

Analysis of Risk Components of Building Construction Projects in Construction Companies: Case Study of Projects in *Jabodetabek*



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ABSTRACT: Risk management is very important for a construction company to carry out all company activities and especially to run a construction project. As is known, the project is carried out through stages in which it is very loaded with unwanted events, ranging from the tender process to get the project, the design stage, the pre-construction stage, the construction stage, and the post-construction stage. It is determined that risk categories are divided into operational; Financial; legal; & marketing. Causative factors consist of external; legal; human; process; & system. Areas of cause determined: design & marketing; legal; implementation; therapy. Risk treatment strategies are determined: eliminating sources of risk; maintaining risk with the right decision; changing the possibilities; and Changing consequences. Based on secondary data obtained on seven projects that have been completed in the Jabodetabek area by one of the construction companies in Indonesia, qualitatively it was found that operational risk occupies the top position, the category that most often arises unwanted events. Process factors are the highest factors as the cause of an unwanted event. Process factors are the highest factors as the cause of an unwanted event. Then the construction period is the highest area, and often an unwanted event occurs. Naturally, the construction period has the longest duration compared to other stages. It further eliminates sources of risk, transforms consequences and turns possibilities into the most frequent ones in the process of managing risks in the project. Meanwhile, based on the level of risk identified from 38 risks that occurred in seven projects, the level of extreme risk occurred in as many as 10 events and as many as 19 events, then after follow-up, the level of extreme risk became as many as 2 events and high to 19 events, this indicates that these unwanted events affect the profit target of the project being worked on. Thus, ERM becomes very important for a construction company in order to achieve the company's goals and objectives and ERM is an important part of good corporate governance

KEYWORDS: Project risk, Project profit

INTRODUCTION

Risk management and the company are closely related. A company's success in carrying out its business processes will be largely determined by its risk management. So it became known as Enterprise Risk Management (ERM). Monahan (2008:11) defines ERM as "dealing with uncertainty for the organization", namely everything related to uncertainty for an organization (company). Lam (2014) quotes the definition of ERM from COSO (the Committee of Sponsoring Organizations of the Treadway Commission), namely "ERM is a process, effected by an entity's board of directors, management, and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its appetite, to provide rational assurance regarding the achievement of entity objectives". Then Lam (2014) defines ERM as "Risk is a variable that can cause deviation from an expected outcome. ERM is a comprehensive and integrated framework for managing key risks in order to achieve business objectives, minimize unexpected earnings volatility and maximize firm value". This definition looks more practical and real, namely that risk is the difference between actual and desired expectations. Quoting from ISO 31000:2018, Risk management is a coordinated activity to direct and control an organization in relation to risk, while risk is the effect of uncertainty on targets. Then ERM was defined as an integrated activity carried out by company managers to achieve company goals and maximize company value through risk management and minimizing costs incurred (Adler: 2020).

Jorion (2007) defines risk as the volatility of unexpected outcomes, which can represent the value of assets, equity or earnings. Uyemura and Deventer (1993), define risk, namely "the volatility (standard deviation) of net cash flows of a business unit". Mun (2006) defines risk as "any uncertainty that affects a system in an unknown fashion whereby the ramifications are also unknown but bear with it great fluctuation in value and outcome". So based on this definition, risk is defined as a loss experienced

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by an institution due to an unclear event that will occur in the future where the risk can be measured and minimized. In this way, risks can be measured and assessed.

In the Project Management Body of Knowledge / PMBOK (2017), risk management can be defined as follows: It is a formal process, where risk factors are systematically identified, analyzed and handled. It is a formal, systematic management method that concentrates on identifying and controlling areas or events that have the potential to cause undesirable changes. In the context of a project, it is an art and science to identify, analyze and respond to risk factors that exist during the implementation of a project. So it can be concluded that risk management is a systematic process system for managing risks, identifying and grouping risks, analyzing risks and prioritizing risks to minimize or even eliminate risks from various types of risks. (<https://www.sisipil.com/manajemen-risiko-project-kompasi/>).

TYPES OF RISK

Risks have very varied types. Types of risk can be classified based on their type or characteristics, including pure risk; speculative risk; particular risks and fundamental risks, and can also be based on the source of the cause, including business risk; geographic risk; political risks; competitive risks etc. Lam (2014) states that risks can be grouped into seven types, namely: (1) Strategic risks, where risks are caused by ineffective company strategies; (2) Business risk, where the company's financial and operational results are not in line with the company's targets; (3) Market risk, where interest rate price movements have a negative impact on the company; (4) Credit risk, failure of obligations by consumers or providers of goods and services; (5) Liquidity risk, where the company cannot get cash to meet the company's needs; (6) Operational risk, where there is failure of the company's people, processes, and systems in its business processes; (7) Compliance risk, where the risk is caused by the company not being able to fulfil legal and regulatory demands. The risks mentioned are generally directed at financial institutions. The risks that will always be faced by various company parties are divided into two large groups, namely financial risks and business risks. In a construction company, risks can be grouped into financial risks; strategy risks; business/operational risks; and reputational risks. The mention of other risks, such as legal risks, marketing risks, and procurement risks are part of these four risks.

RISK COMPONENTS

According to COSO (Committee of Sponsoring Organizations of the Treadway Commission) written in the article <https://bbs.binus.ac.id/business-creation/2020/10/kompon-manajemen-risiko/>, There are several components and processes in risk management, which consists of (1) Internal environment; (2) Objective Setting; (3) Event Identification; (4) Risk Assessment; (5) Risk Response; (6) Control Activities; (7) Information and Communication; (8) Monitoring.

Based on ISO 31000:2018, management components & risk management processes consist of (1) Communication & consultation; (2) Scope, context, and criteria; (3) Risk assessment; (4) Identifying risks; (5) Risk analysis; (6) Risk evaluation; (7) Risk treatment; (8) Monitoring and review; and (9) Recording and reporting.

The risk management process should be an integral part of management and decision-making, and integrated into the organization's structure, operations and processes. This can be applied at the strategic, operational, program, or project level (ISO 31000:2018).

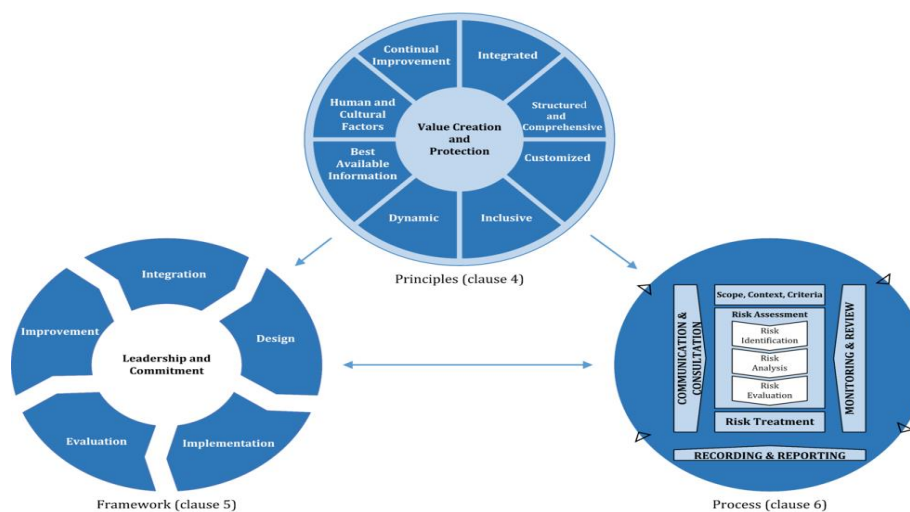


Figure 1. Principles, Frameworks, and Processes

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CORPORATE GOVERNANCE AND RISK MANAGEMENT

Implementing corporate governance is important for a company and has a direct impact on a country's economy. According to the article <https://ahmadmarogi.com/pengertian-corporate-governance-menurut-para-ahli/>, Corporate governance is the principles, values, and processes that ensure that a company operates in an ethical, transparent, and accountable. Corporate governance ensures that companies uphold the interests of all stakeholders, including shareholders, employees, consumers and the general public. Corporate governance also ensures that the company runs its business in compliance with applicable regulations and ethical standards. In the book Enterprise Risk Management, written by Adler (2020). Monk and Minow (2004) define corporate governance as the relationship among various participants in determining the direction and performance of corporations, the primary participants are shareholders, the management and the board of directors. Still in his book, written by Daniri (2014), corporate governance in a company can be realized well, if you understand the building/house of corporate governance, which consists of four parts, namely governance outcomes; governance process; governance structure and governance principles.

According to Adler (2020), corporate governance carried out by companies is a form of risk management action within the company. Lam (2014) states that corporate governance is a component of enterprise risk management (ERM). Corporate governance is a rule that must be fulfilled in order to manage the risks faced by the company, if it is not fulfilled then the risk management will not run well. Corporate governance and ERM have particular importance in the company's strategic direction, company integration and the motivation of the company's top management (Lam, 2014: 77).

RISK MANAGEMENT IN CONSTRUCTION SERVICES COMPANIES

In running its construction business, construction companies cannot be separated from business problems and risks which are managed and evaluated in the company's risk management system. In the management and risk management process, construction companies in Indonesia are guided by the Indonesian National Standard SNI ISO 31000:2018 Risk Management-Guidelines, which is an identical adoption of ISO 31000:2018, Risk Management-Guidelines, with a bilingual translation method. which was determined by the BSN (National Standards Agency) in 2018. This SNI is a revision of SNI ISO 31000:2011 Risk management principles and guidelines. Construction companies in Indonesia are very aware of corporate governance and always maintain a commitment to the effectiveness of implementing corporate governance.

In their journey, construction companies always face very rapid developments in the internal and external environment, giving rise to uncertainty which can affect the achievement of the company's goals. Through risk management, companies try to create and protect company value by minimizing the possibilities and impacts that occur and maximizing existing positive opportunities. The implementation of risk management in the Company refers to the company's risk management infrastructure based on ISO 31000:2018. With ISO 31000:2018, it emphasizes the purpose of risk management, namely creating and protecting value. This goal is realized by improving performance, encouraging innovation, and supporting target achievement. Risk management is part of governance and must be integrated into organizational processes. Implementing risk management requires leadership and commitment from top management, as well as active involvement from all members of the organization. The Company's risk management is implemented at the strategic level and operational levels. Risk management is also applied to specific projects, to assist the decision-making process.

RISK AND PERFORMANCE OF CONSTRUCTION COMPANIES

As explained above, based on the definition of risk, risk management, and corporate governance, the company's targets are very dependent on the risk management system in the company concerned. The achievement of these company targets will show the performance of the company itself, and thus the company. construction in Indonesia. For construction companies, the types of risks that can be identified as having the most influence on project and company performance are operational risk, strategic risk and financial risk. Projects cannot be separated from risks. Risk management is one of the success factors in ensuring the achievement of project objectives to improve company performance. Current theory says that the higher the level of project risk management implementation, the higher the company's performance. Wijaya & Hartono (2013) show that for projects that have a high complexity value, increasing the maturity level of project risk management will have a more significant impact on company performance compared to projects with a low level of complexity.

Agusman et al. (2021) in a literature study entitled "Review and Analysis of Risk in Building Construction Projects" show that technical risks have the greatest impact on building construction projects in both the internal and project categories. It is also important to pay attention to when working on a building construction project, namely Occupational Safety and Health because this greatly influences the cost, time and quality of the planned project.

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Prabawani (2012) showed that operational risk influenced significantly negatively the performance of the project. On the other hand, financial risk and hazard risk influence significantly positively towards the performance of the project. Meanwhile, the risk strategy influences insignificantly positively towards the performance of the project. Rustandi (2017) in his study entitled "Risk Study of the Construction Implementation Phase of the Leuwigoong Dam Irrigation Network Improvement Project". This research aims to obtain the risk factors that most dominantly influence the development of the weir irrigation area project. And how big the impact will be when construction is carried out. The method used is through surveys to determine various possible construction risks and how big the consequences or impact of the risks will be during construction. The collected data was analyzed using a descriptive method with the following stages: Risk identification, risk assessment and risk management. The research results show that the risk that has the greatest probability and impact is the risk factor of uncertainty in field conditions with a risk factor value of 0.83.

This research study aims to identify existing project risks that have occurred in several projects in Jabodetabek cities, and how they affect the achievement of project sales and profit plans, which then have an impact on achieving the company's sales and profit targets (financial performance). From the existing project risks, then analyzed, from the results of the evaluation that has been carried out by each project management, it is hoped that it will produce conclusions 1. What project risks often occur (in this case project risks are categorized), 2. Categories assess the impact of risks on the sample projects, 3. What risks have a significant impact on achieving company sales and profits, 4. How risks are often treated in projects and how effective they are.

METHOD

The method for writing this research will be descriptive qualitative. This research was conducted using secondary data taken based on risk events in several projects in *Jabodetabek* (Jakarta, Bogor, Depok, and Bekasi areas) period 2017 and 2022. A verification and clarification analysis will be carried out which will provide an assessment of the types of risks that occur (risk categories) and which risk levels occur most frequently (top rank of risk categories); risk factors and those that occur most frequently (top rank of causes); areas that cause risks and those that occur most frequently (top rank of causes areas); risk treatment methods and how the level of risk influences project performance. In this research, it will be determined that: risk categories are divided into operational; financial; legal; & marketing. Causative factors consist of external; legal; man; process; & system. Cause areas defined: design & marketing; legal; implementation; maintenance. Risk treatment strategies are determined: eliminating sources of risk; defending risks with sound decisions; changing possibilities; and changing the consequences. This is a primary data collection process that will provide verification and clarification of secondary data. From secondary data, data will be obtained in the form of project names, project risks that occur, causes of risks, impacts (-), follow-up plans (RTL), & risk levels.

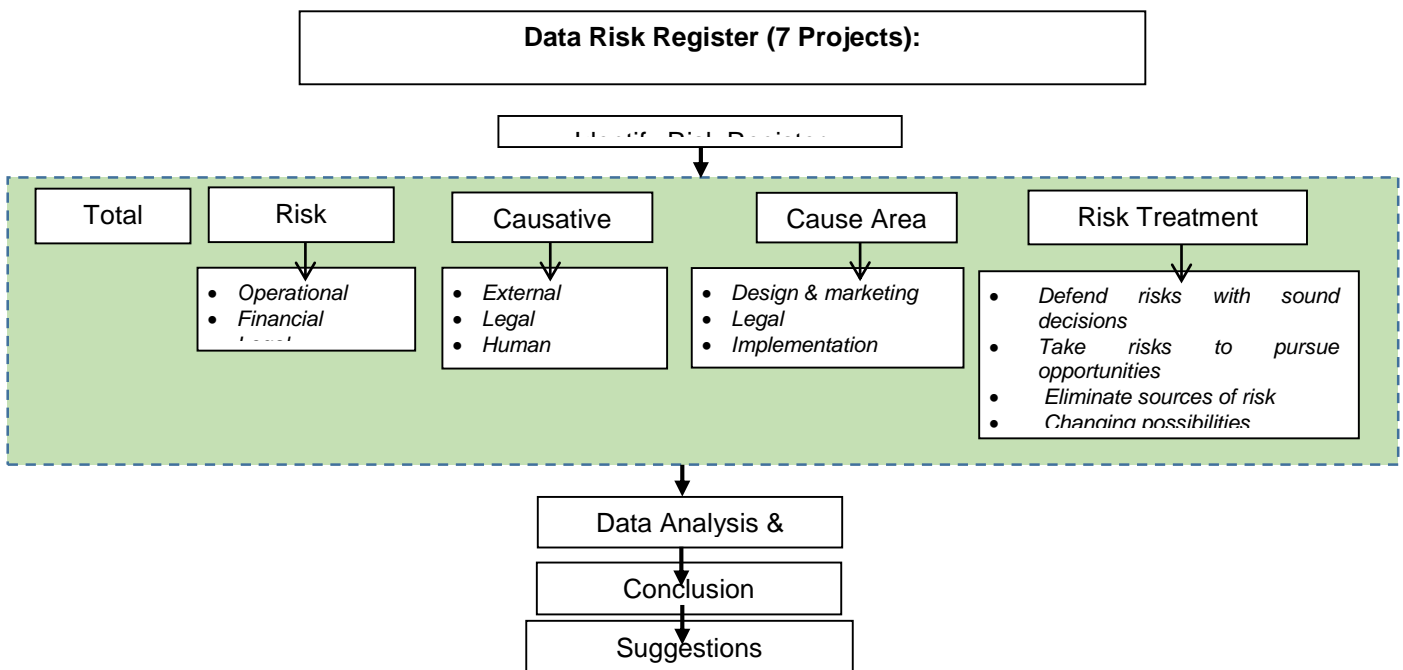


Figure 2. Conceptual Framework

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POPULATION AND SAMPLE

The population of this research is all projects that have been carried out by several construction companies in Indonesia, while the sample of this research is seven projects that have been carried out by a construction company in the *Jabodetabek* area from 2017 to 2022, both projects government, public and private companies. Below are summarized the names of seven sample projects that have been completed by a construction company from 2017 to 2022, in the *Jabodetabek* area, as follows:

Table 1. Project in *Jabodetabek* Area

No	Name of Projects	Year	Location
1	Trans Studio Cibubur	2017	Jakarta
2	Arandra Residences	2017	Jakarta
3	Domestik Hotel Terminal 3	2018	Tangerang
4	Nasdem Tower	2021	Jakarta
5	KCIC Halim Station	2021	Jakarta
6	Mantap Graha	2021	Jakarta
7	Halim Airport	2022	Jakarta

Source: Data processed. (2023).

PREVIOUS RESEARCH

There is some previous research which is relevant to this study. Chyntia Kartika Sanjaya dan Nanik Linawati (2015), The Effect of Implementing Enterprise Risk Management and Control Variables on Company Value in the Financial Sector. The sample used was 66 companies in the financial sector listed on the IDX in 2010-2013. The methodology used is multiple linear regression using the ordinary least squares (OLS) method. The results of the research are: - There is a significant influence of ERM and control variables together on company value. - Meanwhile, separately, ERM has no effect on company value, while the control variable consists of the size company and leverage influences company value.

Agusman, Hermawan Budi Prasetya, Humiras Hardi Purba (2021), Review and Risk Analysis in Building Construction Projects: Literature Study. This research was carried out by conducting an analytical study of articles, journals and literature regarding risks in building construction projects that had been carried out previously to obtain an overview of the risks that are more likely to occur and the risk management methods that have been developed. In the study, risks were grouped into 3 categories, namely: Internal Risk, External Risk and Project Risk. The results of this literature review show that technical risks have the greatest impact on building construction projects in both the internal and project categories. It is also important to pay attention to work on building construction projects, namely Occupational Safety and Health, because this greatly influences the planned costs and time as well as the quality of the project.

Bernardus Calvin, Johny Johan (2020), Risk Analysis and Prevention in the Implementation of High-Rise Building Construction Projects from the Contractor's Side. The research method was carried out by obtaining literature data from various journals and previous research, validating variables together with experts, distributing questionnaires to respondents, and then processing the data with the help of the AHP (Analytical Hierarchy Process) method to determine the priority importance of performance attributes and provides an assessment weight on the parameter scale used. The results of the data analysis showed that 21 variables were included in the high-risk category. Of the 21 variables, the most dominant risk variable is the design change variable from the owner. Appropriate preventative or control measures for this risk variable can be carried out by the contractor by providing notification to the owner that the changes to the work will affect the cost and time value of the project, and then the process must follow the contract rules used.

K. Jayasudha and B. Vidivelli (2016), Analysis Of Major Risks In Construction Projects. The study examined the awareness of professionals in the construction industry of the various types of planning techniques and tools used on construction sites, Questionnaires were administered to selected building professionals (Project Managers, Engineers, Architects), and Contractors and Sub-contractors directly involved in construction work on sites in planning and the use of planning tools and techniques as major tools for successful project execution. The data obtained were analyzed using the Statistical Package for Social Scientist for Windows (SPSS), The study shows that there is low awareness of the functional use of construction planning tools and techniques, and recommends that the use of the construction planning tools and techniques should be applied in all building projects and there should be regular adequate training of professionals on the effectiveness and improvement in Information Technology in the construction industry especially in project planning and execution.

Hemanta Doloi (2014), Cost Overruns and Failure in Project Management: Understanding the Roles of Key Stakeholders in Construction Projects. This research is intended to unfold the industrywide perception of cost performance being heavily reliant

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on the contractor's performance alone. Based on a thorough literature review and relevant industry inputs, 73 attributes associated with cost performance were identified for investigation. Confirmatory factor analysis of the combined responses across all three groups suggests that robust control procedures and adequate programming, along with efficient design and effective site management, are the most critical factors. Multivariate regression analysis performed on eight factors' scores highlighted the influence of five significant factors ($p < 5\%$) on managing cost overruns. Based on the relative importance of weighing technique on 48 selected attributes, planning and scheduling deficiencies have the highest impact on cost performance from clients, consultants, and contractors' perspectives. The findings are expected to abridge a significant knowledge gap by shifting the priorities in cost estimation and management practices across all industry sectors.

Abdussalam Shibani, Dyaa Hasan, Jalal Saaifan, Heba Sabboubeh, Mohamad Eltaip, Messaoud Saidani, Nawal Gherbal (2022), Financial Risk Management In The Construction Projects. This article aims to identify, classify and analyse the most significant risks inherent in the Lebanese construction industry with special emphasis on the financial and economic risk category and eventually establish a conclusion in this regard. The data were collected by conducting a questionnaire survey among experts in the Lebanese construction industry. The results showed that the construction industry in Lebanon is exposed to many risk sources, internal and external, and the most important ones are financial risks such as fluctuation of the currency, inflation, and lack of solvency. Finally, the importance and benefits of implementing risk management are discussed in this research as well as the barriers to its effective implementation

Karim El-Dash 1, Emad Abd-Raboh2, Zakariya El-Dars (2015), Risk Management in The Design Phase of Large-Scale Construction Projects. The study considered the distribution of the responsibility for each risk among the owner, engineer, contractor, and others. The collected data were analyzed qualitatively and quantitatively to assess the severity and effect of these events. The severity of the risks was quantified considering the probability of the risk and its impact on the project. The following risks had the highest severity with respect to the design phase: (1) Lack of coordination among different disciplines; (2) Lack of Project Management Office; (3) Owner's frequent change orders; (4) Inappropriateness of available skills with the project; (5) Lack of quality control system.

RESULT AND DISCUSSIONS

Based on secondary data obtained, in the form of the project year, project name, project location, risk items that occur, risk level, risk causes, impact (-), follow-up plan, and risk level after follow-up, as shown in the table below This:

Table 2. Trans Studio Project (Jakarta, year 2017)

No.	Risk	Level of Risk	Cause of Risk & Impact	Impact (-)	Follow-up plan	Risk after Follow-up
1.	The process through the Indonesian National Arbitrage Agency (BANI) route will continue to the court process	High	The Contractor's claim to the Owner does not meet the agreement	Planned business results in 2021 were not achieved	The contractor prepares supporting data for backup regarding back charges by the owner. Coordinate with Legal bureaus for the Claim process through court. The contractor prepares documents for the owner's anti-back charge and submits a back charge to the owner. Conduct meetings with the owner regarding owner and contractor back charge items	Moderate

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2.	There is a back charge from the owner	Extreme	There are owner claims related to defective work or final account progress	Reduced sales	The contractor prepares supporting data for backup regarding back charges by the owner The contractor prepares documents for the owner's anti-back charge and submits a back charge to the owner Conduct meetings with the owner regarding owner and contractor back charge items	High
3.	Reduction of Material in the site (MOS) and Mechanical Plumbing (MEP) value	High	There is a difference in the recognition value between the final account and the VE Owner's needs	Reduced sales	Conduct a Joint Calculation of the realization of arrivals according to the BA that has been agreed between the Owner and the Contractor Negotiate with the supplier so that it can be returned	High

Source: Data Process. (2023)

Based on Table 2 above, explains the kind of risk, level of risk, cause and impact of the risk and also the follow-up plan and the risk after follow-up. This project consists of three risks. The first, risk of this project is processed through the BANU route and will continue to the court process; the second risk is a back charge from the owner; the last risk is the reduction of MOS MEP value. These three conditions are included in the legal risk category, which has risk factors in the process and the cause of implementation areas. The risk treatment strategy for the first and second risks is to defend risks with good decisions. Lastly, we have to change the consequences for the risk of reducing MOS MEP Value.

Table 3. Andara Residence (Jakarta, year 2017)

No.	Risk	Level of Risk	Cause of Risk & Impact	Impact (-)	Follow-up plan	Risk after Follow-up
1.	Cost Overruns arise in maintenance costs and indirect costs	Extreme	The handover and BAST process exceeds the deadline at the end of 2021	Planned business results in 2021 will not be achieved	Oversee the BAST process by coordinating with the Supervisor and Owner	Moderate
2.	The owner will make a claim	High	Project completed	Decrease in margins	File an Anti-Claim if the Owner makes a Claim	Moderate

Source: Data Process. (2023)

Table 3 above, explains the kind of risk, level of risk, cause and impact of the risk and also the follow-up plan and the risk after follow-up. In the Andara Residence project, there are two risks. The first, risk of this project is cost overruns arising in maintenance and indirect cost which is included in an operational risk category. The process is the risk factor of this condition with maintenance as a causal factor area. The second risk is the owner will make a claim. This risk is included in the legal risk category. The process also caused this risk to happen. The area of causes is also a maintenance area. It can use the change of the consequences for implementing the risk treatment strategy for two risks in this project.

Table 4. Hotel of Terminal 3 Domestic Project (Tangerang, year 2018)

No.	Risk	Level of Risk	Cause of Risk & Impact	Impact (-)	Follow-up plan	Risk after Follow-up
1.	The supply chain financial	High	Payment from the Owner is	Reduced business results	Making changes to the payment system to	High

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(SCF) interest expense from the owner is borne by the Contractor at 50%	gradual, so there is a payment plan from the Owner using the SCF system	vendors from the SCF system to a conventional system
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No.	Risk	Level of Risk	Cause of Risk & Impact	Impact (-)	Follow-up plan	Risk after Follow-up
2.	There is an additional Indirect cost for 6 months	High	Change of settlement schedule from 31 July 2021 to 31 January 2022 without any change in contract value	Reduced business results	Overhead Claim to Owner	High
3.	Recognition of work progress is hampered	Moderate	Addendum 3 is still in progress	Reduced sales value to the owner	Addendum 3 was approved immediately	Low
4.	There is an increase in the indirect cost of value	Moderate	Extension of implementation time until January 31 2023	Reduced business value	Make a Claim to the Owner	Low
5.	There is an increase in tax payments to 11%	Moderate	The owner does not approve a claim	Reduced business results	Make a Claim to the Owner	Low

Source: Data Process. (2023)

Based on Table 4, explain about the kind of risk, level of risk, cause and impact of the risk and also the follow-up plan and the risk after follow-up. In the Hotel of Terminal 3 Domestic project, there are five risks identified that will be discussed. we have created risk categories for each category. First, the SCF interest expense from the owner is borne by the Contractor at 50% and is concluded as a financial risk. External factors cause this risk in the implementation area. Changing the possibilities is one of the risk treatment strategies that we can do.

The second risk, there is an additional indirect cost for 6 months. This risk is one of operational risk, where the processed factor is the cause of risk in the implementation area. We can change the possibility strategy for risk treatment. Third, the risk of recognition of work progress is hampered. The third condition includes an operational risk category in the implementation-caused area. We can change the consequences of this risk treatment strategy. The next risk on this project is there is an increase in the indirect cost Value, which includes an operational risk. The process is one of the factors of this risk in the implementation area. We can use changing the possibility as a risk treatment strategy. The last risk is a financial risk, where there is an increase in tax payments to 11%. The external factor influences this risk in the implementation area. We can also use changing the possibility as a risk treatment strategy.

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Table 5. NASDEM Tower Project (Jakarta, year 2021)

No.	Risk	Level of Risk	Cause of Risk & Impact	Impact (-)	Follow-up plan	Risk after Follow-up
1.	So there is a risk of excavation failure/landslides	Extreme	If the excavation uses the open cut method and strengthens the slope using <i>kamprot</i>	It will have an impact on reducing the Contractor's brand image, delays in implementation times and late fines	Changes in excavation methods	High
2.	The delay in completion time is 3 months	High	If the direct contractor does not perform	Additional operational costs affect business results	Additional operational costs affect business results	Moderate
3.	Delay in completing work	High	The new building permit arrived at Lt. 16, the revised IMB is still in the process	Termination of work, delays in completing work and additional costs	Correspondence with the owner and MK	Moderate
4.	Interest expense is included in the unit price	High	Changes to the internal payment system	Additional strategic material costs	Become a central burden (strategic material)	Moderate
5.	Completion of overall work and minutes of handover I will experience a setback (1 month)	Moderate	If direct sub-contact does not perform	Additional operational/overhead costs	Coordination with MK and owner	Moderate

Source: Data Process. (2023)

Based on Table 5, explain about the kind of risk, level of risk, cause and impact of the risk and also the follow-up plan and the risk after follow-up. In the NASDEM Tower project, there are five risks were identified. First, there is a risk of excavation failure caused by processed risk factors in the implementation risk area. So, we have to eliminate sources of risk. Second, the risk of delay in completion times is caused by human risk factors. We also can eliminate a source of risk as for risk treatment strategy. Third, the risk of delay in completing work is caused by processed risk factors. Changing the consequences are good choice for doing a risk treatment strategy. For three risks above include an operational risk category. Fourth, interest expense is included in the unit price is a financial risk caused by the system. We have to defend risks with sound decisions. The last is, the completion of overall work and minutes of handover I will experience a setback (1 month) including the operational risk that is caused by humans. Eliminating a source risk is one of the risk treatment strategies for this risk. All the risks in this project above are caused by the implementation area.

Table 6. KCIC Halim Station Project (Jakarta, year 2021)

No.	Risk	Level of Risk	Cause of Risk & Impact	Impact (-)	Follow-up plan	Risk after Follow-up
1.	There has been a change in steel prices	High	The steel structure design approval has not yet been approved by the planner, waiting for the steel design decision to order	SUBKON has not yet placed an Order for Material Orders in accordance with the Optimization design, so this has an impact on the price of raw steel materials for	Negotiating prices with subcontractor Coordinate and send a letter to the task giver to immediately finalize the design Proposing steel volume optimization to the task provider	High

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			materials and steel fabrication	the Medio quarter of 2021	Conduct evaluations with new competitors	
2.	The project will experience delays if the design is not completed until March 2021	High	There are designs for steelwork, architecture and MEP that are not yet final	Project completion will be delayed, sales will not go according to plan	Holding design workshops every week to speed up the design finalization process Send a letter to the assignor to speed up the finalization of the design	Moderate
3.	Changes to design drawings and optimization values were not approved	High	The structural, architectural and MEP designs are not yet final	There was a delay in work due to uncertain drawings Changes in the volume and specifications of work in the field follow the approved drawings Additional costs due to design changes Changes in the schedule of materials used	Calculating job changes with employers and submitting changed work items as additional or less work and re-price rationalization	High
4.	Addition of fireproof work items to steel structure work	High	Planners requested the use of fireproof steel paint in the 12m area above the track based on Chinese code standards. The employer received the planner's request on 25 Jan 2021. The contractor is waiting for instructions to carry out fireproof work.	Additional costs due to changes in fireproof work specifications between the initial design plan and the planner's request	Carrying out engineering design optimization by sending calculations to the task provider and coordinating with consultants and employers	High
5.	There is a change in ACP material specifications to aluminium panels	High	Change of ACP material to Aluminum Panel according to planner's request. The employer approved the design changes. The contractor is waiting for instructions to change the ACP material to an Aluminum Panel	Additional costs due to changes in design specifications between the initial plan and the planner's request	Carrying out engineering design optimization by sending calculations to the task provider and coordinating with consultants and employers	High

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6.	There were design changes from the original plan	High	The owner carried out design optimization on the Halim Station project	There was a decrease in contract turnover and a decrease in margins	Letter regarding the owner's design optimization status Conduct internal evaluation on items that can still be optimized.	High
7.	Orders for steel materials cannot yet be placed	Extreme	The design of the steelwork has not yet been decided by the planners	Sub-con proposed an escalation of the increase in steel prices	Negotiating prices with the main steel structure work subcontractors Submit design proposals to the planner Hold workshops and regular meetings to discuss design changes	High
8	The project experienced an additional construction period	Extreme	There has been no design decision from the planner and owner	Indirect Costs increase	Submit additional indirect costs to the task provider Make efficiencies in indirect costs	
9	There have been changes to the design and materials used in the Halim Station Project	Extreme	The Owner requested to optimize the balance budget for the Halim Station Project	There was a decline in contract turnover and margins	Submit a price offer according to the AD.1 design drawing Carry out specification optimization	Extreme
10	Steel price escalation	Extreme	Orders for materials and steel fabrication await optimization design decisions which have not yet been approved	Sub-con proposed a price increase because the contract price was no longer relevant	File a price adjustment claim with your employer	High
11	The budget from KSO (Joint operation) is 1.2 T, and the budget calculation (submission) from the Contractor is 1.5 T	Extreme	Design change from C1 to AD1	Descooping jobs by employers	Clarification regarding the scope of work Subcon clarification	High
12	The project experienced an additional construction period	High	There has been no design decision from the planner and owner	Additional overhead costs	Submit a time addendum and prelim claim	High
13	Planned business results in 2022 were not achieved	High	Reducing the scope and scope of roofing work	Profit is not achieved	Negotiation of final bid prices with the Division and supported by complete administrative data, especially for claims	High

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					for overhead costs and claims for book business results	
14	Profits recorded in December 2021 cannot be claimed by KSO	Moderate	The price offer according to AD.1B which includes profit claims in 2021 is not approved or the price offer is negotiated by the employer	Profits that have been recorded in 2021 will become expenses	Negotiation of the final bid price with the Division, Director of Operations and Director of Finance supported by complete administrative data, especially for claims for overhead costs and claims for book business results	High
15	Delay in work completion time	High	Until now there has been no decision on the interior design specifically for public areas, with the initial target schedule being completion in July 2022 until now there has been no consensus regarding the decision.	Work in the field related to public areas cannot yet be carried out and the process of obtaining materials/sub-cons is waiting for a fixed design	Send a letter to the employer asking for details of public area job references The PO for ceramics will be sent to the sub-conference after the design reference is fixed SPK metal ceiling after fixing interior design references	High
16	Additional implementation time for detailing and additional costs if there is a misinterpretation in detailed drawings	Extreme	The design drawings currently accepted are general drawings and not detailed, so when procurement is to be processed it requires further detailing and clarification to the planner or task provider.	Delays in implementation time and additional costs	Engineering and Commercial Coordination regarding the acquisition of sub-cons and materials	High
17	Completion time is getting narrower so acceleration is needed	Extreme	Contract addendum that has not been ratified and interior design that has not been fixed	Addition of acceleration fees	Submitting Engineering Value for items that are not yet detailed and Carrying out work priorities that are not affected and not hampered by obstructing conditions	High

Source: Data Process. (2023)

Based on Table 6 above, explain about the kind of risk, level of risk, cause and impact of the risk and also the follow-up plan and the risk after follow-up. In the KCIC Halim Station project, there are seventeen risks have been identified. This project has more risk than the other ones. First, there have been changes in steel prices is one of the operational risks caused by external risk factors

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in the implementation area. Second, the project will experience delays if the design is not completed by March 2021 is a legal risk caused by processed factors in the implementation area. Third, Changes to design drawings and optimization values that were not approved are also a kind of legal risk. It is caused by the process factor in the implementation risk area. For the first, second and third risks, eliminating sources of risk can be used to treat these risks.

Fourth, the addition of fireproof work items to steel structure work which caused by external factors. While, the fifth, there is a change in ACP material specifications to aluminium panels caused by processed factors. Two of these risks include of operational risk category in the implementation risk area. For the treatment of these risks, we can change the risk consequences strategies.

Sixth, there were design changes from the original plan in the marketing risk category caused by processed factors in the design and marketing risk area. Seventh, orders for steel materials that cannot yet be placed are included in the operational risk category that is caused by processed factors in the implementation risk area. For sixth and seventh risks also use changing possibilities as risk treatment strategies. Eighth, the project experienced an additional construction period is included in the marketing risk category caused by processed factors in the implementation risk area. For this risk, we can change the consequences as a risk treatment strategy.

Ninth, there have been changes to the design and materials used in the Halim Station Project is also includes the marketing risk category. Tenth, steel price escalation is included in an operational risk category. These risks are caused by process factors in the implementation area. We can use changing the consequences as a risk treatment strategy.

Eleventh, there is a difference between KSO and contractor budget. We can categorize this risk as a legal risk caused by process factors in the implementation area. Choosing to eliminate the source of risk is good for the treatment strategy of this risk. Twelfth, the project experienced an additional construction period is an operational risk category. It can be caused by process factors in the implementation area. Thirteenth, planned business results in 2022 were not achieved is one of marketing risk. It is caused by external factors in the implementation area. We can change the consequences of the risk treatment strategy.

Fourteenth, profits recorded in December 2021 cannot be claimed to KSO also included in marketing risk caused by process factors in the design and marketing area. Changing the consequences is one of the risk treatment strategies for this risk. Fifteenth, is a delay in work completion time, including the operational risk that is caused by process factors in the implementation area. Eliminating the source of risk can be the best risk treatment strategy.

Sixteenth, additional implementation time for detailing and additional costs if there is a misinterpretation in detailed drawings also be a legal risk. It can be caused by process factors in the implementation area. Changing the consequences will be a good risk treatment strategy. The last, seventeenth, completion time is getting narrower so acceleration is needed, it concludes in operational risk that is caused by legal factors in the implementation area. Eliminating the source of risk can be the best risk treatment strategy for this.

Table 7. Graha Mantap Project (Jakarta, year 2021)

No.	Risk	Level of Risk	Cause of Risk & Impact	Impact (-)	Follow-up plan	Risk after Follow-up
1.	Inappropriate occupancy level of non-captive saleable areas	Moderate	The market absorption rate for the marketable saleable area is below the planned value	So that it has an impact on not achieving business results	Conduct periodic market studies to determine business and marketing strategies so that the unit can be absorbed by the market and carry out operational cost efficiency to minimize the value of risks that occur	Moderate
2.	Inappropriate occupancy level of non-captive saleable areas	Moderate	The market absorption rate for the marketable saleable area is below the planned value	So that it has an impact on not achieving business results	Conduct periodic market studies to determine business and marketing strategies so that the unit can be absorbed by the market and carry out operational cost efficiency	Moderate

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to minimize the value of risks that occur.
The saleable area offer to Holding WIKA Group and other BUMN Partners

Source: Data processed. (2023)

Based on Table 6, explain about the kind of risk, level of risk, cause and impact of the risk and also the follow-up plan and the risk after follow-up. In the *Graha Mantap* project, there are two risks. First, inappropriate occupancy level of non-captive saleable areas. Second, inappropriate occupancy level of non-captive saleable areas. All of the risks are included in marketing risk that is caused by process factors in design and marketing areas. Changing the consequences.

Table 8. Halim Airport Project (Jakarta, year 2022)

No.	Risk	Level of Risk	Cause of Risk & Impact	Impact (-)	Follow-up plan	Risk after Follow-up
1.	The push and pull of strategic decision authority	High	The number of stakeholders who have an interest in the project	Delay in decision-making	Determining the priorities of decision-holders	Moderate
2.	There are areas of overlap and differences in the perceptions of these planners	High	There are additional planning vendors	Late charge	Coordination meetings with task-givers and planners	Moderate
3.	There are risks to the quality of work and repairs to new materials	Moderate	There is the use of new materials that are still commonly used in mainstream projects	Defect and repair costs	Installation of mockups and tightening work supervision	Low
4.	There is a cash flow deficit	Moderate	There are new vendors who are not used to the WIKA payment pattern	Fulfillment of payment for cash materials before delivery	Special dropping submission	Low

Source: Data processed (2023)

Based on Table 8, explain about the kind of risk, level of risk, cause and impact of the risk and also the follow-up plan and the risk after follow-up. In the project, there are four risks. The first, the push and pull of strategic decision authority is caused by human factors. Second, there are areas of overlap and differences in the perceptions of these planners that are caused by external factors. Third, there are risks to the quality of work and repairs to new materials, caused by process factors. Three of these risks are include the operational risk category that causes in the implementation area and can change the consequences as per risk treatment categories. The last, cash flow deficit is included in the financial risk category that is caused by process factors and the company should be eliminating the source of risks.

Based on the results of the analysis presented in Table 2 until Table 8 above, it can be obtained from seven projects that have been carried out in the Jabodetabek area, between 2017 and 2022, the existing risks have been grouped into 4 (four) risk categories, namely Legal risk, Operational risk, Financial risk and Marketing risk. Risk factors are categorized into: Process; Man; System; External; and Legal. Cause areas are grouped into Design & Marketing; Implementation; and Maintenance/Maintenance. The risk treatment strategies implemented are categorized into: Eliminating sources of risk; Changing consequences; Changing possibilities; and Defending risks with the right decisions. It can be summarized in the table as follows:

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Table 9. Summary of Risks

No	Project	Total Risk	Risk Category				Risk Causes				
			Marketing Risk	Legal Risk	Operational Risk	Financial Risk	Human	Process	System	Legal	External
1	Trans Studio Cibubur	3	No	2	1	No	No	3	No	No	No
2	Arandra Residences	2	No	1	1	No	No	2	No	No	No
3	Hotel Domestik Terminal 3	5	No	No	3	2	No	3	No	No	2
4	Tower Nasdem	5	No	No	4	1	2	2	1	No	No
5	KCIC Halim Station	17	4	5	8	No	No	13	No	1	3
6	Graha Mantap	2	2	No	No	No	No	2	No	No	No
7	Halim Airport	4	No	No	3	1	1	2	No	No	1

Table 9. Summary of Risk (continued)

No	Project	Total Risk	Cause of Areas			Risk Treatment Strategy			Defending Risk With the Right Decisions
			Design & Marketing	Implementation	Maintenance	Eliminating Source of Risk	Changing the Consequences	Changing the Possibilities	
1	Trans Studio Cibubur	3	No	3	No	No	1	No	2
2	Arandra Residences	2	No	No	2	No	2	No	No
3	Hotel Domestik Terminal 3	5	No	5	No	No	1	4	No
4	Tower Nasdem	5	No	5	No	3	1	No	1
5	KCIC Halim Station	17	2	15	No	6	5	6	No
6	Graha Mantap	2	2	No	No	No	2	No	No
7	Halim Airport	4	No	4	No	1	3	No	No

Source: Data Processed. (2023)

CONCLUSION

The goal or objective of a project is to achieve the project's sales and profit targets in accordance with the work plan. In a construction project, risk management is very important to carry out and implement, starting from the identification, management and evaluation process to ensure that project targets are achieved according to plan. It is very important to treat risks in the construction process at every stage of construction, starting from the tender process, design, pre-construction, construction and post-construction so that risks can be identified as early as possible and accommodated as optimally as possible. Based on the risk categories described in the sample of project events taken, which consist of marketing risk, legal risk, operational risk and financial risk, operational risk occupies the top position, the scope where undesirable events (risks) occur most frequently that have an impact on targets. and project objectives. Based on the factors that cause risk, the process is the highest factor that causes an undesirable event. The process can also be interpreted as a procedure or stage in carrying out a project. Based on the area that causes an event (risk), the implementation area or construction period is the area where undesirable events occur most frequently. This is natural, that the implementation period has the longest duration compared to the other stages, pre and post-construction. Based on the risk treatment strategy, eliminating sources of risk, changing consequences and changing possibilities are the most frequently carried out in the process of managing and evaluating risks that occur in projects. This can be due to the fact that when an undesirable event is identified, it can be said that it is more than 75% certain to occur in the field. Based on the level of risk identified, most have an extreme and high level, both before and after follow-up, this indicates that these undesirable events (risks) greatly influence the project targets being undertaken. ERM is very important for a construction company in the context of evaluating and achieving company goals and objectives. ERM carried out by a construction company is an important part of good corporate governance.

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