutions are predictable and reliable. Changes in the policies, laws and specifications of the country where the construction project is carried out, changes in political staff and disruption of the continuity of the work can be given as

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examples of these risks (Asare *et al.* 2015, Chang *et al.* 2018a, Chang *et al.* 2018b, Zhang *et al.* 2021, Hiyassat *et al.* 2022).

These factors were cited 172 times in total; and the average number of citation (μ) was found to be 7.47 and the standard deviation (σ) was found to be 3.94. The risk factors, which were cited more than 11.41 ($\mu+\sigma$) times were classified as "highly cited factors" and the risk factors cited less than 3.53 ($\mu-\sigma$) times were classified as "lowly cited factors". "Contractor's lack of managerial skills" (R19) was cited 16 times, which makes this factor "the most cited factor", on the other hand, "Virtual risk" (R21) was cited one time, which makes this factor "the least cited factor".

4 CONCLUSIONS

This study aims to explore the most critical risk factors through a semi-systematic literature review and show how the former studies on risks in international construction projects changed over the years. 32 journal articles published in 14 academic journals since 2012 were reviewed in depth and 23 risk factors were identified. "Host government related risk" (R2), "Resource price fluctuations" (R6), "Unavailability of resources in the host market" (R7), and "Contractor's lack of managerial skills" (R19) were considered as "highly cited risk factors", whereas "Adverse public attitude" (R3), "Project specification and standard problems" (R10), "Technology and proprietary information sharing problems" (R14), and "Virtual Risk" (R21) were considered as "lowly cited risk factors". This study provides construction companies who desire to expand into international markets the risk factors to consider in development of their risk management strategies.

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