

Pandemic Risk Management in Construction Projects



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Abstract: Construction projects undergo critical stages resulting to circumstances with high uncertainty and risk, which has been escalated by the pandemic. As the pandemic continues to overwhelm the world, its negative effects to construction industry are clearly manifested. Health and safety risks in previous studies and researchers are not risk factors that has great impact to construction industry. However, the COVID-19 pandemic significantly increases the risks that needs intensive risk management techniques to continue construction operations.

This study seeks to identify emerging risks and explored risk management techniques applied by construction companies in the Philippines in light of covid-19 pandemic. Findings of the study were based from a questionnaire survey on pandemic risk management in construction projects. Questionnaires were administered based on purposive sampling. Respondents were civil engineers and architects who are directly involved in management and administration of construction projects. The data obtained were analyzed and presented through frequency table and charts. As concluded, health and safety risk are the main risks factors that has effects on cost, time and quality of construction projects. Furthermore, these risks must be managed with great effort and coordination with the government to minimize its effects. In addition, the study is essential to construction industry to mitigate and control new emerging risk to ensure successful project completion.

Keywords: Construction, Pandemic, Risk, Risk Management

I. INTRODUCTION

According to Cole (2021), risk management is the process of identifying, assessing and controlling threats to an organization's capital and earnings. These threats, or risks, could stem from a wide variety of sources, including financial uncertainty, legal liabilities, strategic management errors, accidents and natural disaster. Every business and organization faces the risk of unexpected, harmful events that can cost the company money or cause it to permanently close. Risk management allows organizations to attempt to prepare for the unexpected by minimizing risks and extra costs before they happen [1].

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Last 2019, the world was devastated by covid-19 pandemic. Hence pandemic risk and safety risks are elevated. Pandemic risk should be perceived in terms of a severe threat to an entity's overall strategic objectives and suggests that many organizations' risk management approaches may need substantial re-examination [2]. Construction has been significantly affected by COVID-19 yet is critical to the post-COVID economic recovery. Specifically, construction needs to be constantly aware of safety and risk balanced with timely project delivery. COVID-19 needs to be integrated and promoted within a general risk management approach, in part because this takes account of differing priorities regarding safety risks, rather than overly focusing on COVID-19, and also because the effectiveness of COVID-19 mitigations can be amplified by integration with pre-existing safety processes [3].

Significantly, construction companies need to include risk as an integral part of their project management. Decision making such as risk assessment in construction projects is very important and timely in the construction management [4] amid Covid-19 pandemic.

In a related study discussed, risk management is thus in direct relation to the successful project completion. Project management literature describes a detailed and widely accepted risk management process, which is constructed basically from four iterative phases: risk identification, risk estimation, risk response planning and execution, often managing the risk management process is included. Construction project planning is an essential element in the management and execution of construction projects, which involves the definition of work tasks and their interactions, as well as the assessment of required resources and expected activity durations [5].

Additionally, Risk management in a project encompasses identifying influencing factors that could potentially negatively impact a project's cost schedule or quality baselines; quantifying the associated potential impact of the identified risk; and implementing measures to manage and mitigate the potential impact. The riskier the activity is, the costlier the consequences if the wrong decision is made. Businesses would like to quantify risk for many reasons. Knowing how much risk is involved will help decide if costly measures to reduce the level of risk are justifiable. It can also help to decide if sharing the risk with an insurance company is justified. Some risks, such as natural disasters, are virtually unavoidable and affect many people. All choices in life involve risk. Risks cannot be totally avoided, but the choice can be made so that risk is minimized [5].



Moreover West (2020) elaborated, the term “risk management” as widely used in all aspects of life to describe the steps we take to avoid—or lessen—the damages associated with a potential risk. It typically involves the identification and assessment of risk by a coordinated application of resources to mitigate, control, and monitor the risk [6]. Hence, this study is conducted to determine potential risk in construction projects during pandemic and identify risk management techniques applied to mitigate, control and monitor this risk for the completion of construction projects.

II. METHODOLOGY

Descriptive design is used to describe the situation or case under research study. The study was conducted at the province of Nueva Ecija, Philippines wherein the respondents were engineers whose projects are assigned. The non-probability sampling techniques was used because of limited resources and access due to the pandemic. Respondents were chosen based on their relative ease of access. Members of the population where civil engineers or architects with vital knowledge of risks, risk management and administration strategies. For data collection, the questionnaire-based study was utilized as the main source. The research teacher, adviser and specialist within the field of construction engineering organized the questionnaire after scrutiny and review. The questionnaire was composed of three parts: 1) Different Factors of Risk, 2) Effects of Safety Risk to cost, time and quality of project, 3) Risk Management Techniques Applied. A total of thirty (30) respondents answered in the questionnaire survey administered online through google form. Items in the questionnaires were answered using the 5-point Likert scale that indicates the degree of agreement and disagreement to the statements. For data analysis and interpretation, weighted mean is used. The data obtained were analyzed and presented through frequency table and charts.

III. RESULT AND DISCUSSION

A. Risk Factors

First step to risk management is risk assessment and identification of possible risk that may occur during the construction projects cycles. One study entailed, that risk assessment in construction projects has been applied differently from project to project, using various models of risk assessment to evaluate the risk in certain activities of the projects [7]. Numerous researchers have proposed various types of risk assessment models for precise activities in the construction project assessment [7]. Furthermore, the questionnaire were utilized to examine the risk in the construction industry during this pandemic. The questionnaire-based survey served as the main source of data collection. Table 1 shows the risk factors.

Table- I: Mean of Risk Factors

Risk Factors	Mean	Ranking
Health and safety of workers due to pandemic	4.57	1
Material and labor cost increase due to pandemic	4.43	2
Inability to execute the project on within specified time	4.43	3
Changes of community quarantine status	4.30	4
Delay due to lack of availabilities of materials due to community quarantine	4.30	5
Low productivity of workers due to safety restrictions	4.30	6
Absence of trained manpower because of alternative work arrangement	4.23	7
Delayed payments of client	4.13	8
Poor coordination because of alternative work arrangements	3.80	9
New technology implemented	3.70	10

Table I presents identified risks arranged in the sequence from the highest to the lowest score obtain from the answers of the respondents. The weighted mean scoring technique was used because it can be easily comprehended.

The result shows that health and safety of the workers with a weighted mean of 4.7 is the main risk in construction during this pandemic, and the implementation of new technology is not much of risk with a mean of 3.07, since most companies and organization are already adapting it even before pandemic.

B. Effects of Health and Safety Risk in terms of Cost, Time and Quality

Health and safety of workers due to pandemic is the main risk identified in the survey. Furthermore, the questionnaire examine the awareness of respondents toward the effects of health and safety risk in terms of cost, time and quality of construction projects. The collected data is summarized and presented in Fig. 1.

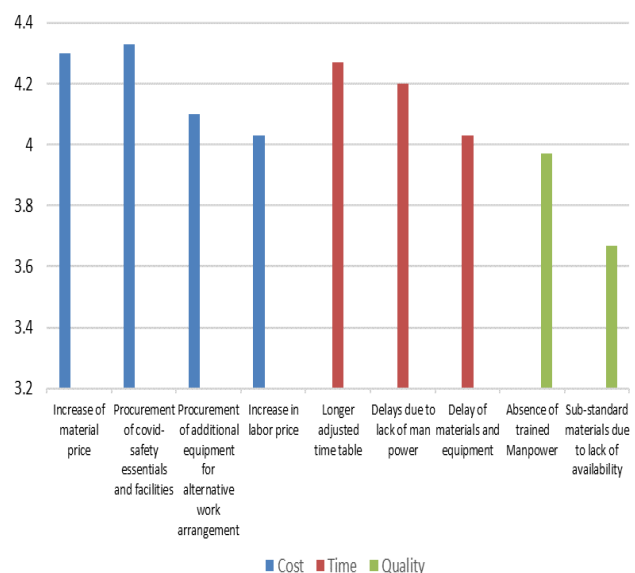


Figure 1: Effects of Health and Safety Risk in Terms of Cost, Time and Quality



The above figure shows that health and safety risk have the greatest effect on cost because of the procurement of covid safety essentials and facilities like alcohol, disinfection facilities, personal protective equipment, thermal scanners, etc. to ensure safety in construction site while the projects are on-going. In terms of time, longer adjusted timetable has the highest effect. Construction projects needs to adjust its timetable because of community quarantine and lockdowns. In terms of quality health and safety risk have lesser effects.

C. Risk Management Techniques

On the premise of the conducted study, Table 2 below shows that the top two most applied risk management are a) strictly following the IATF protocols with a mean of 4.7 and b) conduct seminar covid-19 safety in construction with 4.5 while vaccination of workers is at the least with only 4.07.

Table- II: Mean of Risk Management Techniques Applied

Risk Management Techniques	Mean	Ranking
Strictly follow IATF protocol	4.7	1
Conduct seminar on covid-19 safety in construction	4.5	2
Utilize risk analysis techniques for accurate time estimate	4.46	3
Produce a proper work scheduling according to the new normal	4.46	3
Utilize new technologies like video conferencing for proper	4.43	5
Vaccination of workers	4.07	6

The Inter-agency Task Force for the Management of Emerging Infectious Diseases (IATF-EID) is an inter-sectoral collaboration created to establish preparedness and ensure efficient government response to assess, monitor, contain, control and prevent the spread of any potential pandemic in the Philippines [8]. The IATF-EID provides guidelines and protocols to stop the spread of the COVID-19 virus. All industries including construction adheres to this IATF protocols to protect workers and successfully complete projects with minimal cost and time overruns.

COVID-19 is new to all of us. Hence, the result of the study shows that the conduct of seminar on covid-19 safety in construction is applied as a risk management technique to inform workers about the IATF protocols to mitigate the risk of spreading the disease during the construction projects cycles. Vaccination of workers is the least applied risk management techniques. The result further shows that vaccine is not yet available for all in the Philippines. Herd immunization is not yet achieved.

IV. CONCLUSION

The study shows that health and safety of workers due to pandemic is the number 1 risk factor identified in the study. Moreover, these health and safety risks has significant impact on cost, time and quality of construction projects. In the advent of pandemic, construction industry faces inevitable challenges in the way they operate and keep up safety on construction sites. The findings of the study further shows that following government safety protocols is the most applied risk management technique. This suggests that close coordination and cooperation with the government is an effective technique to continue work amid COVID-19 pandemic. While the construction industry starts to adjust in

the new normal, re-designing work and construction operations considering COVID-19 pandemic following health protocols and guidelines is adapted. Risk assessments need to be conducted with government guidelines to provide a safe working environment in construction. Pandemic risk management must be intensified, and further study is highly recommended. It is therefore important to re-evaluate risk management in light with COVID-19 pandemic to find a more effective ways to mitigate and control pandemic risks in construction.

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AUTHORS PROFILE



Salvador Loria, Jr. currently an Engineering Professor at Nueva Ecija University of Science and Technology. The author is a graduate of a BS in Electrical Engineering and Master in Engineering Education major in Electrical Engineering. At present he is the Chairman of Electrical Engineering at Nueva Ecija University of Science and Technology. He ranked as full professor and he had research publication related in the field of mathematics and electrical engineering in international journals indexed in Scopus.



Jerald F. Silao is a graduate of BS in Civil Engineering in Central Luzon State University located at Science City of Munoz, Nueva Ecija. He is a registered civil engineer and safety officer, experienced in building construction of vertical and horizontal infrastructure projects. He is also a member of Philippine Institute of Civil Engineer, which drives him to broaden his skills, and knowledge in civil engineering practices codes and ethics. As of now, he is affiliated in Local Government Unit of Guimba, Nueva Ecija as Engineer II. He is in charge of all infrastructure projects in their municipality, start from planning, implementation up to turn over.



Ralph Lery U. Guerero is an Electronics Engineer. He is currently affiliated with PLDT Inc. and serves as one of the backend supports in overall zone operations and currently the main officer in charge in the whole area of Cabanatuan City. He is serving the provinces of Tarlac, Nueva Ecija and Aurora with all the outside plant needed for us to run the connections and provide its optimum level of connectivity for the area. He is a research enthusiast and loves making project into reality and also a consultant for almost a decade for high school researches, projects and thesis that other schools do entry at DOST or national level competitions, he is a fan of programming but his favorite is the design and hardware part of a project.





Carlito H. Pantalunan is an electrical engineer. He is a college Instructor, teaching Electrical Engineering courses. He is designated as Inspectorate Chairman of the college responsible on ensuring the compliance of the contractors on the ongoing infrastructure projects of the college. He also have experienced in field, engaged in different Construction projects, focusing on Electrical Designs and Supervision. He is new in the field of research; it is the first research he joined. He loves to write the knowledge and experienced he gained. He is focusing on the study of Construction management and strategies.



Christine L. Renomeron is a Civil Engineer and a student of the Nueva Ecija University of Science and Technology's Master of Engineering Management program (NEUST). As a member of the faculty at Aurora State College of Technology's (ASCOT) Engineering Department, she is also appointed as a member of the college's infrastructure project inspectorate team. In addition, she is an active member of the Aurora Chapter of the Philippine Institute of Civil Engineers. As a new member of the research community, she wishes to establish a stronger connection to the larger academic community and to engage in research that addresses public issues.