High Risk Factors of The Balikpapan RU-V RDMP Mega Project on Project Success

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Abstract:

A project's ability to manage risks and overcome challenges that arise during implementation can play a large role in determining its success. Project success can also be measured through the level of innovation implemented and operational efficiency achieved. This research aims to examine how natural risks, design risks, resource risks, financial risks, and legal and regulatory risks influence project success. The problem in this research is project quality problems which can result in delays in project implementation. The analysis method uses quantitative with multiple regression analysis techniques. Population of all employees on the Balikpapan RDMP Project. The sample was determined using purposive sampling, namely Leaders, Managers and Field Staff, totaling 66 employees. The research results show that the natural risk p-value is 0,000, resource risk p-value 0,044, and financial risk p-value 0.048 which means influentialsignificant negative impact on the success of the RU-V RDMP Balikpapan mega project, while the design risk p-value is 0,994and regulatory legal risk, the p-value of 0.674 has no effect on the success of mega projects.

1. Introduction

The construction industry is a sector that involves the construction and maintenance of various physical structures such as buildings, bridges and other infrastructure. In this industry, projects can cover a wide range of scales, from home construction to mega projects such as airports and toll roads. The process involves stages ranging from planning, design, construction, to maintenance. Technology is becoming an important factor in advancing the construction industry, with the use of BIM, drones and new, more efficient construction techniques. Sustainability is also a key focus, with many projects prioritizing green construction practices and the use of environmentally friendly materials. This industry involves various parties such as project owners, architects, engineers, contractors and material suppliers, and is governed by strict regulations and safety standards. Despite various challenges such as high costs and a lack of skilled work skills, the construction industry continues to adapt and develop to meet society's evolving needs (March, C., & Emmitt., 2016).

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The construction world is currently showing significant developments when viewed from a management and energy perspective. One of them that is currently developing in terms of energy is PT Pertamina Balikpapan Refinery as a subsidiary of PT Pertamina (Persero) which focuses on petrochemical and oil refining. Where the role is to manage the Balikpapan Pertamina Development Master Plan (RDMP) project refinery (Fitriani et al., 2021). Based on data released by the World Energy Council in 2014, it was stated that Indonesia has energy security at the 69th level out of 129 countries. Apart from that, data released by KPPIP in 2014 shows that currently Indonesia is producing oil for only 38 days in 2025.

The RU V Balikpapan RDMP (Refinery Development Master Plan) project is a development and expansion project for an oil refinery located in Balikpapan, Indonesia. RDMP is an effort to increase the capacity, efficiency and flexibility of existing oil refineries. In general, the RU V Balikpapan RDMP project operates in the oil and gas industry. The main objective of this project is to increase the capacity of the Balikpapan oil refinery and improve the quality of the products produced, including fuel and other oil products. RDMP projects involve multiple aspects of construction and engineering, including construction of new facilities, installation of new equipment, infrastructure upgrades, and integration of complex systems. The project also involves technology updates, energy efficiency improvements and oil production process optimization. Overall, the RU V Balikpapan RDMP project focuses on developing and modernizing oil refineries, with the aim of increasing production capacity and product quality to meet increasing market needs in the oil and gas industry.

Energy requirements in project implementation at RDMP RU V Balikpapan are increasingly complex and activities will be higher as the project progresses, therefore adequate risk control is needed. Where these risks will definitely have various characteristics and mitigations to overcome them. The various kinds of risks that exist will later be focused more on high risks (High Risk) where the handling and mitigation must continue to be monitored because it is feared that it will cause various obstacles to the progress of the project. Controlling this risk can be done by improving the quality of risk management (Spence, W. P.,2015).

The process of working on this project will take a large amount of resources and time, therefore it is important to apply risk management analysis to avoid unnecessary threats and weaknesses when implementing the system. This risk management analysis helps to minimize weaknesses and problems that will arise and cause various threats in the process so that the company can overcome threats and risks through taking appropriate actions. The implementation of risk management which is handled directly by a special team in the Risk Division in the Balikpapan RDMP Project is based on ISO "31000:2018 which is an international standard. This standard is a standard prepared to provide general guidelines and principles for implementing Risk Management.

From previous research on several projects regarding risk management, the focus was more on risk-taking behavior in the payment system in the case study of the Bali Island

Villa project, such as for contractor profits that Karina et.al (2013) carried out. Compared to managing project risk management as Novatus et.al (2016) does, where the focus is on the risk analysis process which has an impact on companies providing construction services in small-scale Manado projects. Therefore, the study carried out on this project is similar to the Balikpapan RDMP project carried out by Fitriani et al., (2021) where he carried out a study regarding the evaluation of information technology risk management based on ISO 31000:2018 in Balikpapan. From previous research, there are still gaps that need to be addressed in this research, namely optimizing risk management. Previous research has not discussed risk management related to RDMP projects in detail. New research could explore aspects of risk management including identification, analysis and mitigation of risks associated with these projects.

This mega project is a project that aims to develop the capacity of an existing oil refinery. This project is planned to be carried out in several areas owned by PT. Pertamina Persero, including at RU II Dumai, RU IV Cilacap, RU V Balikpapan, and RU VI Balongan as well as the NGRR (New Gas Root Refinery) project, where several new refineries will be built and the locations will be in the Tuban and Bontang areas. It is hoped that all of these projects will be able to realize national energy with total production reaching 1.6 million barrels per day by 2024.

Chan et al., (2022) stated that many large project failures are caused by other aspects such as the lockdown due to Covid-19 so that the distribution of materials is hampered, imperfect project planning and scheduling, slow decision making, inadequate distribution of information or data, Incomplete project planning and scheduling, and unclear coordination between parties are also factors that result in inappropriate project quality. such as social problems that often occur in the field, difficult field conditions, unfavorable weather, limited equipment, inappropriate equipment, inappropriate vendor selection and even the performance of vendors whose work methods often cause problems. Other things that exist could also be aspects of design and documentation that are not of suitable quality, field systems that are not integrated, working drawings that are not clear, and specifications that are difficult to understand.

Syaranamual et al., (2022) explained that every construction project will of course continue to have the possibility of various kinds of risks occurring. When the complexity of a project is higher, the level of risk that the project bears will also be greater. The various risks in question have a real influence on the success of a construction project. Syaranamual et al., (2022) show that various things are factors that cause risk and determine the success or failure of a construction project, including: natural disaster risk, financial risk, legal risk, and resource risk where construction risk has a valuable influence. same on the success of the construction project. However, the risk factor that has the greatest influence on the success of a construction project is financial risk.

In the construction sector, the possibility for various types of risks to occur will of course continue to exist. These risks have a real impact on the success of a project. Therefore, it is important to know and analyze various factors that will influence the

success of a project, so that in the end the failure rate of a project can be minimized. So, it is necessary to carry out an analysis process related to.

Gap phenomenon

What happens is that in the implementation of mega projects, both during the implementation period and during the maintenance period, there are many improvements in work results and obstacles which reflect the poor quality performance of project implementation. There are many risk aspects at the project implementation stage that can cause production quality failures and a number of these factors are likely to be caused by the HR component. Project quality problems that can lead to delays in the implementation of this project, are the same as what happens to all work in the project in all divisions in this RDMP mega project. Based on data obtained from the Risk Team for a mega RDMP project, it was recorded that from 2020 there were several high risks that were always a major concern whose value was quite significant and resulted in delays during the ongoing project implementation.

This study is also based on the existing research gap, where Syaranamual et al., (2022) show that legal risk and financial risk have a real influence on the success of a project, however Joni, (2012) shows that legal risk and financial risk do not have an influence on the success of a project.

2. Theoretical Background

Internal and External Project Factors

In reality, implementing a construction project cannot be separated from many problems, both external and internal, which will affect project performance. Where variables from internal factors can come from the project starting from consultants or contractors, planners, and owners (users). Meanwhile, variables from external factors come from outside the construction project consisting of the competitive socio-political, technological and macroeconomic environment (Kwak, 2002). According to previous research, internal and external project factors can be classified into groups. It is important to understand and manage these factors effectively to increase project success. Changes inside and outside the project can require adjusting appropriate strategies and actions to minimize negative impacts and maximize positive results (Syaranamual et al., 2022).

Natural Risks

Natural factors relate to situations that are not under the control of government development or projects such as terrorist acts, civil strife, military coups, war, and natural disasters (Kwak, 2002). Natural risks, which are divided into indicators of bad weather, natural disasters, environmental damage and fire, can have their impact minimized through an initial anticipatory planning process for disasters that might occur on construction projects, where this can be implemented by providing a special budget and also making schedule plans. work that is based on the main objective of minimizing the risks that have been mentioned, or by creating insurance for work and construction buildings during operational times where the third party acts as an anticipator in the event of a disaster (Kwak, 2002).

Design Risk

Design risk, which is divided into indicators of differences in drawings and specifications, difficulties in using technology, changes in field conditions and changes in design, can be reduced by obtaining an explanation accompanied by the results of studies and analysis regarding the planned design and coordinating with the planner beforehand. more intensive (Memon et al., 2011).

Resource Risk

Resource factors include equipment, labor and materials, namely the core of the construction industry which is a large part of the project value. Labor is a resource with detailed roles for the success of a project. Unless there is adequate recruitment of unskilled and skilled labor, proper allocation and management of human resources will not result in good results. Equipment has a positive element compared to human resources which can continuously work and require facilities and little human power. (Memon et al., 2011).

This resource risk is divided into indicators of damage/delay/loss of various construction equipment, damage/delay/loss of construction materials, required labor not being available, and difficulty in accessing the project location. The impact can be minimized through the process of making schedules or records regarding equipment, materials. , as well as the labor needed during the project and also making plans for access options on a project.

Financial Risk

Financial risks which are divided into indicators of changes in currency values, failed project cash flows, inappropriate cost estimates and inflation can be reduced by the impact that arises through the process of controlling the financing of a construction project, and the real action that can be taken is by adding up the costs of income and expenses. , the overall cost budget, where the funds can then be controlled when currency values change and inflation occurs so that there is no cash flow failure on a construction project. This financial risk can also be transferred to the owner if there is an increase in prices as stated in the contract. Contractors are required to be able to calculate all possibilities that occur without exception of price increases before a job offer is submitted Chan et al., (2022).

Legal and Regulatory Risks

The best legal and regulatory risks related to difficult licensing indicators, unfulfilled legal conditions and requirements, problems with various contract parties, the contents and types of failed contracts as well as changing trade-related regulations can be minimized through a coordinated procurement process. well and selecting various parties who will be directly related to project work who have good responsibilities and qualifications when the project is being implemented.

Project Success

A construction project is a project related to efforts to create an infrastructure building, which basically includes basic work which also includes the architectural and civil

fields. Where project success can be interpreted as all the things that are expected to be achieved, anticipating all project requirements and having sufficient resources to fulfill all needs. (Dipohusodo, 1996).

Another definition of project success is that results exceed those expected or situations that are considered normal for matters related to other accompanying satisfaction, safety, quality, time and costs. (Asley et.al, 1987). The success of a project is divided into two factors, namely (Kerzner, 1995):
- These Primary Factors include: (a) The project is on time, (b) The budget is appropriate (Project Budget) (c) There is alignment with quality
- These Secondary Factors include: (a) The user can accept the project (Project Owner), (b) The user name can be allowed to be used.

The project success criteria themselves can be measured by considering several criteria, namely (Chan et al, 2022): (a) Cost, every project running well can be assessed from the financing assessment, where this is a criterion for success, and it is also known that the budget Financing and also cost estimates that are made correctly are one of the success factors (Abrar, 2008). (b) Quality, quality is an important factor in the criteria for determining the success of projects that are included in the quality management process (Kendrick, 2003). (c) Time, time is one of the most important standards of project success for each project which is used as a reference for success (Cleland, et.al, 2002), (d) Satisfaction of the Parties, Both external and internal there are parties who feel satisfied including contractor, owner or user, and the final result which is the criteria for project success (Westerveld, 2003). (e) Health, Work Safety and Environmental Impact; Occupational safety and health include success which also includes costs, time and quality. K3 is important because it is a crucial result for achieving project goals where maximum results will be achieved without ignoring the level of work safety (Husen, 2011).

From the 5 criteria factors above, for this research measurements were taken in terms of the criteria of time control (schedule). In accordance with the progress of each job, to understand the possibility of deviations in a report. This means that the existing time plan can be used as a reference for implementation in understanding work progress.

Relationship Between Research Variables
Natural Risks on Project Success
Natural risks can influence the success of a project, natural risks can minimize their impact through an initial anticipatory planning process for disasters that might occur on a construction project, where this can be implemented by providing a special budget and also planning a work schedule based on the main objective, namely minimizing the risks that have been mentioned, or by creating insurance for construction work and buildings during operational times where the third party acts as an anticipator in the event of a disaster (Joni, 2012).

The results of research from Joni, (2012) prove that natural risks have a significant influence on the success of a project. Through the implementation of risk

management, it is hoped that negative influences in the construction work process can be reduced and minimize losses in time, costs and quality of work. All industry players have begun to understand the importance of paying more attention to risks in the various projects they undertake because errors in making estimates and resolving risks will certainly have a negative impact, either directly or indirectly. This risk can cause funding to swell and work completion schedules to be delayed, showing that natural risks have a real impact on the success of a project (Fitriani et al., 2021).Based on the explanation previously mentioned, the following formulation of hypothesis 1 can be obtained:

H1: Natural risks have a significant effect on project success

Design risk has a significant effect on project success

Design risks can affect the success of a project, design changes can be reduced by obtaining explanations accompanied by the results of studies and analyzes regarding the planned design and coordinating more intensively with the planners in advance (Sandyavitri, 2008). Sandyavitri, (2008) shows that design risk has a significant effect on the success of a project.

Through the implementation of risk management, it is hoped that bad influences in the construction work process can be reduced and minimize losses in time, costs and quality of work. All industry players have begun to understand the importance of paying more attention to risks in the various projects they undertake because errors in making estimates and resolving risks will certainly have a negative impact, either directly or indirectly. This risk can cause funding to swell and the work completion schedule to be late (Joni, 2012). Joni, (2012) shows that design risk has a significant effect on project success. Based on the explanation mentioned previously, the following formulation of hypothesis 2 can be obtained:

H2: Design risk has a significant effect on project success

Resource Risks to Project Success

Resource risks can influence the success of a project, resource risks can be minimized through the process of making schedules or notes regarding the equipment, materials and labor needed during the project and also planning access options for a project. The contractor makes a schedule and work methods related to the needs and arrival of materials, equipment and labor which are in line with the scope and time of project implementation. If necessary, the contractor can create an overtime work agenda to anticipate all work that requires a lot of labor, for example during casting work where this is intended to fulfill the progress that has been made in the plan (Syaranamual et al., 2022). Syaranamual et al., (2022) show that resource risk has a significant effect on the success of a project.

The contractor makes a schedule and work methods related to the needs and arrival of materials, equipment and labor which are in line with the scope and time of project implementation. If necessary, the contractor can create an overtime work schedule to anticipate all work that requires a lot of labor, for example during casting work where this is intended to fulfill the progress that has been made in the plan. The security of the project area must be improved to prevent the loss of construction materials or

equipment through the process of installing a project safety fence which also includes the assistance of special officers to supervise the entry and exit points of the project and also provide assistance in the process of regulating the exit or entry of vehicles and equipment. production so that traffic jams can be avoided around the project area. Arrangements for the flow of vehicles and construction equipment in and out must be planned so that the work of a construction project does not encounter obstacles (Yudhaningsih et al. (2022). Yudhaningsih et al. (2022) shows that resource risk has a significant effect on the success of a project.

Based on the explanation previously mentioned, the following formulation of hypothesis 3 can be obtained:

H3: Resource risk has a significant effect on project success

Financial Risks to Project Success

Financial risk can have an influence on the success or failure of a project, where financial risk can be reduced by the impact that arises through the process of controlling the financing of a construction project, and the real action that can be taken is by adding up the total costs of income, expenditure, and budget costs, where next the funds This can be controlled when currency values change and inflation occurs so that cash flow failure does not occur on a construction project. Showing that financial risk has a significant effect on the success of a project (Syaranamual et al., 2022).

Risk is a situation that arises because there are uncertain circumstances related to the chance of an event which, when it occurs, will result in consequences that will not provide benefits. More deeply, risks in a project are all conditions in a project that arise because there are uncertain circumstances regarding the chance of an event occurring which, when it occurs, will result in physical or financial consequences that will not benefit efforts to achieve project goals. namely financing, time and project quality (Parulian, 2021).

Finance is the preparation of funds carried out by the contractor to produce the desired product starting from payment of wages, procurement of materials, equipment operations and various other things so that the related product can be used optimally for the purpose of the project. Based on Parulian's opinion, (2021), finance/capital is an element of project resources used in the installation development process or producing the desired project product, starting from spending on feasibility studies, engineering design, procurement, manufacturing, construction until the installation or product is useful. optimally.Parulian, (2021) shows that financial risk has a real influence on the success of a project. Based on the explanation previously mentioned, the following formulation of hypothesis 4 can be obtained:

H4: Financial risk has a significant effect on project success

Legal and Regulatory Risks on Project Success

Legal and regulatory risks can influence the success of a project, legal and regulatory risks can be minimized through a good coordination procurement process and selecting various parties who will be directly related to project work who have good responsibilities and qualifications when the project is being implemented (Christin et

al. al., 2021). Christin et al., (2021) show that legal and regulatory risks have a significant influence on the success of a project.

Naturally, construction work itself will always contain problems. Various reasons were found that resulted in delays in the implementation of construction projects. These include rework, strikes, poor organization, lack of materials, failed equipment, requests for change, the Act of God, etc. Delays in construction are mostly caused by delays in the payment process, contractor financing during construction, changes in design, owner precautions, not finding contract professionals/management, as well as various other factors found in Egypt (Abd El-Razek et al 2008). Additionally, construction project delays are often interconnected, making the situation more complex. so it has the potential to become a legal problem. Syaranamual et al., (2022) show that legal risk has a significant effect on project success,

Based on the explanation mentioned previously, the following formulation of hypothesis 5 can be obtained:

H5: Legal and regulatory risks have a significant effect on project success

Framework of thinking

It is hoped that the results of this study can provide input to other academic fields to serve as a source of additional information for various subsequent research, and for all parties involved in the construction sector to be able to pay more attention to risk factors that can influence the success of their projects. The framework of thinking in this study can be shown in Figure 1 as follows:
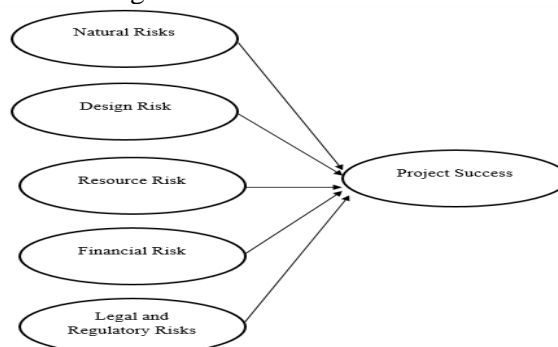

Figure 1. Thinking Framework

3. Methodology

This research design involves the use of quantitative research methods, where the research approach collects data in the form of numbers and applies statistical analysis to answer research questions (Ghozali., 2016). The population of this research is employees of the Balikpapan RDMP Project. The sampling technique used was non-probability sampling with a purposive sampling technique as follows: Leaders, Managers and Field Staff at the Balikpapan RDMP Project totaling 66 employees. The data analysis technique is multiple regression analysis to obtain estimates regarding the causal relationship between variables that have been determined and are based on theory. Analysis was used assisted by the SPSS statistical application

program. The data collection procedure involves the use of primary data through filling out questionnaires by respondents, and secondary data obtained through references relevant to the research title.

The reason this quantitative method is suitable for use in this research is because using this approach is more structured and produces quantitatively measurable data. This allows researchers to minimize subjectivity bias in data collection and analysis. This method provides an opportunity to test hypotheses objectively and draw conclusions based on empirical evidence.

4. Empirical Findings/Result

Descriptive Identity of Respondents

The research results from the identity of the respondents were 66 respondents asLeaders, Managers and Field Staff at the Balikpapan RDMP Project. The identity of the respondents is known to be predominantly male, as many as 61 people, based on age, 44 people are more dominant in the 35-40 year age range, 11 people have the most dominant length of work, 16-20 years. As follows.

Table 1. Respondent Identity

No.	Gender	Frequency	Percentage
1	**Gender**		
	Man	61	92.42%
	Woman	5	7.58%
2	**Age**		
	30 - 35 Years	8	12.12%
	35 - 40 Years	44	66.66%
	>41 Years	14	21.21%
3	**Length of work**		
	11-15 Years	11	16.66%
	16-20 Years	44	66.66%
	>20 Years	11	1.66%

Data Normality Test

To determine the normality of data using the Kolmogorov-Smirnov test, the significance value must be above 5% (Santoso, 2004). Testing the normality of the data using the following Kolmogorov Smirnov test:

Table 2. Kolmogorov-Smirnov

		Unstandardized Residuals
N		66
Normal Parameters, b	Mean	,0000000
	Std. Deviation	,39140268
Most Extreme Differences	Absolute	,060
	Positive	,051
	negative	-,060

Statistical Tests	,060
Asymp. Sig. (2-tailed)	,200c,d

Source: Data results processed

The sample results in table 2 show that the variables are normally distributed, where the Kolmogorov-Smirnov ratio of 0.200 is greater than 0.05. Then it is also proven by the results of the histogram normality test, showing that the graph is on the curve of the histogram bell line which shows that the data is normally distributed.
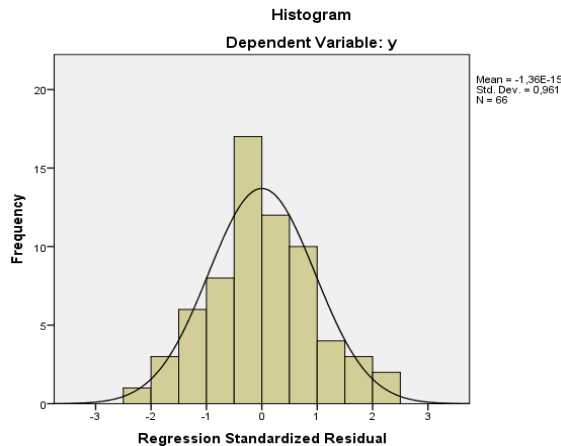

Figure 2. Normality Histogram
Source: Data results processed

Model Test (F test)
Overall regression testing is carried out using the F test. This test is carried out using a significance level of 5%.

Table 3. F-test

Model		F	Sig.
1	Regression	25,473	,000b
	Residual		
	Total		

a. Dependent Variable: y
b. Predictors: (Constant), X5, X1, X2, X4, X3

The results of the f-test test which shows the feasibility of the model has an estimated F value of 25.473 where the significance is 0.000, meaning that when the calculated F value is 25.473 it is above the F table (1.96) and the significance value is below the value of 0.05, namely 0.000 , then an indication is obtained that the model is worthy of research.

R2 Test (Coefficient of Determination)
The coefficient of determination is classified as an indication of the magnitude of the influence of the independent variable on the dependent variable. The coefficient of determination value is shown by the adjusted R2 value.

Table 4. Coefficient of Determination

Model	R	R Square	Adjusted R Square

1	,824a	,680	,653

Source: Output of Multiple Regression Analysis Results (2023)

The coefficient of determination is classified as an indication of the magnitude of the influence of the independent variable on the dependent variable. The coefficient of determination value is shown by the adjusted R^2 value. The results of this study provide an adjusted R^2 value of 0.653. This indicates that 65.3% of project success can be explained by natural risks, design risks, resource risks, financial risks, and legal and regulatory risks, while the remaining 34.7% of project success is influenced by other variables not included in the model. This. This provides an indication that project success is not only caused by the influence of natural risks, design risks, resource risks, financial risks, and legal and regulatory risks, but there is also the influence of other variables.

Partial Test (t test)

The t test and the need for regression analysis, linear regression analysis is used in this study with the aim of gaining knowledge regarding the presence or absence of the influence of independent variables (Imam Ghozali, 2001). The regression equation for analysis in the first model can be explained as follows:

Project Success (Y) = -0.721 Natural Risk (X1) + 0.001 Design Risk (X2) – 0.159 Resource Risk (X3) – 0.124 Financial Risk + 0.057 Legal and Regulatory Risk

Based on the equation above, it can be explained that natural risk reduces project success by 0.721, the direction of the negative regression coefficient shows that there is a negative influence of natural risk on project success. This indicates that natural risks show the strongest influence than design risks, data source risks, financial risks and legal and regulatory risks. The t test results in equation 1 can be explained as follows:

Table 5. T-test results

Model		Unstandardized Coefficients		t	Sig.
		B	Std. Error		
1	(Constant)	,706	,478	1,478	,145
	Natural Risks	-,673	,086	-7,808	,000
	Design Risk	,001	,172	,008	,994
	Resource Risk	-,152	,071	-2,136	,044
	Financial Risk	-,123	,059	-2,077	,048
	Legal and Regulatory Risks	,060	,142	,423	,674

a. Dependent Variable: Project Success

The results of the analysis in table 5. Above will be summarized and explained in table 5, the hypothesis conclusions are as follows:

Table 6. Hypothesis Conclusion

Hypothesis	B	t-count	Sign	Information
Natural Risks influence Project Success	-,721	-7,808	0,000	H1 Accepted*
Design Risk influences Project Success	,001	,008	0.994	H2 Rejected
Resource Risk affects Project Success	-,159	-2,136	0.044	H3 Accepted**
Financial Risk influences Project Success	-,124	-2,077	0.048	H4 Accepted**
Legal and Regulatory Risks influence Project Success	,057	,423	0.674	H5 Rejected

Source: Regression output results, 2023

Natural risk is the most dominant variable influencing project success, this can be seen from the largest beta value, namely 0.721, this gives an indication that the Leaders, Managers and Field Staff at the Balikpapan RDMP Project need to mitigate natural risks better. From table 5. it is discussed as follows:

1. **Influence of Natural Risk (X1) on Project Success (Y)**

   Partial testing of variable X1 (natural risk) has a regression coefficient value of -0.721, the calculated t value is 7.808 where the significance value is 0.000. The calculated t value, namely 7.808, is above the t table value (1.96) and the significance value is below the value of 0.05, namely 0.0001, so Ho is rejected and Ha is accepted. This shows that natural risk variables have a real impact on project success, so hypothesis 1 can be accepted.

2. **Effect of Design Risk (X2) on Project Success (Y)**

   Partial testing of the variable X2 (Design Risk) has a regression coefficient value of 0.001, the calculated t value is 0.008 where the significance value is 0.994. The calculated t value is 0.008 which is smaller than the t table (1.96) and the significance value is greater than 0.05, namely 0.994, then Ho is accepted and Ha is rejected. This shows that the design risk variables do not have a real impact on project success, so hypothesis 2 can be rejected.

3. **Influence of Resource Risk (X3) on Project Success (Y)**

   Partial testing of variable X3 (resource risk) has a regression coefficient value of -0.159, the calculated t value is -2.136 where the significance value is 0.044. The calculated t value is -2.136 which is above the t table value (1.96) and the significance value is below the value of 0.05, namely 0.044, so Ho is rejected and Ha is accepted. This shows that the resource risk variable has a real impact on project success, so hypothesis 3 is accepted.

4. **Influence of Financial Risk (X4) on Project Success (Y)**

   Partial testing of variable X4 (financial risk) has a regression coefficient value of 0.124, a calculated t value of 2.077 where the significance value is 0.048. The calculated t value, namely 2.077, is above the t table value (1.96) and the significance value is below the value of 0.05, namely 0.048, so Ho is rejected and Ha is accepted. This shows that the financial risk variable has a real impact on project success, so hypothesis 4 is accepted.

5. **Influence of Legal and Regulatory Risk (X5) on Project Success (Y)**

   Partial testing of the variable The calculated t value is 0.423 which is smaller than the t table (1.96) and the significance value is greater than 0.05, namely 0.674, so

Ho is accepted and Ha is rejected. This shows that the legal and regulatory risk variables do not have a real impact on project success, so hypothesis 5 can be rejected.

5. Discussion

Natural Risks influence Project Success

The research results show that there is a significant negative influence of natural risks on the success of a project, where risks caused by nature can interfere with the success of a project. The direction of the negative regression coefficient shows that there is a negative influence of natural risk on project success. This provides an indication that project risks caused by nature can make the project unsuccessful. Natural risks can influence the success of a project, natural risks can minimize their impact through an initial anticipatory planning process for disasters that might occur on a construction project, where this can be implemented by providing a special budget and also planning a work schedule based on the main objective, namely minimizing the risks mentioned, or by creating insurance for construction work and buildings during operational times where the third party acts as an anticipator in the event of a disaster. The research results support Joni, (2012) who shows that natural risks have a significant negative effect on the success of a project.

Design Risk influences Project Success

The research results from descriptive statistical calculations show that the average natural risk is 3.8030 with a standard deviation (SD) of 3.87524; These results show that the SD value is greater than the average natural risk, but shows a small range of values which in the end causes natural risk to have no effect on project success.

Hypothesis two which shows that there is a significant negative influence of natural risks on the success of a project is rejected, where the risks caused by design changes do not affect the success of a project. As long as design changes can be reduced by obtaining an explanation accompanied by the results of studies and analysis regarding the planned design and coordinating more intensively with the planners first, there will be no risk. The results of this study do not support Sandyavitri, (2008).

Resource Risk affects Project Success

The research results show that there is a significant negative influence of resource risk on the success of a project, where risks caused by resources can interfere with the success of a project. The direction of the negative regression coefficient shows that there is a negative influence of resource risk on project success. This provides an indication that project risks caused by resources cause the project to be unsuccessful. Resource risks can influence the success of a project, resource risks can be minimized through the process of making schedules or notes regarding the equipment, materials and labor needed during the project and also planning access options for a project. The results of this research support Syaranamual et al., (2022) who show that resource risk has a significant negative effect on the success of a project.

Financial Risk influences Project Success

The research results show that there is a significant negative influence of financial risk on the success of a project being accepted, where risks caused by financial problems can interfere with the success of a project. The direction of the negative regression coefficient shows that there is a negative influence of financial risk on project success. This gives an indication that the risks caused by financial problems make the project unsuccessful. Financial risks can be reduced by the impact that arises through the process of controlling the financing of a construction project, and the real action that can be taken is by adding up the total costs of income, expenditure, budget costs, where then these funds can be controlled when currency values change and inflation occurs so that there is no failure of cash flow on a construction project. The results of this research support Syaranamual et al., (2022) who show that financial risk has a significant effect on the success of a project.

Legal and Regulatory Risks influence Project Success

The results of descriptive statistical calculations show that the average legal and regulatory risk is 4.0114 with a standard deviation (SD) of 4.05988; These results show that the SD value is greater than the average legal and regulatory risk, but shows a small range of values which in the end means that legal and regulatory risk does not show an influence on project success.

Hypothesis five which shows that there is a significant negative influence of legal and regulatory risks on the success of a project is rejected, where the risks resulting from changes in laws and regulations do not affect the success of a project. As long as changes in laws and regulations impact can be minimized through a good coordination procurement process and selecting various parties who will be directly related to project work who have good responsibilities and qualifications when the project is being implemented. The results of this study do not support Christin et al., (2021).

6. Conclusions

Based on the results of multiple regression analysis and discussion, the following conclusions are presented:

1. Natural risks have a significant negative influence on project success, this shows that risks caused by nature will make the Balikpapan RDMP project unsuccessful.
2. Design risks do not have a significant influence on project success, this shows that the risks caused by design do not influence whether the Balikpapan RDMP project is successful or not.
3. Resource risk has a significant negative influence on project success, this shows that the risk caused by resource errors will make the Balikpapan RDMP project unsuccessful.
4. Financial risk has a significant negative influence on project success, this shows that risks caused by financial problems will make the Balikpapan RDMP project unsuccessful.

5. Legal and regulatory risks do not have a significant influence on project success, this shows that the risks caused by laws and regulations do not influence whether the Balikpapan RDMP project is successful or not.

Managerial implications

The following are presented managerial implications that can be improved for the company:

1. The risk study on the Balikpapan RDMP project must be carried out optimally so that the Balikpapan RDMP project is carried out in line with schedule and in line with planned financing.
2. This risk management must be carried out optimally and supported by many parties so that the risk-based Balikpapan RDMP project can be implemented well.
3. This study must be developed in more depth so that it becomes better and useful, especially for the Balikpapan RDMP project and in the end, development in this nation can be carried out optimally and all people can experience greater benefits in the future.

Limitations and Suggestions for Future Research

Various study limitations that can be drawn from this study include:

1. The limitations of the study modeling are still relatively low, where the variables that provide an explanation for the success or failure of the Balikpapan RDMP project are shown by the coefficient of determination values which tend to be small.
2. All the results of this study and the various limitations obtained in the study can be a source of ideas for developing studies in the future, so that the expansion of the study suggested in this study is adding independent variables that can have an influence on project success. The recommended variables are: economic risk, material risk and so on.

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