

# LEVEL OF RISK MANAGEMENT KNOWLEDGE AMONG CONSTRUCTION PROJECT MANAGERS IN SRI LANKA

D.H.N. Welikala<sup>1</sup>, H.S. Jayasena<sup>2</sup> and B.K.C. Perera<sup>3</sup>

## ABSTRACT

*Risk management often becomes a significant concern among the construction professionals especially due to the complex nature of the industry. Though it is a popular subject in project management discipline, it was observed that authentic application of the principles of risk management at times is arguable in practice. As a Project Manager who is a key role player in a project, it is vital to have a solid knowledge on risk management and its related arena. Evidence was found of limited risk management knowledge among construction professionals. Therefore, a study was conducted to find the status of risk management knowledge among the construction Project Managers in Sri Lanka. A mixed method approach was followed by a comprehensive literature review on elements of body of knowledge of risk management and later a questionnaire survey to contextualise the status of the knowledge gap of Project Managers in real. According to the findings of the study, it could be concluded that Sri Lankan Project Managers are not fully confident on their risk management knowledge. It was primarily likely to be due to the limited learning in the subject area when pursuing higher studies. The study also identifies the options to devise appropriate strategies to improve risk management knowledge among the Construction Project Managers in Sri Lanka.*

**Keywords:** Construction Industry; Project Management; Risk Management; Sri Lanka.

## 1. INTRODUCTION

The construction industry in nature itself is complex and it is exposed to various risks. Managing such risks play a vital role in the sector which has direct impact on project performances. While it is clear that risks are inevitable, managing risks using effective methods has already been identified as a crucial concern. The major objectives of risk management were stated as identifying and reducing the risk for the success of the project and achieving its goals. Even though construction projects of different scales incorporate different levels of risks, their effect should not be disregarded (Maytorena, et al., 2004; Ray, 2017).

Risk management is one of the foremost disciplines brought out in project management practices. Apparently, Bosse in 2020, showed that the responsibility of risk management has to be taken by the Project Manager in each construction project. Iacob (2013) has also

---

<sup>1</sup> Teamwork Engineering Services (Pvt) Ltd, Sri Lanka, donwelikala96@gmail.com

<sup>2</sup> Department of Building Economics, University of Moratuwa, Sri Lanka, suranga@uom.lk

<sup>3</sup> Department of Quantity Surveying, Sri Lanka Institute of Information Technology, Malabe, kavinya.p@sliit.lk

mentioned that multidisciplinary training, varied experience and education of risk management were important as a Project Manager to be competent in mitigating and managing the risks. Therefore, it can be stated that, construction professionals have already acknowledged the essentiality of knowing the risk management techniques and applications properly, by the Project Managers. Meanwhile, Madushanka and Tilakasiri (2020), have found that, there was a lack of awareness of risk management among the construction industry professionals in Sri Lanka. However, it was observed that, the level of knowledge gap was not established either by them or by any scientific source so far.

There are key elements of risk management body of the knowledge that Project Managers are required to know and be skillful, in order to properly manage the risks. Lack of such knowledge shall become a key source for aggravated exposure to risks (Ghale, et al., 2021; Sankar, et al., 2022). Thus, this brings the need for strategies to equip Sri Lankan Project Managers with necessary risk management knowledge. To device effective strategies, it is imperative to identify the gaps in current risk management knowledge among them.

Hence the aim was set as finding the status of risk management knowledge among construction Project Managers in Sri Lanka. The knowledge status was contextualized from several perspectives: viz (a) confidence on risk management knowledge, (b) subject learning, and (c) preference for learning. The set objectives of the study were 1) identify the key elements of risk management body of knowledge, 2) identify the knowledge acquisition process of those key elements and 3) find the level of acquisition of those elements by the Project Managers in Sri Lankan construction projects.

## **2. ELEMENTS OF RISK MANAGEMENT BODY OF KNOWLEDGE**

From the past, construction industry has associated with risk management theories and techniques. This has become a vantage to avoid sudden emergencies and to pursue a stable construction process for clients (Dionne, 2013). However, the construction industry has made relatively slow progress in realizing the advantage of risk management, wherein which, stakeholders mainly focused on other aspects of project performances. Even, in Sri Lanka risk management was not satisfactorily established due on various grounds (Perera and Rameezdeen, 2014).

Management of risks is a salient feature and quite a challenging task in practical implementations. Since risk management is a frequentative process, responsible department, personnel or the Project Manager required the skills on realizing and recognizing the main causes of risk and monitoring them throughout the project duration. Banaitiene and Banaitis (2012) have presented the importance of this process while accommodating it in a systematic manner from the inception to the end of the project life cycle. As mentioned by them, Project Management Institute has stated that, management of risks was one of main competencies out of the other nine competencies of knowledge that Project Managers require to be promoted. After conducting thorough literature survey, following steps were found as the body of knowledge in risk management for Project Managers.

## **2.1 RISK MANAGEMENT PLANNING**

Good risk management plan has helped to Project Manager to handle the risk in the construction project. Also, this helped to identify ways of assessing the risk and how often it requires to plan (Parker and Mobey,2004). According to Watt (2020), there were four ways to act upon a risk. Those were accepting, avoiding, mitigating, and transferring. Avoiding the risk was the best action that could carry out. If it's possible to prevent risk or its impact that won't create any damages for the construction project. Unless, avoiding the risk wouldn't be the best option rather mitigating would be the best way to deal within. Thus, it is mandatory to predict and plan the risk well as to mitigate with the least disturbance for the project.

## **2.2 RISK IDENTIFICATION**

The next stage of management of risk was the identification of risks. This was another important part for Project Managers to be concerned about. They should have proper knowledge on identifying risks in the projects. This step identified the potential risks that are very common and other uncommon risks events. According to the given literature, risks were investigated by studying the activities of organizations in all directions and trying to present new risks that would arise in the future as a result of changes in the external and internal environment. (Ranong and Phuennggam,2009). Normally, in the identification period, previous similar project's risks were observed and analysed. Moreover, it was not limited the previous project's risks but also incorporate many other risks that could have happened in the new project. Hence, it is indeed to be thorough in this knowledge area and having good experiences may aid well in advance to ascertain all upcoming risks.

## **2.3 QUALITATIVE RISK ANALYSIS**

The qualitative analysis made it possible to identify the significant risk factors. The aim was to compile a list of the key roots of risk and a description of their possible outcomes, including an initial estimate of their potential impact on time and cost calculations (Perry and Thompson, 1992). Many managers have accepted that, this initial qualitative analysis was important and brought significant benefits in terms of understanding the project and its possible problems as mentioned by Perry and Thompson (1992). Also, this analysis included assessing the probability, the impact of various risks, and identifying risks to improve project performance while identifying high priority risks (Nadaf, et al., 2018). This was also an important factor in improving Project Managers' knowledge and skills when managing risks.

## **2.4 QUANTITATIVE RISK ANALYSIS**

Another identified body of knowledge on risk management was quantitative risk analysis. This was a process that explored the cumulative impact of identified individual project risks and other sources of unpredictability on the overall objectives of the project mathematically. It contained more advanced techniques and methods to investigate and analyse the risks of construction projects. Usually, it involved more complex analytical methods that often require computer programs. The use of quantitative risk analysis made it possible to model the showing of a construction project and quantified the probability of the appearance of identified risk factors and their possible impact (Banaitiene and

Banaitis, 2012). The purpose of quantitative analysis of risk was to determine the impact of the recognized risks on the overall objectives of the project. (Bansal, 2019).

## **2.5 RISK RESPONSE PLANNING**

According to Chou and Wang (2003), the risk response planning was the choice of an appropriate reduction strategy which used to reduce the negative impact of the risk. Further, they have mentioned, the way that risks have to be managed or handed over the same into another party or retained itself. Similarly, this method was also used to reduce the threats of the project. To adopt this technique, Project Managers have to be aware of the content and the repercussions of such risks (Miller and Lessard, 2001). The goal of this method was to achieve project objectives at planned cost without unnecessary overruns and take action to minimize its threats beforehand (Fang et al., 2013).

## **2.6 RISK MONITORING AND CONTROLLING**

Risk identification, planning, and tracking new risks involve risk monitoring and planning. According to Schieg (2010), there were four strategies of risk control. They were avoidance, decrease, passing on risk and bearing the risk by oneself. This included tracing existing risks, recognizing new risks, monitoring the effects of previous risk management activities and evaluating the effectiveness of present risk management processes. Same as mentioned above, this step also a necessary body of knowledge that Project Managers are required intentionally.

The above-discussed body of knowledge on risk management is on-demand essentiality of the industry. Hence, the Project Managers as key role players of a construction project are mandated to be qualified and should be competent in the above knowledge areas. There are variety of sources available to improve their knowledge as well as their awareness. To acquire these bodies of knowledge, Project Managers need to update their knowledge and improve the skills via training, and other mechanisms which can be provided by their companies to them such as coaching programs, mentorship programs, seminars and status meetings. Despite that, Jen (2012) has stated, self-training can increase the knowledge about the risk management substantially.

## **3. RESEARCH METHODOLOGY**

From the literature review conducted in previous section, the key elements in the body of knowledge of risk management were identified. As to achieve the aim of the study, the research was designed according to the mixed method approach where both qualitative and quantitative data have been analysed. The selected strategy of inquiry was a survey. Hence, the deductive theory was adopted and the believed research philosophy was pragmatism where questions were asked from a number of people and some of the observed data were measured in the data analysis.

The adopted research methodology was as follows. Initially a literature review was conducted to identify the required knowledge on the risk management as Project Managers. Accordingly, an extensive set of data on important body of knowledge in risk management was found exploring various sources regarding risk management discipline in construction projects. The used sources were journal articles, online reports, books and relevant other available resources. Based on the findings of conducted literature review, a questionnaire was developed to establish the existing body of the knowledge. While

questionnaire survey carried many quantitative questions as in multiple options, few explorative questions were inserted to gather qualitative data. The questionnaire has consisted of eleven questions and each question was designed to collect data in order to furnish the status of existing knowledge of Project Managers in risk management. The prepared questionnaire was on an online form and it was sent for twenty-five participants who were working in the construction field as Project Managers in Sri Lanka and collected the necessary data for the research. The collected data were analysed based on their own percentages in the collection of overall data. Other numerical data were analysed as at average value. For example, the learning hours of risk management topics were analysed as average values. The data representation was done via graphical methods for further clarification. The last question was an open question that was analysed through a descriptive method. From the collected data, knowledge acquisition process of the key elements of body of knowledge in risk management and the level of acquisition of those elements by the Project Managers in Sri Lankan construction projects were analysed and compounded. Finally, the conclusions of the study and the recommendations of novel enunciator were given for future implementations.

#### 4. DATA ANALYSIS AND DISCUSSION

Based on literature review in this study, the key elements of body of knowledge in risk management were identified. The survey was done to find out the knowledge and confidence about risk management in construction industry among the industry professionals. The obtained raw data were analysed with the aid of pie charts for clear graphical representation. The analysis output paved the path to reach a conclusion by discussing the findings of the questionnaire survey. This section is based on the findings that were obtained in the data collection.

##### 4.1 DEMOGRAPHIC DATA

In this research, demographic data gives an idea about the professional qualifications of the personals that provided the data for the survey. Thus, Figures 1 and 2 presents the educational qualifications and the number of years of gained experience in the field.

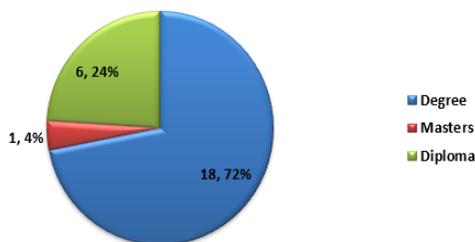


Figure 1: Educational qualifications

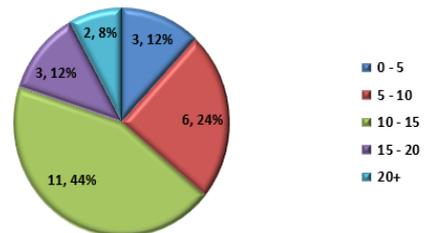


Figure 2: Years of experience

Since the survey was limited to Project Managers, out of twenty-five respondents eighteen Project Managers were Bachelor’s degree holders while one person had a masters’ degree and six respondents were diploma holders. When considering the years of experience in the field, Figure 2 shows that, only three people had experience below 5 years. More than 60% of the respondents had either 10 years or more years of experience in the industry. Considering all these factors, it can be considered that all the respondents

were responsible personnel in field who were having a sound knowledge about the subject.

## 4.2 CONTEXTUAL DATA

In order to achieve the set research aim, the contextual data which includes the subject matter in which deployed for analysis were given below.

### 4.2.1 Confidence on Knowledge about Risk Management

The responses for the question about the level of confidence were limited to intermediate levels. 56% of persons were quite confident about the knowledge while rest of all the Project Managers were somewhat confident. Interestingly, none had recorded their responses as in either fully confident or not confident at all. In complying with the above demographic finding, all the participants in the sample were taken as sound knowledgeable professionals and it was a comparatively good sign to have no response as “not confident”. On the other hand, nobody was assured enough to state out that they were “full confident” though the majority was been the industry more than ten years. Figure 3 represents graphical view on confidence level of total sample set.

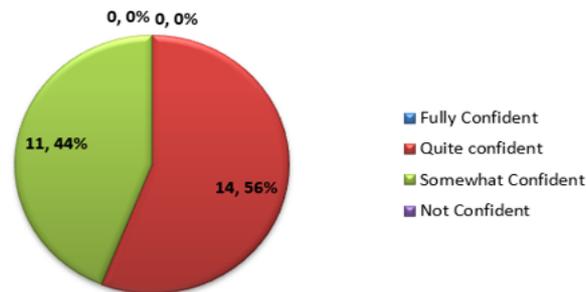


Figure 3: Confidence level

### 4.2.2 Risk Management Studying

The respondents answered a question by stating that, if they learned nothing on risk management, risk management as a part of a subject module, or as a separate subject module of a full. Although they had come from different diplomas, Bachelor’s degrees and Master’s degrees, no program had taught them risk management as a separate subject module. This was a considerable observation that was found in the educational system which would cause the way to exist “not fully confident” Project Managers in the field of risk management.

### 4.2.3 Qualification which taught Risk Management

The level of qualification in which the risk management was taught is shown in Figure 4.

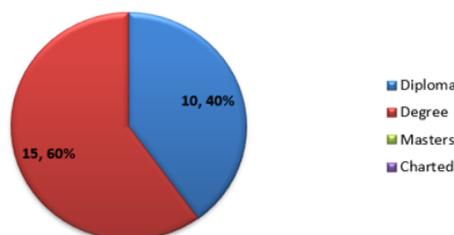


Figure 4: Qualification which taught risk management

Out of the twenty-five respondents, fifteen experts have studied the risk management in Bachelor's degree programme while other ten experts have studied risk management in their diploma programme. This indicated that in Sri Lanka, the risk management was only taught in initial levels of higher study programs. The relevant area of the subject was touched neither Master's degree programs nor chartered programs.

#### 4.2.4 Total Number of Hours Spent on Learning and Studied Areas on Risk Management

By taking the average of the collected responses, the average learning hours that were being allocated for learning risk management could be identified as 10 hours. The key areas that have been taught were found as risk management planning and mitigatory measures. Although a diploma or a degree runs for two to four years' time, only 10 hours were allocated for risk management learning which indicates that a less attention and priority has been given by the programme itself. This could imprint a less consideration towards risk management discipline among diplomats and graduands who were going to be occupants in the industry. The total number of hours spent on learning risk management is given in the Figure 5.

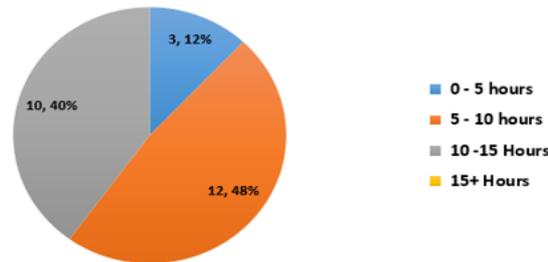


Figure 5: Total number of hours spent on learning

#### 4.2.5 Studied Topics in Risk Management

Among the study topics of risk management, the mostly studied topic was risk management planning which followed by risk monitoring and controlling (refer Figure 6). Only seven Project Managers had studied on risk identification. From the survey, it was clear that no much attention was given to quantitative risk analysis, risk response and qualitative analysis planning in the subject modules as per the conducted construction educational study programmes. But all these topics were recognised as essential learnings that all Project Managers should be thorough as key role players in the construction industry. The lack of knowledge in these two areas clearly indicates a problem in the practical field.

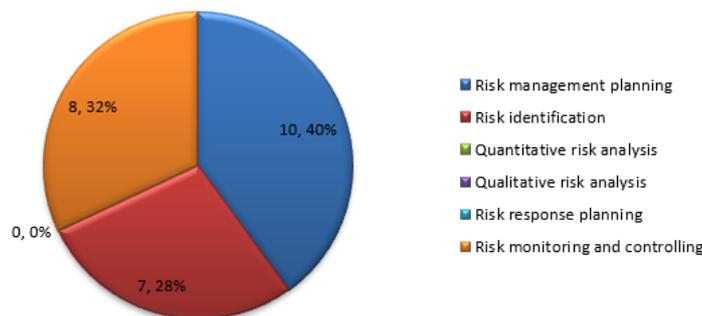


Figure 6: Studied topics in risk management

#### 4.2.6 Number of Hours Spent on Studying the above Topics

In average, the mostly studied topic has been taught for 6 hours which is 60% of the total studied period on risk management. From the survey, it was clear that, mostly the risk management was only taught via a single case study regarding a single construction site. This clearly projects the poor educational background that has been provided for risk management by many study programmes. Figure 7 shows the number of hours spent on the mostly studied topic key knowledge elements by the Project Managers.

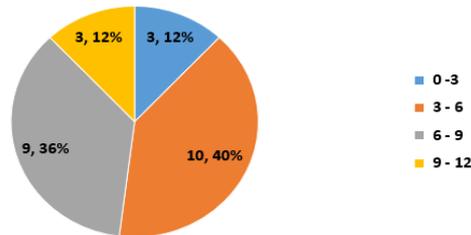


Figure 7: Number of hours spent on studying the key knowledge elements

#### 4.2.7 Other Risk Management Topics Learnt

Other than the given options, risk management was mentioned as the other mostly studied topic area among the respondents. Whereas in section 4.2.5, none of the respondents chose either qualitative risk analysis or quantitative risk analysis out of given options. Hence, it can be seen that, respondents were familiar with the term ‘risk assessment’ but not the ‘quantitative and qualitative risk analysis’ where the similar content has been covered in both the instances. Having said that, this showed that taught programs adopt ‘risk assessment’ term than the two other analysis terms in Sri Lanka. Most of the respondents revealed that the study of risk management was completed by preparing a risk assessment for a case study. Also, the risk mitigations were discussed within those programs. These two topics have occupied about 5 hours in lecturing. But four respondents have mentioned that although the subject module limited its time duration, they have self-studied about the topic for more than 12 hours in order to prepare the risk assessment. Some few other participants have answered that, they have been taught on risk management and improvements to risk management. Further they recorded their duration of learning as 2-4 hours for the above topics. Two respondents have studied about risk identification for 2 hours session while a single person has mentioned that, unforeseen risk management was learned for three hours. Apart from all these, one person has mentioned that he/she could not remember what else he/she studied. Therefore, it shadowed, how professionals in the construction industry hindering the risk management discipline even still being engaged in live projects.

#### 4.2.8 Other Topics Respondents liked to Study

Other than the deductive questions, the questionnaire was included an explorative question also to find other topics that respondents were willing to learn on risk management. Accordingly, these answers were the ones that the respondents considered as the most important topics to learn other than the taught course or subject module. After analysing the responses, it was clear that many respondents considered the ways of addressing the risks are the most crucial thing that need to learn. Having said that, it could be considered as important factor because, sometimes the most damage would not cause by the risk, but from the deficiencies of the way that the responsible personal react.

Moreover, it is important to prevent the risk from happening. Therefore, avoidance of risks is also important to learn. As well as, it is important to know how to maintain a risk management portfolio and to do the risk evaluation quantitatively. This would help in identifying the most crucial risk out of many at a time. With the development of the world, there are many software's that eases the work of people. Henceforth it is advantageous to study the relevant software to handle the work in an easier manner. Also, learning the causes of accidents and injuries that could occur within the site would be assist in preventing them and the injuries. Figure 8 shows the recorded other topics that respondents like to study.

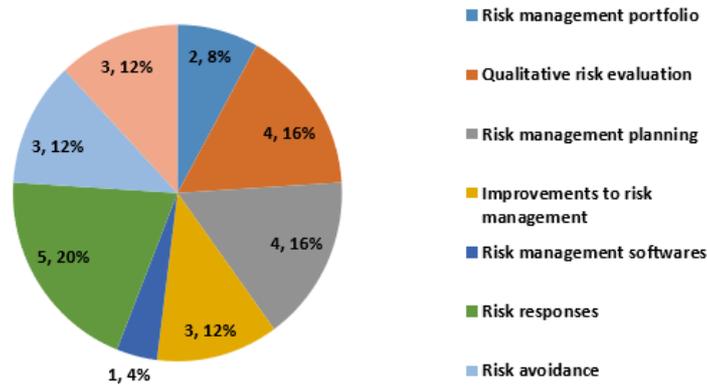


Figure 8: Other topics respondents like to study

#### 4.2.9 The Best Ways to Increase Risk Management Knowledge

Most of the professionals identified, the best way to gain knowledge about the risk management as to face the situation and acquire it within experience. Although the required knowledge cannot be gained without experience, the best solution can be identified as increasing the learning hours by providing a separate course module. Moreover, it is important to have practical sessions or workshops to gain clear idea as in differentiating what to do and what to avoid in a risky situation. Also, it is best if risk assessments could be done in every activity regarding every separate construction work in the industry as in having case studies in road construction, piling sites, retaining wall construction and water projects etc. Every project differs from one to one and henceforth it is worthwhile to know about the risks that could occur in every situation. The proposed ways of improving the knowledge on risk management is given in the Figure 9.

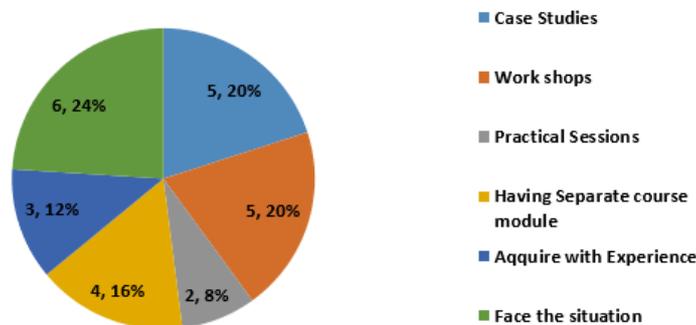


Figure 9: Ways of improving knowledge on risk management

## 5. CONCLUSION AND RECOMMENDATIONS

Because of complexity of the construction industry, abundance of risks can be occurred. Thus, proper management of risk process is pompous for the success of the project. With indication of limited risk management knowledge among Project Managers in Sri Lanka, a research study was conducted to finding the status of risk management knowledge among them.

The study finds that Sri Lankan Project Managers are not fully confident on their risk management knowledge. They already are aware that their knowledge is limited, likely to be due to limited learning they had on the subject. They currently learn the subject as subsection of one of main subject modules either in the undergraduate degree or diploma. The key areas that, they covered in those programmes are (a) Risk management planning, (b) risk identification and (c) risk monitoring and controlling. Less attention was there for (d) quantitative risk analysis, (e) qualitative risk analysis and (f) risk response planning. However, these topics could have been covered using an alternative topic named as ‘risk assessment’. The large majority of Project Managers have spent less than ten hours on learning risk management. Accordingly, their lack of confidence on their own knowledge on risk management can be rationalized. Further to those topics, Project Managers found the use of risk management software also to be important. By not limiting the subjects to taught modules, Project Managers expressed the interest on learning, through alternative means such as case studies, workshops, and real-life experiences. The findings of the study are consistent with previous findings, and these provide a more elaborated explanation than the previous findings.

The findings indicate that the risk management of projects by Sri Lankan Project Managers is not at the optimal level. Appropriate strategies should be devices to bridge their knowledge gap for them to be able to perform well. If the full scope of knowledge elements cannot be included in taught programmes, above-identified modes can be utilized to impart such knowledge among them.

## 6. REFERENCES

- Banaitiene, N. and Banaitis, A., 2012. *Risk management: Current issues and challenges*. 2<sup>nd</sup> ed. Croatia: InTech publishers.
- Bansal, A., 2019. Difference between quantitative and qualitative risk analysis [Online]. Available from: <https://www.izenbridge.com/blog/differentiating-quantitative-risk-analysis-and-qualitative-risk-analysis/>.
- Bosse, M., 2020. What is risk awareness? - American Heritage Insurance Group [Online]. Available from: <https://americanheritageins.com/what-is-risk-awareness/> [Accessed 9 August 2020].
- Chou, H.Y. and Wang, M.T., 2003. Risk allocation and risk handling of highway projects in Taiwan, *Journal of Management in Engineering*, 19(2), pp. 60-68.
- Dionne, G., 2013. Risk management: History, definition, and critique. *Risk Management and Insurance Review*, 16(2).
- Fang, C., Marle, F. and Zio, E., 2013. An integrated framework for risk response planning under resource constraints in large engineering projects. *IEEE Transactions on Engineering Management*, 60(3), pp 627-639.
- Ghaleh, R.M.B., Pourrostam, T., Sharifloo, N.M., Sardroud, J.M., and Safa, E., 2021. Improving the project risk management process in construction projects by provide a suggested method based on PMBOK standard and SHAMPU model, *Journal of Structural and Construction Engineering*, [Online]. Available from: [https://www.jsce.ir/article\\_140330.html?lang=en](https://www.jsce.ir/article_140330.html?lang=en) [Accessed 01 June 2022]

- Madushanka, H. and Tilakasiri, K., 2020. The identification and management of major risks in Sri Lankan construction industry. *Journal of Economics and Finance*, 11(1), pp.16-23.
- Maytorena, E., Clarke, S., Dalton, M., Kiely, T., and Winch, G.M., 2004. Identifying project risks: A cognitive approach. 3<sup>rd</sup> PMI research conference, July 2004.
- Miller, R. and Lessard, D., 2001. Understanding and managing risks in large engineering projects. *International Journal of Project Management*, 19(8), pp. 437-443.
- Nadaf, J., Nadaf, M., Jamadar, B. and Aswi, K.P., 2018. Qualitative risk analysis for construction projects. *International Research Journal of Engineering and Technology*, 5(6), pp 1649-1654.
- Parker, D., and Mobey, A., 2004. Action research to explore perceptions of risk in project management. *International Journal of Productivity and Performance Management*, 53(1), pp 18-32.
- Perera, K. and Rameezdeen, R., 2014. Risk management in road construction: The case of Sri Lanka. *International Journal of Strategic Property Management*, 132, pp.87-102.
- Perry, L. and Thompson, P., 1992. *Engineering construction risks; A guide to project risk analysis and risk management*. 2<sup>nd</sup> ed. London: Thomas Telford Publishing.
- Ranong, P.N., and Phuenggam, W., 2009. *Critical success factors for effective risk management procedures in financial industries*. Master's thesis. Sweden: Umeå University.
- Ray, S., 2017. The risk management process in project management. *Project Manager* [Online]. Available from: <https://www.projectmanager.com/blog/risk-management-process-steps> [Accessed 8 July 2020].
- Sankar, S. D., Shashikanth, K., and Mahender, S., 2022. Risk management in construction industry. In: Pal, I., Kolathayar, S. *Sustainable Cities and Resilience. Lecture Notes in Civil Engineering*, 183. Springer, Singapore [Online]. Available from: [https://doi.org/10.1007/978-981-16-5543-2\\_4](https://doi.org/10.1007/978-981-16-5543-2_4) [Accessed 1 June 2022].
- Schieg, M., 2010. Risk management in construction project management. *Journal of Business Economics and Management*, 7(2), pp 77-83.
- Watt, A., 2020. *Project Management* [e-book], BCcampus Open Education [Online]. Available from: <https://opentextbc.ca/projectmanagement/chapter/chapter-16-risk-management-planning-project-management/> [Accessed 8 July 2020].