Risk Factors Identification of Office Building Construction Project in BPJS Ketenagakerjaan to Improve Time Performance

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Abstract- Several office building constructions within BPJS Ketenagakerjaan during the last 5 (five) years have experienced delays in project completion. The delay is because the process of controlling the construction of office buildings has yet to be developed based on risk. The method uses gap and qualitative risk analysis to determine the dominant risks during the construction life cycle and develop them with risk management based on PMBOK 6th edition. By conducting assessments and analyses related to dominant risk factors at each stage of the office building construction project's life cycle in BPJS Ketenagakerjaan that impacts on-time performance and then formulates a risk response for each of these dominant risks. The results of this study are the dominant risk factors at each stage of the life cycle of the office building construction project in BPJS Ketenagakerjaan.

Index Terms- Project management, Time performance, Project delay, Risk Management

I. Introduction

With investment management funds and participation program management with significant value, BPJS Ketenagakerjaan continues to develop and innovate in setting standardization of office buildings and customer service areas to improve the brand image. As well as providing excellent service to participants by making changes to the appearance/facade of the building, space requirements and standardization under management policies or changes in organizational structure.

A. Background

The object of the research is a Public Legal Entity, as well as the development of guidelines for controlling the construction of Office Buildings within the BPJS Ketenagakerjaan (owner's perspective) as a social security organization for workers in Indonesia on a risk-based basis to improve time performance, with a risk-based approach. At each stage of the project life cycle, it is necessary to carry out risk management.

As one of the organizers of social security in Indonesia, stipulated by Law No. 24 of 2011 concerning Social Security Administering Bodies, PT Jamsostek (Persero) transformed into BPJS Ketenagakerjaan. BPJS Ketenagakerjaan organized the social security program for workers, including Accident Insurance Work, Death Benefits, and Old Age Benefits. Furthermore, in 2015 held a Pension Guarantee program (JP). BPJS Ketenagakerjaan's vision is to realize reliable, sustainable, and prosperous employment and social security for all Indonesian workers.
BPJS Ketenagakerjaan's missions are:
1. To protect, serve & prosper workers and their families.
2. To provide a sense of security, ease & comfort to increase participant productivity and competitiveness.
3. To contribute to the nation's development and economy with good governance.

The total of 337 offices throughout Indonesia consists of 1 head office unit, 11 regional office units, 123 branch office units, and 202 Pratama branch office units. BPJS Ketenagakerjaan also contributes to the nation's development and economy by implementing good governance.

There are several cases of office building construction delays and problems raised by the mass media which can impact the reputation risk of BPJS Ketenagakerjaan. The cause of project delays is the lack of good project management by the project's owner or contractor, causing construction delays and additional costs for both parties (Truman & King, 2018). A case study conducted in

Indonesia found that projects often experience delays caused by owners and contractors, architects, sub-contractors, and consultants (Zetta. R, 2017).
Based on the delay indications and the impact of the project delay for BPJS Ketenagakerjaan, it is necessary to develop risk-based project management. To determine the dominant risk in the BPJS Ketenagakerjaan office building project to reduce the possibility and impact of adverse risks and to optimize the chances of project success.

B. The objective of The Study

This research aims to provide input to BPJS Ketenagakerjaan as the project owner in developing the existing project management guidelines to improve time performance in project completion. By using risk management to (1) Identify the stages and activities in the life cycle of the BPJS Ketenagakerjaan office building projects; (2) Identify influencing risk factors based on data from office building construction projects within BPJS Ketenagakerjaan, and at each stage of the project life cycle that may affect time performance.

C. Limitations

The study is limited in the following respects (1) The object of research is the office buildings construction/renovation at BPJS Ketenagakerjaan (2) The risks analyzed are risks related to the office buildings construction/renovation. (3) The construction projects are from initiating the work plan until the physical Handover of the building. (4) This research's perspective is from the owner's side.

I. LITERATURE REVIEW

1. Office Buildings Projects

Office building projects are essential to the country's development (Yap, Chow, & Shavarebi, 2019). However, the construction of an office building has associated risks, and it is necessary to identify the dominant risks that may arise so that mitigation is necessary to minimize the risks that can occur in each phase of the project life cycle.

According to PMBOK Guide 6th edition, the project life cycle is the series of phases a project goes through from start to completion. It provides a basic framework for managing projects, regardless of the specific project work involved. Stages can be sequential, repeating, or overlapping, and all projects can be mapped to a typical life cycle shown in Figure 1 (PMI, 2017).

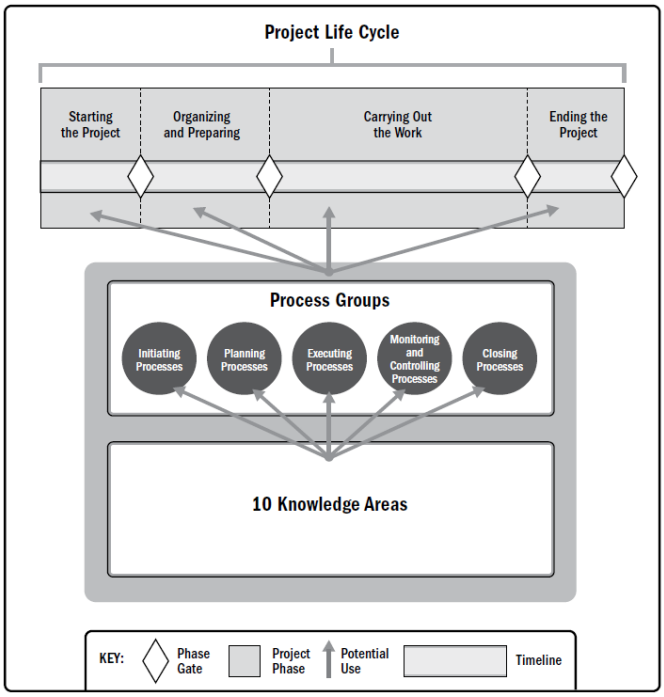

Figure 1. Project Life Cycle
Source: PMBOK Guide 6th edition (PMI, 2017)

2. Project Time Performance

Managing projects in time, cost, and performance is more accessible said than done. The project management environment is highly volatile and includes multiple meetings, reporting, conflict resolution, ongoing planning and re-planning, customer communications, and crisis management. Disciplined time management is one of the keys to effective project management. The project manager cannot control his own time and will not hold anything else on the project. (Kerzner, H, 2003).

Generally, a project delay is when the work is finished outside the estimated timeframe, and most construction projects experience time overrun. Delay is when a construction project slows down without stopping, while suppression is a project termination directed from the owner to the contractor. The time delay is based on two methods: a non-excusable delay (Non-Excusable Delay) and an excusable delay (Akhun, MA, 2017).

3. Risk Management

Risk Management at BPJS Ketenagakerjaan is stipulated by the Board of Directors Regulations and is a confidential document whose use is limited only to the internal BPJS Ketenagakerjaan. BPJS Ketenagakerjaan risk management policies are prepared based on applicable regulations and provisions and ISO 31000:2018 Risk Management Guidelines. According to ISO 31000:2018, risk management is part of governance and must be integrated into organizational processes. Risk management aims to create and protect value, which is realized by improving performance, encouraging innovation, and supporting target achievement.

According to PMBOK 2017, project risk management includes carrying out risk management planning, identification, analysis, response planning, response implementation, and risk monitoring on projects. Project risk management aims to increase the likelihood and impact of native risks and reduce the probability and impact of adverse risks, to optimize the chances of project success.

4. Risk Factors in Office Building Construction

Identify risks in office building construction projects within BPJS Ketenagakerjaan with risk categorization to identify risks using the Risk Breakdown Structure (RBS) as illustrated in Figure 2. RBS is a hierarchical representation of potential risk sources that can cause problems and affect project objectives. Risk factors play an essential role in determining the success of project implementation. This research will develop an office building project strategy by evaluating dominant risk events throughout the project life cycle using a risk management approach.

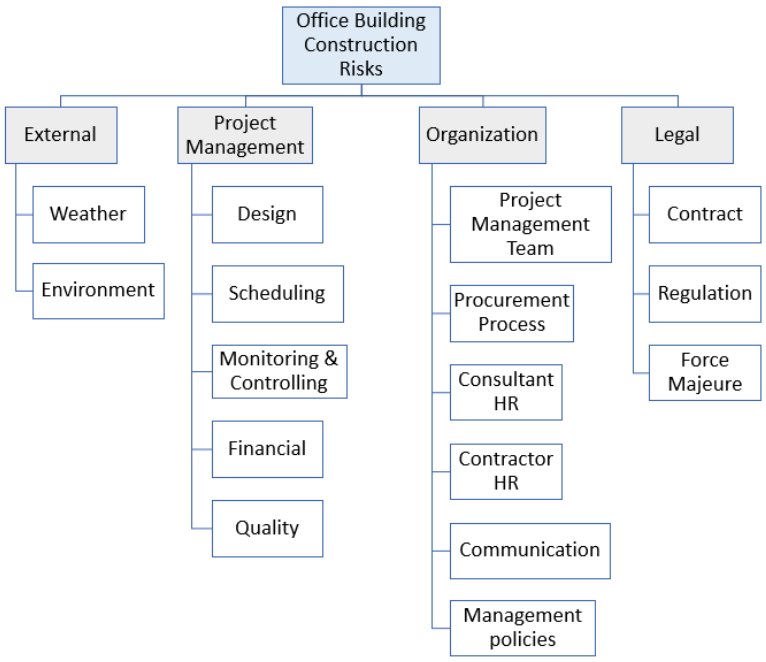

Figure 2 Project Risk Factors Categories RBS of Office Building Projects in BPJS Ketenagakerjaan

II. RESEARCH OBJECTIVES

This research was conducted by reviewing several journals from previous studies which mentioned the risk factors that often occur in construction projects. Furthermore, the risk factors of the prior research are categorized into risk breakdown structure (RBS) based on the life cycle of office building construction projects within BPJS Ketenagakerjaan. Table 1 summarizes the risk factors that can cause project delays, categorized based on RBS and validated by academics and experts in BPJS Ketenagakerjaan office construction projects.

Table 1. Summary of the risk factors that can cause project delays

Risk Categories	Risk Sub Categories	Project risk factors affecting time performance		Reference
External	Cuaca	X1	Bad weather	Cheng, 2021
	Environment	X2	Lack of environmental safety	Cheng, 2021
	Environment	X3	Strikes, revolutions, riots, demonstrations	Cheng, 2021, Aziz R, 2013
	Environment	X4	Project site conditions Unforeseen surface and subsurface conditions (soil, water table, etc.)	Sanjeet K, 2019, Aziz R, 2013
	Environment	X5	Global financial crisis	Aziz R, 2013
Legal	Force Majeure	X6	Natural disasters (force majeure)	Chatterjee, 2018
	Contract	X7	Variation/Change order	Cheng, 2021
	Contract	X8	Legal disputes between the parties	Aziz R, 2013
	Regulation	X9	Delays in obtaining permits from the city government	Aziz R, 2013
Organization	Management policies	X10	Estimated project duration is too short/unrealistic to complete	Nguyen P, 2021, Cheng, 2021
	Management policies	X11	Job Delays	Cheng, 2021, Aziz R, 2013
	Management policies	X12	Improper project feasibility study	Aziz R, 2013
	Management policies	X13	Slow decision making	Cheng, 2021, Aziz R, 2013
	Communication	X14	Disputes of the parties	Chatterjee, 2018, Nguyen P, 2021
	Procurement Process	X15	Negligence for not clarifying during the bidding stage	Tarihoran A, 2019
	Procurement Process	X16	Incorrect bid type and project value	Cheng, 2021
	Procurement Process	X17	Availability and budget allocation	Chatterjee, 2018, Cheng, 2021
	Procurement Process	X18	Choosing the wrong contractor	Aziz R, 2013
	Procurement Process	X19	Insufficient contractor experience	Aziz R, 2013, Cheng, 2021
	Procurement Process	X20	Bureaucracy in bidding/tendering methods	Aziz R, 2013
	Contractor HR	X21	Lack of proper management in identifying the needs of users / users	Safaeian M, 2022
	Contractor HR	X22	The consultant does not meet the requirements	Cheng, 2021
	Contractor HR	X23	Errors and delays in the creation of design documents	Aziz R, 2013
	Contractor HR	X24	Difficulty in obtaining a work permit	Cheng, 2021
	Contractor HR	X25	Poor project site management and supervision	Aziz R, 2013
	Contractor HR	X26	Contractors' internal disputes (strikes)	Chatterjee, 2018
	Contractor HR	X27	Lack of understanding and implementing project management	Cheng, 2021
	Contractor HR	X28	labor fluctuations	Nguyen P, 2021
	Contractor HR	X29	Poor productivity and skills of the workforce, lack of competency	Cheng, 2021, Sanjeet K, 2019, Aziz R, 2013
	Contractor HR	X30	Bad resource management	Cheng, 2021
	Contractor HR	X31	Difficulty in hiring suitable skilled workers	Chatterjee, 2018
	Project Management Team	X32	Project management member experience	Chatterjee, 2018
	Project Management Team	X33	Late payments to contractors	Chatterjee, 2018, Cheng, 2021, Aziz R, 2013
	Project Management Team	X34	Lack of staff reliability/competence	Chatterjee, 2018, Cheng, 2021, Aziz R, 2013
	Project Management Team	X35	Mistakes due to not carrying out a risk assessment	Tarihoran A, 2019
	Project Management Team	X36	Weak programming and team development	Safaeian M, 2022
	Project Management Team	X37	Lack of project management knowledge	Safaeian M, 2022
Project Management	Design	X38	Design changes by the owner	Nguyen P, 2021
	Design	X39	Weak analytical and design team	Safaeian M, 2022
	Design	X40	Faulty/incorrect design	Cheng, 2021
	Design	X41	Delays in approving the design document	Aziz R, 2013
	Monitoring & Controlling	X42	Additional work	Aziz R, 2013
	Monitoring & Controlling	X43	Overdue submission of engineering results by related disciplines	Tarihoran A, 2019
	Monitoring & Controlling	X44	Long timeframe between design and bid/tender time	Aziz R, 2013
	Financial	X45	Insufficient cash flow/contractor financial difficulties	Chatterjee, 2018, Sanjeet K, 2019, Aziz R, 2013
	Monitoring & Controlling	X46	Lack of monitoring of construction activities	Chatterjee, 2018
	Monitoring & Controlling	X47	Poor plan implementation (poor performance)	Cheng, 2021
	Monitoring & Controlling	X48	Lack of materials	Cheng, 2021
	Quality Control	X49	Lack/difficulty of utilities (electricity, water, work equipment)	Chatterjee, 2018, Safaeian M, 2022, Cheng, 2021, Sanjeet K, 2019, Aziz R, 2013
	Quality Control	X50	Low quality of materials	Nguyen P, 2021
	Quality Control	X51	Inaccurate measurement	Chatterjee, 2018
	Quality Control	X52	Mistakes and rework	Cheng, 2021, Aziz R, 2013
	Quality Control	X53	Changes in material types and specifications during construction	Aziz R, 2013
	Quality Control	X54	Construction work methods are not appropriate	Cheng, 2021, Aziz R, 2013
	Quality Control	X55	Poor/improper construction quality	Nguyen P, 2021, Chatterjee, 2018
	Scedulling	X56	Improper/effective planning and scheduling	Chatterjee, 2018, Cheng, 2021, Tarihoran A, 2019, Aziz R, 2013
	Scedulling	X57	Material Long Lead Items (need time) are not identified at the beginning of the project	Tarihoran A, 2019, Sanjeet K, 2019
	Scedulling	X58	Delays in material delivery	Cheng, 2021, Sanjeet K, 2019

III. RESEARCH METHODOLOGY

This research consists of four steps. First, do a literature study. Then step 1 data collection with a questionnaire instrument for expert validation of the life cycle of office building construction projects within BPJS Ketenagakerjaan. The validation results were then followed by step 2 data collection in the form of a questionnaire to experts to validate the variable risk factors at each stage of the project life cycle and whether these risk factors could affect time performance. Then, stage 3 collects pilot survey data to determine the understanding of prospective respondents. Finally, step 4 data collection in the form of a questionnaire to 27 respondents to find out the risk rating of risk factors at each stage of the project life cycle. To obtain the dominant risk factors at each stage of the project life cycle within the Employment BPJS, which impact on-time performance. After collecting all the survey questionnaires, analyze the data using SPSS software and risk probability and impact matrix.

The Likert scale used to measure probability and impact is a scale of 1 to 5, where scale 5 is the scale used for the measure with the highest likelihood and a substantial impact. The risk factor value is multiplied by the frequency with the impact value of each risk factor to obtain the risk rating. In this calculation, the probability and impact matrix guidelines are used by PMBOK 2017, as shown in Figure 3.

Probability	Threats					Opportunities					Probability
Very High 0.90	0.05	0.09	0.18	0.36	0.72	0.72	0.36	0.18	0.09	0.05	Very High 0.90
High 0.70	0.04	0.07	0.14	0.28	0.56	0.56	0.28	0.14	0.07	0.04	High 0.70
Medium 0.50	0.03	0.05	0.10	0.20	0.40	0.40	0.20	0.10	0.05	0.03	Medium 0.50
Low 0.30	0.02	0.03	0.06	0.12	0.24	0.24	0.12	0.06	0.03	0.02	Low 0.30
Very Low 0.10	0.01	0.01	0.02	0.04	0.08	0.08	0.04	0.02	0.01	0.01	Very Low 0.10
	Very Low 0.05	Low 0.10	Moderate 0.20	High 0.40	Very High 0.80	Very High 0.80	High 0.40	Moderate 0.20	Low 0.10	Very Low 0.05	
	Negative Impact					Positive Impact					

Figure 3 Probability and Impact Matrix
Source: PMBOK Guide 6th edition (PMI, 2017)

IV. FINDINGS DAN DISCUSSION

They are referring to the project life cycle in PMBOK 2017 and the results of the step 1 experts validation questionnaire to obtain the life cycle of office building construction projects within the BPJS Ketenagakerjaan, as shown in Figure 4. The experts in the step 1 questionnaire have experience in being involved in BPJS Ketenagakerjaan office building construction projects and have experience in building construction for 7 to 15 years.

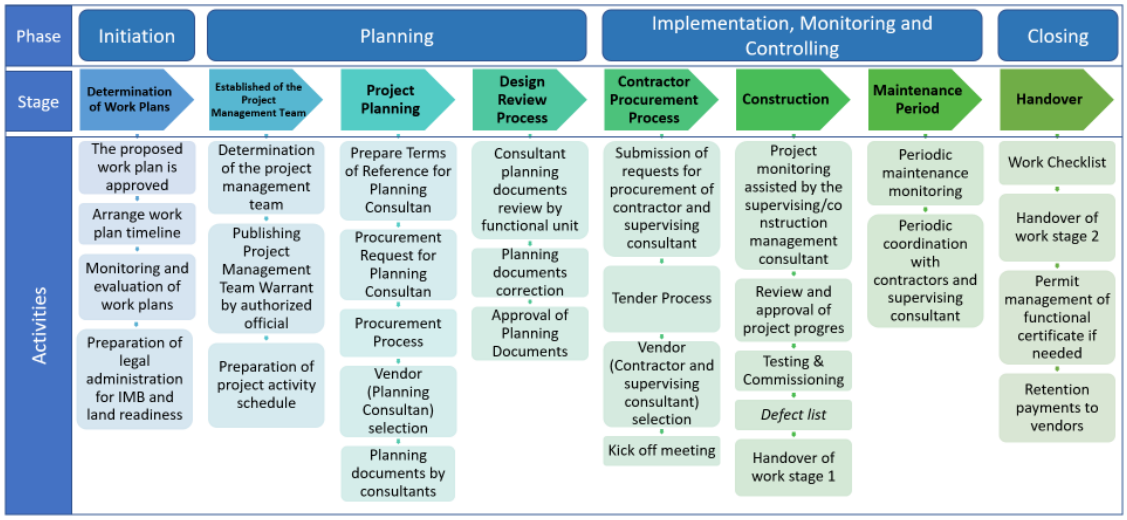

Figure 4 Project Life Cycle of BPJS Ketenagakerjaan Office Building Construction

Then in step 2 of the survey, respondents are experts with 9 to 23 years of experience in project management, both experts from BPJS Ketenagakerjaan employees and academics. The result of validation, as shown in Table 1, obtained risk factors that can cause project delays. The risk factor is named variable X.

Table 2. Respondent Characteristics

Experience	Frequency	Percent (%)
< 5 years	6	22%
5-10 years	8	30%
10-15 years	9	33%
> 15 years	4	15%
TOTAL	27	100%

In step 3 of the survey, respondents then carried out a risk assessment of the probability and impact values on a Likert scale of 1 to 5 for these variables. Then perform an analysis of homogeneity tests, validity and reliability tests, descriptive tests, and risk analysis. Table 3 shows the tabulation of the survey results. Then calculate the probability and impact average value for each risk variable at each stage of the Employment BPJS project life cycle.

Then the risk rating is calculated by multiplying the average probability and the average impact value to obtain the risk factor with a high-risk category. The dominant risk factor is 37 out of 58 variables Analysis of validated survey data.

The highest rank of risk factors at each stage of the project life cycle is as follows :
Stage Project Planning: Delays in obtaining permits from the city government (X9), Stage Design Review Process: Faulty/incorrect design (X40), Stage Contractor Procurement Process: Insufficient contractor experience (X19), Stage Construction : (1) Choosing the wrong contractor (X18); (2) Insufficient cash flow/contractor financial difficulties; and (3) Negligence for not clarifying during the bidding stage (X15).
These findings are related to prior research about significant delay factors. According to Azis R., 2013 the owner-related group of delay factors was the third most important group. The significant factors were delay in progress payments (Funding problems), Selecting inappropriate contractors, and Inadequate planning.

Figure 5 shows that the stages of Determination of the Work Plans level, Established of the Project Management Team, Maintenance Period, and Handover have medium risk categories. Stages with dominant risk factors with high categories are Project Planning, Design Review Process, Contractor Procurement Process, and Construction. The risk that affects time performance has the highest value during construction. Moreover, the top 3 high-rank risks are at the Construction stage, i.e., (1) Choosing the wrong contractor; (2) Insufficient cash flow/contractor financial difficulties; and (3) Variation/Change order.

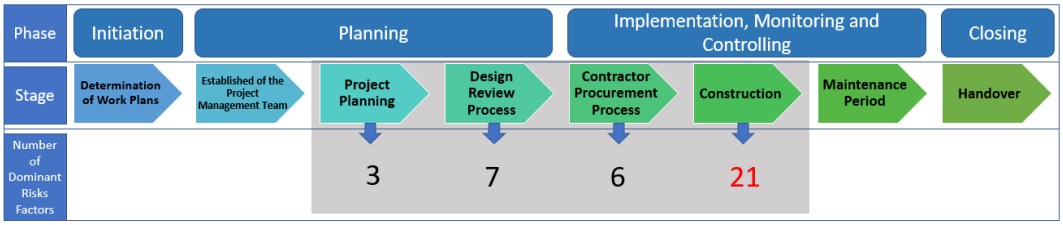

Figure 5 Numbers of Dominant Risk Factors at each Stage of Project Life Cycle

An equally important group of factors for the construction of office buildings was the group of environmental risks, and the group of factors construction risks assesses the degree of risk common in the construction site. The most influential factors were construction ground problems, material cutting leading to defective components, and design errors in the drawings compared with the construction reality (Nguyen P., 2021). These are also high categories of risks in this study, Bad weather (X1), Lack of environmental safety (X2), Project site conditions, unforeseen surface and subsurface conditions (X4), and Errors and delays in the creation of design documents (X4).

Table 3. Risk Rating of BPJS Ketenagakerjaan Office Building Projects

Stage	Variables	Risk Factors	Avg Probability	Avg Impact	Risk (FxD)	Category	Rank
Project Planning	X9	Delays in obtaining permits from the city government	0,56	0,40	0,224	High	14
	X38	Design changes by the owner	0,54	0,38	0,208	High	26
	X40	Faulty/incorrect design	0,57	0,36	0,206	High	28
Design Review Process	X13	Slow decision making	0,57	0,35	0,202	High	36
	X23	Errors and delays in the creation of design documents	0,60	0,34	0,205	High	29
	X35	Mistakes due to not carrying out a risk assessment	0,57	0,39	0,222	High	17
	X38	Design changes by the owner	0,58	0,37	0,215	High	19
	X40	Faulty/incorrect design	0,59	0,40	0,236	High	10
	X41	Delays in approving the design document	0,60	0,35	0,212	High	21
	X43	Overdue submission of engineering results by related disciplines	0,58	0,37	0,215	High	19
Contractor Procurement Process	X16	Incorrect bid type and project value	0,56	0,36	0,202	High	37
	X18	Choosing the wrong contractor	0,63	0,41	0,260	High	5
	X19	Insufficient contractor experience	0,62	0,42	0,262	High	4
	X22	The consultant does not meet the requirements	0,59	0,38	0,222	High	16
	X30	Bad resource management	0,57	0,36	0,203	High	35
	X56	Improper/effective planning and scheduling	0,60	0,34	0,203	High	34
Construction	X1	Bad weather	0,61	0,40	0,247	High	8
	X2	Lack of environmental safety	0,58	0,35	0,205	High	30
	X4	Project site conditions Unforeseen surface and subsurface conditions (soil, water table, etc.)	0,57	0,36	0,204	High	31
	X6	Natural disasters (force majeure)	0,53	0,42	0,224	High	15
	X7	Variation/Change order	0,66	0,40	0,264	High	3
	X15	Negligence for not clarifying during the bidding stage	0,57	0,37	0,210	High	22
	X18	Choosing the wrong contractor	0,61	0,45	0,275	High	1
	X19	Insufficient contractor experience	0,61	0,39	0,238	High	9
	X25	Poor project site management and supervision	0,59	0,37	0,218	High	18
	X27	Lack of understanding and implementing project management	0,57	0,36	0,204	High	32
	X29	Poor productivity and skills of the workforce, lack of competency	0,61	0,38	0,233	High	12
	X30	Bad resource management	0,59	0,36	0,210	High	23
	X31	Difficulty in hiring suitable skilled workers	0,58	0,35	0,204	High	33
	X35	Mistakes due to not carrying out a risk assessment	0,54	0,38	0,208	High	26
	X42	Additional work	0,61	0,38	0,234	High	11
	X45	Insufficient cash flow/contractor financial difficulties	0,63	0,43	0,271	High	2
	X46	Lack of monitoring of construction activities	0,58	0,40	0,232	High	13
	X47	Poor plan implementation (poor performance)	0,59	0,36	0,210	High	24
	X48	Lack of materials	0,60	0,43	0,257	High	6
	X55	Poor/improper construction quality	0,56	0,37	0,208	High	25
	X58	Delays in material delivery	0,59	0,42	0,249	High	7

I. CONCLUSION

The results of this study identify the life cycle and the dominant risk factors at each stage of the office building project at BPJS Ketenagakerjaan that affect time performance. By distributing questionnaires as a research instrument involving experts and respondents from stakeholders engaged in office-building projects at BPJS Ketenagakerjaan. The results showed that the life cycle stage of office building projects within BPJS Ketenagakerjaan consists of four phases and seven stages, starting from the Determination of Work Plans, Established of the Project Management Team, Project Planning, Design Review Process, Contractor Procurement Process, Construction, Maintenance Period, to Handover. To deepen the risk analysis, researchers conducted secondary data collection and qualitative risk analysis of the collected data to obtain the dominant risk factors.

Risk factors throughout the life cycle of office-building projects within BPJS Ketenagakerjaan affect time performance, and the risk that affects time performance has the highest value during construction. The dominant risk factors at each project's life cycle stage are as follows:
Stage Project Planning: Delays in obtaining permits from the city government (X9), Stage Design Review Process: Faulty/incorrect design (X40), Stage Contractor Procurement Process: Insufficient contractor experience (X19), Stage Construction : (1) Choosing the wrong contractor (X18); (2) Insufficient cash flow/contractor financial difficulties; and (3) Negligence for not clarifying during the bidding stage (X15).

Risk factors ranking shows the need for risk management to reduce losses that can result in project delays, thus requiring the attention of the project manager or project management team. For further research, each dominant risk requires a risk response. In an office construction project within the BPJS Ketenagakerjaan environment, these guidelines can be added to the project management team guidelines to improve time performance.

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