

Measurement of Project Risk Management Maturity Level using Project Management Maturity Model (PMMM): Case Research a Telecommunication Company in Indonesia

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Abstract: Construction projects are highly dynamic, but have a lot of risks in every field of work. To reduce the occurrence of a risk to the project, it is obligatory to do project risk management to avoid losses to the project time, cost, and quality. Evaluation of risk management also needs to be done to improve the quality of project risk management. Hence, this research aims to improve project management in one of the project-based organizations in Indonesia by measuring the maturity level of project risk management. This research uses the Project Management Maturity Model (PMMM) as its framework with seven risk management processes as its criteria. This criterion will be used to compile a self-assessment survey that will be disseminated to gather evidence. This research also carried out the weighting and ranking of these criteria using the Analytical Process Hierarchy (AHP) method. The results of this research found that from the results of weighting and ranking that the criteria of priority are plan risk management, and the maturity level obtained in the six risk management processes at level 1 which is the initial process, and one process at level 4 which is the managed process. Overall, the maturity level of PBO project risk management is currently at level 1, which is the initial process.

1 INTRODUCTION

Construction projects have close links with economic, social, and infrastructure development for any country. Construction projects can provide employment, encourage growth, and act as a link between other sectors and the economy (Dixit et al., 2018). The construction project itself is a dynamic field and has a lot of risks, especially construction projects which are very flexible and complex have a very high risk because it is implemented outside and involves many parties (Alifen, Setiawan, and Sunarto, 1999). When working on a construction project, it is very important to do risk management to avoid loss of costs, qualities, and project schedules. Risk management is an approach taken to risk by understanding, identifying, and evaluating the risk of a project (Labombang, 2011). Yazdanifard and Ratsiepe (2011) stated that one of the main problems of project management is the poor risk management implemented by the company because of risk management covers and influences

all activities in a project. In a research conducted by Pratami, Fadlillah and Haryono (2018) on one of the telecommunications construction projects, there were found 27 risks with a very high level, 6 risks with a high level, and 3 risks with a very low level so a risk assessment is needed when the project will begin to find out the risks contained in the project.

The results of the Project Management Institute's (2018) research stated that poor project performance was occurred due to low levels of project management maturity. The level of project management maturity allows organizations to identify how to improve project performance (Brookes et al., 2014). This was reinforced by the research conducted by Kaming and Setyanto (2009), which stated that there is a relationship between the maturities of project management with the level of success of project implementation. Therefore it is important to know the extent of the achievement of organizational performance through the level of maturity of its project management

(Hartono, Wijaya and Arini, 2014).

To explain this research in more detail, a research case was taken at one of the PBO (Project-Based Organizations) in Indonesia engaged in telecommunications services and networks. The project management problem is one of the issues in this organization, especially in project risk management. Therefore the purpose of this research is to identify the maturity level of the organizational project risk management in order to improve the performance of project risk management implementation.

This research is expected to have a contribution to developing project risk management maturity assessment by using the PM Solutions project management maturity model (PMMM), as the PM Solutions model has not all yet integrated with PMBOK 6th edition. This research gives additions to implement risk response and monitor risk process to the maturity assessment in order to be integrated with the PMBOK 6th edition. The result of this research can also be used in other projects and organizations engaged in construction, especially telecommunication construction, to escalate the maturity level of their project risk management.

2 LITERATURE REVIEW

2.1 Analytic Hierarchy Process (AHP)

Analytic Hierarchy Process is a measurement method used to obtain an assessment of the scale made consisting of and continuous (Saaty, 1987). AHP has special applications in making group decisions and is used throughout the world in various decisive circumstances in fields such as

government, business, industry, health care, and education (Saaty, 2008).

The procedure for conducting AHP can be summarized as follow (Saaty, 2008):

- Define the research problem and form it into a hierarchy. The hierarchy contains objectives, criteria, and alternatives;
- Make a pairwise comparison matrix filled with a comparison of elements in pairs according to the criteria;
- The assessment synthesis to produce a whole set of priorities for the hierarchy;
- Check the consistency of the assessment;
- The final decision will be obtained based on the process that has been done.

2.2 Project Management Maturity Model (PMMM)

Project Management Maturity Model (PMMM) is a tool developed and used to measure the level of project management maturity (Patel, Sharma, and Shah, 2016). PMMM is a conceptual framework where the project management process can be optimized to improve organizational capability efficiently. PMMM has been used as a reference to measure the level of project management maturity in various industries. PMMM offer best practice to assist organizations determine the maturity of the organizational project management processes, map logical pathways to improve organizational processes, determine priorities for short-term process improvement actions, find out the need for a project management office and assess compliance with organizational structure, track progress towards improvement plans project management, building a culture of project management excellency (Crawford, 2015).

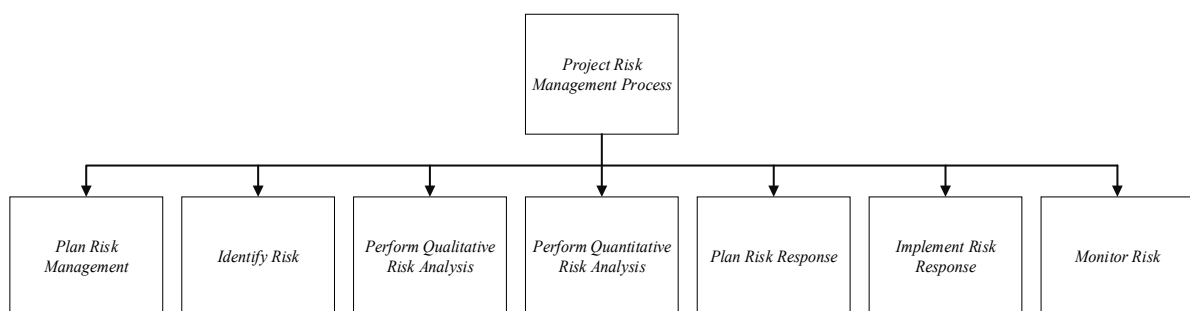


Figure 1: Project Risk Management Hierarchy Process

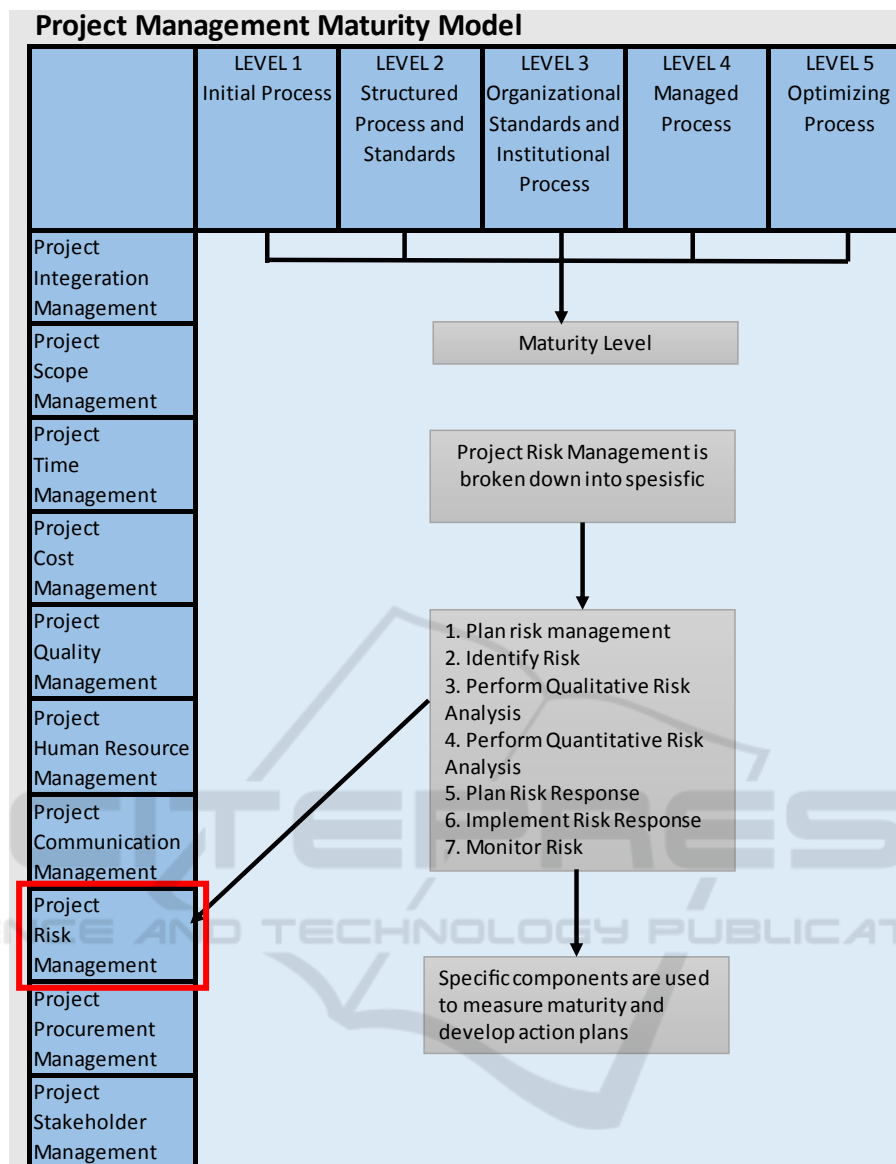


Figure 2: PM Solutions Project Management Maturity Model

3 RESEARCH METHODOLOGY

3.1 AHP Implementation

The Analytic Hierarchy Process used in this research aims to weight and rank the project risk management process because AHP can be applied to prioritize available criteria by weighting criteria and ranking (Forman and Gass, 2001). Weighting is implemented by expert judgments that have experience in telecommunications construction

project work. AHP in this research has seven criteria, which are project risk management processes obtained from PMBOK 6th Edition. The hierarchy arrangement in this research is shown in Figure 1.

3.2 Model Determination

This research uses the PM Solutions Project Management Maturity Model (PMMM) as the maturity model. The PM Solutions model was developed by a team of experienced project managers and has been successful in helping many

companies measure their level of maturity (Grant and Pennypacker, 2015). The structure of the PM Solutions Model is shown in Figure 2, and this model has been defined by the process of project risk management in accordance with the standards of the PMBOK 6th edition.

The model of PM Solutions has five levels of maturity that is in correspond with the structure of the SEI Capability Maturity Model (Grant and Pennypacker, 2015). In table 1, the maturity level is further described and adjusted to project risk management (Crawford, 2015):

Table 1: Explanations of each maturity level

Level	Description
Level 1: Initial Process	The organization does not have a method or approach related to PRM, and the process is only done on an ad hoc basis, management awareness related to project risk management is very low
Level 2: Structured Process and Standards	There is a PRM process, but it is only used for large scale project, management has supported the implementation of project risk management
Level 3: Organizational Standards and Institutionalized Process	All PRM processes have standards for all projects and can be reused; the processes and standards used by the organization are formally documented.
Level 4: Managed Process	The PRM process has been integrated with organizational processes and systems, and management has mandated to comply with the PRM process, there is an analysis of project performance
Level 5: Optimizing Process	There is a process to measure the effectiveness and efficiency of the project, and there are

	lessons learned, management is more focused on continuous improvement
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3.3 Designing Self-Assessment Survey

The self-assessment survey was designed with adjustments to the description of the maturity level of the PM Solutions model and consisted of 48 question items. The self-assessment will be given to three company managers, project managers, and the project team to be filled in accordance with company conditions accompanied by evidence to support the assessment. The evidence will be validated to ascertain whether the evidence is in accordance with the criteria or not.

3.4 Validation of Research Result

Validation is done after the result of AHP management and project risk management maturity level measurement is obtained. The validation is done with the help of expert judgment. Expert judgment is determined through several criteria such as already having project management certificate, experience in project management, and around ten years' experience in the construction project, especially telecommunication constructions.

4 RESULT

4.1 Weighting and Ranking of AHP

The results of the weighting implemented by the expert judgment are included in the comparison matrix of the results of the recapitulation of comparison criteria including plan risk management, identify risk, perform a qualitative risk analysis, perform a quantitative risk analysis, plan risk response, implement risk response, and monitor risk. Then normalize the project risk management maturity criteria until the weighting and ranking of the project risk management criteria are shown in Table 2.

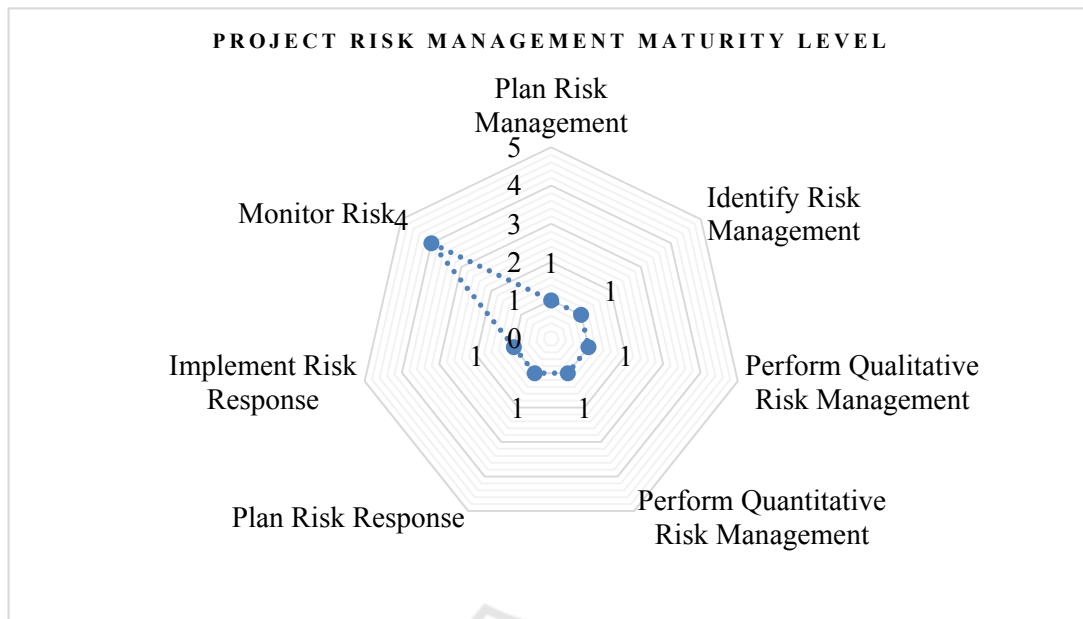


Figure 3: Result of Project Risk Management Maturity Level

Based on Table 2 it can be deduced that the order of importance of the project risk management maturity criteria from highest to lowest in a row are plan risk management, identify risk, perform a qualitative risk analysis, plan risk response, implement risk response, monitor risk, and perform a quantitative risk analysis

Table 2: Result of AHP

Criteria	Priority Vector	Percentage	Rank
Plan Risk Management	0,28	28%	1
Identify Risk	0,19	19%	2
Perform Qualitative Risk Analysis	0,15	15%	3
Plan Risk Response	0,14	14%	4
Implement Risk Response	0,11	11%	5
Monitor Risk	0,08	8%	6
Perform Quantitative Risk Analysis	0,05	5%	7

4.2 Project Risk Management Maturity Level

The results of the assessment of the project risk management maturity level on PBO presented in the form of a spider web diagram in Figure 3 can be obtained that there is a process that is at level 4 (managed process), which is risk monitor. This can

be stated that the company in this process has been in a managed process. This means that at that level, the company has integrated the risk monitoring process with the processes that are in the company. Management has given the mandate to comply with regulations on the risk monitoring process. In implementing the risk monitoring process, the company is already in accordance with the views of the organization. In making a decision, the company has used data. It also makes risk monitoring a process with the highest level.

In contrast to the risk monitor in the risk management plan process, identify risk, perform a qualitative risk analysis, perform a quantitative risk analysis, plan risk response, and implement risk response, the company is only at level 1, which is the initial process. This means that the company does not yet have a standard and basic process in implementing the six processes. This is caused by the lack of awareness and understanding of management related to the implementation of project risk management.

Overall, based on PMMM, the risk level of the company's project management is still at level 1, which is the initial process. It can be concluded because in determining the level of maturity must be taken from the lowest level because to reach a level, and then all criteria must be met. So that the achievement level cannot move to the next level before all criteria have been fulfilled (Crawford, 2015). The company needs a lot of improvement

from many aspects to increase the level of maturity. This is inversely proportional to the current condition of the organization, which requires a high level of project risk management maturity because the projects that the organization is working on are at the medium to a high level with contracts worth hundreds of millions to billions of rupiahs, which means it has many risks. All of these things will not be achieved if there is no contribution from management as well as the employees.

4.2.1 Plan Risk Management

In the plan risk management process, there are six attributes that have been prepared based on the maturity level, based on the results of the self-assessment survey obtained that the company is unable to meet the six attributes. It can be concluded that in this process, the company is at level 1, which is the initial process, where there is still a lack of awareness of the company regarding the implementation of risk management plans. This lack of awareness means that the company has never undertaken a risk management plan for the undertaken projects and tends to ignore the application of this process, thus creating no document related to risk management that can be used and accessed by the project team.

4.2.2 Identify Risk

In the identify risk process, there are six attributes that have been arranged based on their level of maturity. Based on the results of the self-assessment survey, obtained that the company could fulfill three attributes, including two attributes at level 1 and one attribute at level 5, but the company remained at level 1 which is the initial process because the company was unable to meet the attributes at level 2 to level 4 even though the attribute at level 5 has been fulfilled.

The company's inability to meet these attributes is due to various things, namely:

- The company does not have a process document to identify risks so other projects cannot use the process;
- The company is more inclined to identify risks in depth when these risks arise or when a problem occurs;
- In identifying risks, the company has not yet done it on a project scale, so it is more likely to only consider in terms of time and cost alone.

The inability of this company also affects the lessons learned less maximally.

4.2.3 Perform Qualitative Risk Management

In the perform qualitative risk analysis process, there are six attributes that have been arranged based on their maturity level. Based on the results of the self-assessment survey obtained that the company can meet two attributes, namely attributes at level 1 and at level 4. It can be said that the company is at level 1, which is the initial process because the company cannot meet the attributes at level 2 and level 3. The company is at level 1 strengthened by the fulfillment of attributes stating that when risks are identified, the project manager will spontaneously speculate on the impact of these risks without using any procedures.

4.2.4 Perform Quantitative Risk Management

In the quantitative risk analysis process, there are six attributes that have been arranged based on their level of maturity. Based on the results of the self-assessment survey obtained that the company can meet one attribute, namely the attribute at level 5. However, it can be said that the company is at level 1, namely the initial process, because the company cannot meet the attributes at level 1 and level 4.

In this process, the company is able to meet the attributes at level 5 in the form of lessons learned to improve handling. However, in the lessons learned, there are shortcomings; namely, the content in the document is less than the maximum due to the non-fulfillment of the attributes at the previous level.

4.2.5 Plan Risk Response

In the plan risk response process, there are 11 attributes that have been prepared based on the maturity level. Based on the results of the self-assessment survey obtained that the company can meet two attributes, namely, attribute at level 3. It can be said that the company is at level 1, namely the initial process, because the company cannot meet the attributes at level 1 to level 5.

The company's inability to meet these attributes is due to various things, namely:

- The company is not able to meet the attributes at level 1 that is because when planning the risk response, the project team will carry out a mitigation strategy when the risk has occurred. The absence of mitigation strategies for future events will cause the implementation of risk responses not to be maximized. This deficiency also reinforces the statement that the company in this process is still at level 1;

- Next is company's inability to meet the attributes at level 2 and level 3, it is caused by the company not having standard procedure documents in risk response planning so that the project team does not have guidelines for making or developing risk response planning;
- At level 3 attributes, the company is able to fulfill two of the five attributes that have been prepared. Both of these attributes have been fulfilled because in developing the company's risk response it has an application that has been integrated with the company's cost and time management, but the company has not yet integrated with the financial and accounting systems, strategic planning processes, and PMO which causes the company cannot fulfill other attributes;
- The last drawback is the company does not have an allocation of the project contingency costs, so it cannot be used to determine the efficiency and effectiveness of the project.

4.2.6 Implement Risk Response

In the implementing risk response process, there are six attributes that have been arranged based on their maturity level. Based on the results of the self-assessment survey obtained that the company can only meet the attributes at level 3. So it can be said the company is at level 1, namely the initial process, because the company cannot meet the attributes at level 1 to level 5.

The company's inability to meet these attributes is due to various things, namely:

- Company is not able to meet the attributes at level 1 because the company does not do a formal risk response planning so that no risk response documents are planned and agreed upon;
- Company is not able to meet the attributes at level 2 because the company does not have a standard process in implementing the risk response so that in the process of implementing a risk the project team does not use a standard process;
- Next, the company does not have a risk response implementation report document so that the implementation process cannot be analyzed and evaluated. Also, the absence of lessons learned from the process of implementing the risk response that the implementation process cannot be improved.

4.2.7 Monitor Risk

In the monitor risk process, there are seven attributes that have been arranged based on their maturity level. Based on the results of the self-assessment survey obtained that the company can meet five attributes and two attributes that have not been fulfilled, namely an attribute at level 4 and attributes at level 5. So it can be said that the company is at level 4, namely managed process even though there is one attribute at level 4 that has not yet been fulfilled, but most of it has been fulfilled, so the company stays at level 4.

Attributes that are not fulfilled are attributes at level 4, namely the risk control system is not integrated with the monitoring program because the company does not yet have a monitoring program, but the company's risk control system has been integrated with other organizational control systems and the cost and time management program. The next attribute that is not met is the attribute at level 5 that the company does not yet have lessons learned that serve to increase risk monitoring efforts.

5 CONCLUSION

From the calculation of the level of maturity, it is obtained that overall PBO is still at level 1, which is the initial process. In general, the PBO does not have a method or approach related to PRM, the PRM process is only conducted on an ad hoc basis, and management awareness regarding project risk management is very low. Especially the most highlighted is the risk management plan process, which is at level 1, whereas based on calculations using AHP, the risk management plan is ranked 1.

With project risk management at level 1, this PBO is certainly very far from best practice in project management, because level 1 is the lowest in the available maturity level. The company itself wants to continue to improve the quality of risk management and the expectations of employees and the project team to have special documents and applications that discuss project risk management, and then the company must improve and enhance the maturity level of their project risk management. It is highly recommended that PBO can provide counseling guidance to company management on the importance of risk management to the project. As a result of this counseling, management can further develop the implementation of risk management, such as conducting training and workshops for project management and the team. This is certainly

done in order to improve performance in implementing risk management projects to achieve better results for undertaken projects. This measurement is implemented to determine the company's achievements for now and can be used as an evaluation to help in the company's continuous improvement.

In this research, it has been proposed an improvement plan to increase the maturity level of project risk management in accordance with the current organizational level, which is at level 1, namely the initial process. The organization can understand more about the maturity level of project risk management from this research. In addition, the organization can also find out the strengths and weaknesses of project risk management. However, this research only measures project risk management, and further research is needed to determine the organizational maturity level of the overall project management by measuring other knowledge areas.

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