Identification of Risk Factors of Road Development Process in District Sarmi-Jayapura

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Abstract Comparison between road infrastructure owned by Sarmi Regency with total area of Sarmi equal to 35,587 km^2, that is only 0.85%. Thus the road infrastructure owned by Sarmi Regency has not even reached 1% of the total area as a whole with the structure of the road in the form of hardened roads. In any construction project there must be a risk, not least in this road construction project in Sarmi Regency. Risk is a consequence of an uncertain condition. In a construction project the uncertainty is huge because it can not be predicted exactly how much profit or loss will be obtained. Because of this, the purpose of this study is to determine the factors and risk variables that occur in the construction of roads in Sarmi District. Determination of risk factors and variables is done by regular study and field observation. The results of this study indicate that there are at least 10 risk factors indicated to influence road construction in Sarmi-Jayapura Regency, which are political factor, environmental factor, economic factor, natural factor, project factor, human factor, criminal factor, technical factor and safety factor. In addition, there are 49 research variables indicated to have an effect on road construction in Sarmi-Jayapura Regency. The stages of research that will be done in general is the selection of problems, preliminary studies, formulate problems, formulate basic assumptions, determine hypotheses or truth while, choose a research approach, determine the variables and sources of research data, compile research instruments, collect data, analyze data statistically , and draw conclusions.

1. Introduction

Sarmi is an autonomous region in Papua Province. This regency is one of the new districts resulting from the expansion of Jayapura Regency. The consideration of the enhancement of the status of Sarmi District into a district is to spur the progress of Papua Province in general, as well as the growing aspirations of the people who want to increase the status of Sarmi District into districts. Sarmi region covers eight districts covering an area of 35,587 km^2. The extent of almost 58% of Jayapura area before it was split. In this vast area of land road infrastructure is still very minimal. This makes it difficult to transport goods to and from Sarmi Regency. Currently the existing land roads in Sarmi Regency is still not adequate, both in terms of road quality and road length. This inhibits the utilization of abundant natural resources in Sarmi Regency. Due to the absence of road infrastructure to make the population of Sarmi regency much under the poverty line, in addition, Sarmi Regency has the potential of natural resources is very large. This makes the road development in Sarmi regency increasingly important.

Comparison between road infrastructure owned by Sarmi Regency with total area of Sarmi equal to 35,587 km^2, that is only 0.85%. Thus the road infrastructure owned by Sarmi Regency has not even reached 1% of the total area as a whole with the structure of the road in the form of hardened roads.

In any construction project there must be a risk, not least in this road construction project in Sarmi Regency. Risk is a consequence of an uncertain condition. In a construction project the uncertainty is huge because it can

not be predicted exactly how much profit or loss will be obtained. Because of this, it is necessary to know the risk factors on road construction in Sarmi District from the beginning of the construction project, to reduce the risks and impacts of possible risks.

Risks in construction projects are actually borne by many parties involved in the project. In general, risks are only identified from the owner and contractor, while many others are also involved in the project, such as supervisory consultants, planner consultants, and communities around the project. This thesis research is aimed to know the risk factors in road construction project in Sarmi Regency from perception of stakeholders or stakeholders in the project, either from contractor, owner, consultant planner, supervisor consultant, and the local people who are directly affected by the project and not directly affected by the project.

These risk factors will be discussed in terms of economic, technical, socio-political, and others. Risk perceptions of these stakeholders will not be the same because of their different interests and perspectives on the project. In order to minimize the risks that arise, it is necessary to identify the risks that will occur to overcome the negative consequences that occur in road construction in Sarmi Regency.

2. Research Problems

Problem to be solved in this research are:

a. What are the risk factors in road construction process in Sarmi-Jayapura Regency?
b. What are the risk variables in road construction process in Sarmi-Jayapura District?
c. What is the process of the assessment phase undertaken in this research?

3. Literature Review

3.1. Risk Management

According to Noshworthy [1], risk management is the identification of threats and the implementation of measurements aimed at reducing incidents and minimizing any damage. Risk analysis and risk control form the basis of risk management where risk control is an application of appropriate management to achieve a balance between security, usage and cost.

According to Han and Diekmam [2], the objective of risk management is to minimize losses, whereas according to Jacobson et al. [4], the ultimate goal of risk management is choosing measurement of risk mitigation, risk transfer and risk recovery to optimize organizational performance. Risk management is implemented to reduce, avoid, accommodate a risk through a number of sequential activities [4].

3.2. Risk Identification

According to AS/ ZS 4360 [5], risk identification is identify risks is identify what risks I might have by applying initial screening to risk events and potential risk status and developing them into preliminary risk status. By identifying risks, information on risk events, information about the causes of risks, and information about the impact of those risks can be collected. Risk identification can be done in several ways, namely the analysis of historical data, observation and survey, benchmarking, and expert opinion. The principle of historical data analysis is to use various information or data about everything that ever happened, both primary and secondary data. The principle of observation and survey is to conduct a direct investigation, observation or survey, on the spot. The principle of benchmarking is to first select a reference or benchmark. Benchmarks or references are objects that are similar to the object being observed in terms of the presence of risk. This method can be applied to complement risk identification using historical data analysis methods and surveillance and survey methods. Methods by using expert opinion can be obtained by interviewing one person, to a group of people, or through a special group discussion, or focus group discussion (FGD).

3.3. Risk Analysis

Risk analysis, i.e. analyzing or measuring the risks that may occur to determine which priority risks should be solved first and the methods used to solve or minimize them. Risk analysis is a process of identification and assessment, while risk management is the response and action taken to mitigate and control the risks that have been analyzed [6].

The purpose of risk analysis and management is to help avoid failure and to give an idea of what happens when projects are not in accordance with the plan.

According to Smith [7], there are two ways to perform a risk analysis that is qualitative and quantitative. Quantitative way analysis is used on things that can be mathematically calculated such as material losses caused by the project, whereas qualitative analysis is used to things that cannot be calculated materially for example is a disturbance of comfort to the community around the project.

3.4. Risk Evaluation

A common process used to determine risk management by comparing risk levels against predetermined standards, target risk levels and other criteria. The risk evaluation on a project depends on the probability of occurrence of the risk, the frequency of occurrence, and the impact of that risk if it occurs [8].

3.5. Risk Response

Risk response is the action taken against the risk that may occur. Important known risks need to be followed up with the responses made by the contractor in handling those risks. According to Flanagan and Norman [9], the methods used in dealing with risks include risk retention, risk reduction, risk transfer, and risk avoidance.

3.6. Risk Improvement

This stage is performed as a complement after evaluation and measurement of risk [10]. Risk management should be undertaken to avoid enormous losses, as for risk management techniques such as avoidance, transfer, mitigate, and acceptance.

3.7. Construction Process

According to Dipohusodo [11], the construction phase in the field has been started since the winner of the auction, and begins by issuing a Work Order (SPK) and the delivery of the field in all circumstances, which must always be maintained, to the contractor. According to Husen [12], stakeholders for construction services consist of project owners, consultants, contractors, specialist contractors and suppliers.

3.8. Portrait of Road Projects in Sarmi District - Jayapura

So far, the existing roads in Sarmi Regency are still inadequate, both in terms of road quality and road length. This inhibits the utilization of abundant natural resources in Sarmi Regency. Due to the absence of road infrastructure to make the population of Sarmi regency much below the poverty line, whereas Sarmi regency has the potential of natural resources is very large. This makes the road development in Sarmi regency increasingly important.

Based on road length data which is only 300,73 km, can be calculated comparison between road infrastructure owned by Regency of Sarmi with total area of Sarmi equal to 35,587 square kilometers, that is only 0.85%. Thus the road infrastructure owned by Sarmi Regency has not even reached 1% of the total area as a whole. The community hopes that the 2016 will be a 360-kilometer-long Jayapura-Sarmi road, although it is only a hardened road.

Figure 1: Condition of Road in Research Location before Construction

4. Research Methodology

4.1. Model Research Framework Optimization

The optimization of the research framework model is made in the form of a flowchart as shown in Figure 2 below:
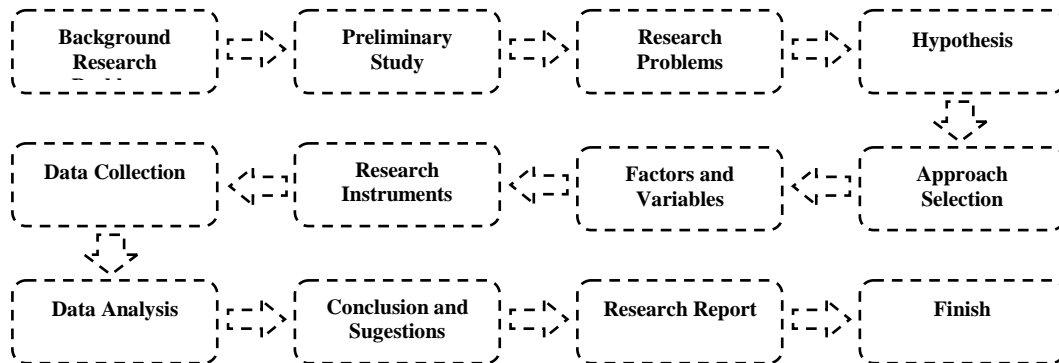

Figure 2: Research Framework

4.2. Research Process

To facilitate the understanding of the research process, a diagram of the research flow as shown in Figure 3 below:
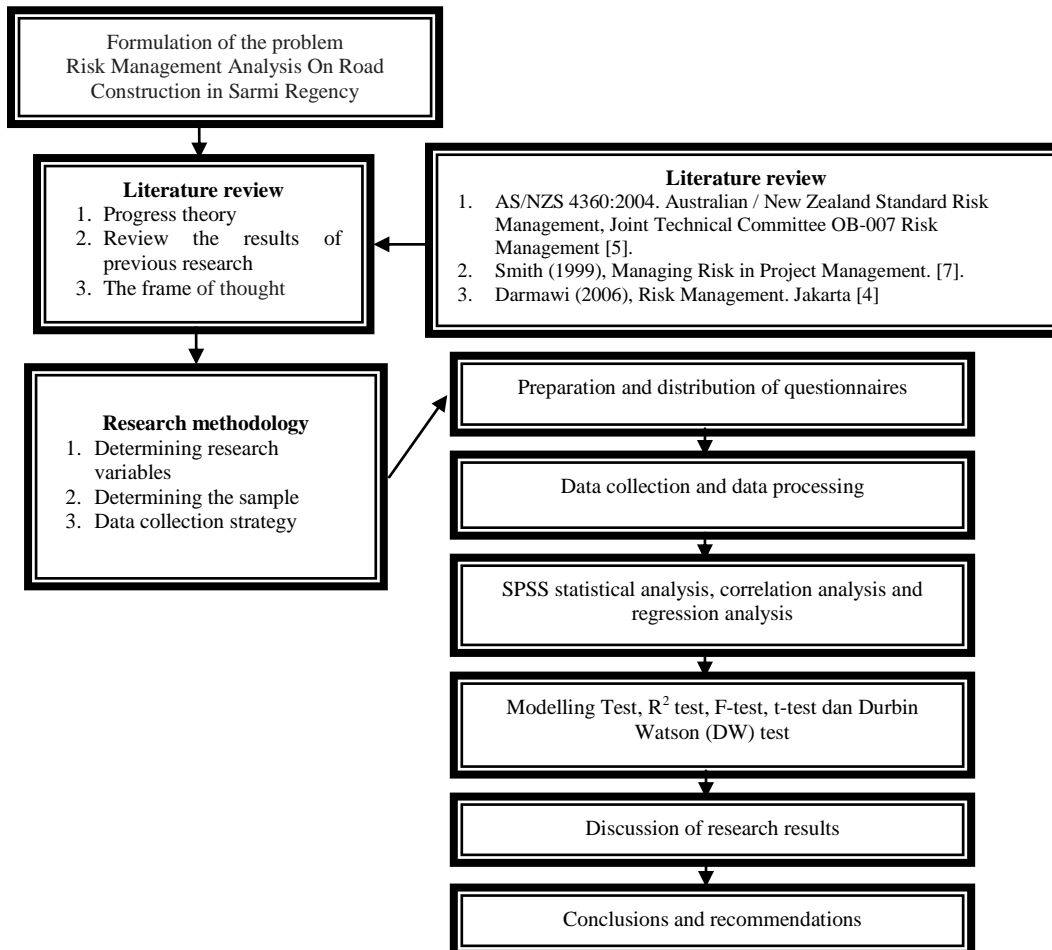

Figure 3: Research Process

4.3. Research Instruments

The research instrument that will be used is questionnaire. Questionnaire is designed based on the information obtained in the previous research literature. The distribution of questionnaires is done to the particular group of respondents required in the data collection stage.

4.4. Data Collection Techniques

The primary data collection in this research will be conducted by questionnaire survey. The collection of secondary data indirectly to the object of research, but through documents relating to the object of research. The secondary data used in this study were taken from several previous research studies and literatures related to road risk optimization.

4.5. Measuring Tool

Measuring tool to be used is Likert scale, Respondents are asked to provide a rating based on Likert scale that is used to measure the level of influence of the variable causes with ladder / category 1-5.

4.6. Research Sites

Sarmi Regency has an area of 17,740 km^2, consisting of 10 districts, 84 villages, and 2 villages. Upper Tor District is the district of Sarmi Regency which has the widest area of 4,499 km^2 or 25.36%. While Sarmi District is the district that has the smallest area of 471 km^2 or 2.66% of the entire region of Sarmi Regency. The location of the study is shown in Figure 4 below.
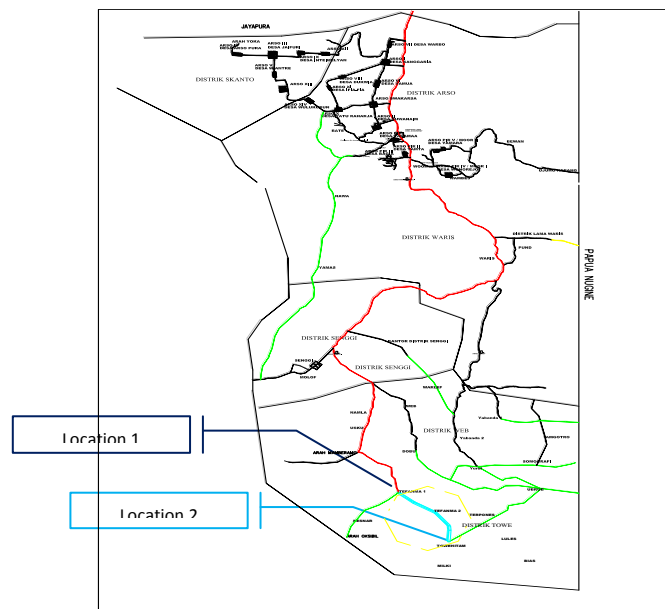

Figure 4: Research Location

4.7. Research Respondents

Respondents in this research are the perpetrators of road construction in Sarmi Regency. The sampling technique used is probability sampling, that is the sampling technique with the consideration that the respondent is the one who has the same opportunity to fill the questionnaire.

4.8. Methods of Research Analysis

Research conducted requires data collection by conducting a survey on the source of information required. Surveys are a systematic method for collecting data based on a sample to obtain information from similar populations. The main purpose of the survey is not to determine a specific case, but to obtain the main characteristics of the targeted population at a given time.

From the data obtained and collected, it is necessary to find the right analysis pattern to process the data. The analysis used should be an appropriate analysis in processing the existing data, so the results according to the topic and purpose. This research uses risk analysis in data processing. This analysis helps in identifying the risk factors of road construction in Sarmi Regency which is the result that want to be obtained from this research.

These factors are present at the implementation stage and future project activities in road construction. The variables contained in this study are independent variables or independent variables (X) and the dependent variable or variable (Y).

Dependent or dependent variable (Y) is: road construction in Sarmi Regency while independent variable or independent variable (X) that is: risk factors of road construction in Sarmi Regency. At the stage of construction implementation related to the things that are required during the construction process. The variables are contained in the table 1.

5. Research Analysis

5.1. Analysis of Research Problems 1

The research problem 1 analyzed the factors influencing the road development in Sarmi-Jayapura Regency. Based on the literature review and the reality in the field, the indicated risk factors are influential political factors, environmental factors, economic factors, natural factors, project factors, human factors, criminal factors, technical factors and safety factors.

5.2. Analysis of Research Problems 2

Research problem 2 analyzes the research variables based on predetermined research factors. The research variables obtained through literature study can be seen in table 1 below:

Table 1: Research Variables

No.	Research Factors	Research Factors
1.	Political	Print and electronic media news that is counterproductive to the implementation of road construction
		Lack of coordination among related agencies in decision-making that may affect construction project work
		The existence of inputs other agencies that resulted in changes in design and technical workmanship
		There is a conflict of interest between the agencies related to road construction
		There is a change of structure / responsibility to the government agencies in handling the ongoing projects
		Licensing procedures for the implementation of the complicated development of various parties
		The rejection of certain mass organizations for the sake of their group (connected with the elections)
2.	Environment	Constraints in land acquisition for buildings that pass the road
		Late fuel due to very high rainy weather
		Disruption of work smoothness due to the high level of traffic density around the project site
		The compensation fund demanded by the surrounding community is like a big fisherman as a result of them being unable to carry on as usual because of the project
3.	Economy	The occurrence of inflation during the implementation of construction projects affecting material prices
		The rise in the price of fuel oil (BBM) during the road construction project took place
		Workers' demands on wage increases that do not match the standard wage
		Late payment of terminals by owner to contractor
4.	Finance	Late payment by contractor to supplier of building materials / materials
		Financial management contractors are less professional
		High operational and overhead costs

		Cutting the value of payments that are not in accordance with the contract because the owner is not satisfied with the work of the contractor
		Late progress of the work because the contractor lack of funds to cover the operational costs of the project
		Existence of funds outside of the contract
5.	Natural	Project delay due to weather
		Damage caused by natural disaster
		Incomplete geological data and existing field survey
6.	Project	Delay in delivery of project material from outside Jayapura
		Material requirements are not met because of the large volume
		The data provided by the owner is incomplete, so the design changes that affect the number of work volumes that are not in accordance with the contract
		Field measurements to determine position, point, line and height do not match the design
7.	Humanity	The minimum labor productivity thus affecting the progress of the work
		Labor delay due to holiday holidays
		Working strike during project run
		Fatigue due to the large number of work done overtime
		Lack of training provided to project workers in terms of road construction SOP
		The quality of work is not good due to incompetent workforce
8.	Criminal	Loss of materials and equipment during project implementation
		There is a destruction of equipment, materials, and facilities by irresponsible parties
		The occurrence of small-scale corruption practices undertaken by project workers
9.	Technique	Machine efficiency is less than maximum
		Delays due to improper use of methods
		Non-conformity between the volume of contract work and field conditions
		Non-conformity about condition info and geotechnical data provided by the owner so that the erection work is constrained in terms of time and cost
		Utilization of less efficient materials to the detriment of contractors
		Lack of heavy equipment
		Congestion around the project hinders material arrival
		Diversion of road trace resulting in swelling of material volume
		Planning less attention to natural conditions
		The work of existing utility relocation that is passed by the road project so that it affects the cost
10.	Safety	Lack of awareness of project workers on occupational safety and security
		The existence of workers who are sick or have an accident until the death

5.3. Problem Research Analysis 3

The research problem 3 analyzes the process and the steps that will be done in this research. The research begins with the selection of problems, then proceeds to a preliminary study with the intent to seek information that is needed by the researcher to make the problem clearer, then to formulate the problem so that the research can be carried out as well as possible, and clearly to start from, formulate the basic assumption or something which is believed to be true by the researcher who will serve as the research reference, determine the hypothesis or the temporary truth determined by the researcher, but still must be proven, choose the approach and determine the

type of research to be used, determine the variables and sources of research data, , collecting data using predetermined research instruments, analyzing the data already collected, and drawing conclusions based on the results of data analysis.

6. Conclusions and Recommendations
6.1. Conclusions
Based on the analysis that has been done, there are at least 10 risk factors indicated to influence the road construction in Sarmi-Jayapura regency, namely political factors, environmental factors, economic factors, natural factors, project factors, human factors, criminal factors, technical factors and safety factors.

In addition, there are 49 research variables indicated to have an effect on road construction in Sarmi-Jayapura Regency. The variables are divided on each of the research factors that have been determined.

The general stages of research are problem selection, then preliminary study, formulating problems, formulating basic assumptions, determining hypotheses or temporary truths, choosing a research approach, determining variables and sources of research data, composing research instruments, collecting data, analyzing data, and drawing conclusions.

6.2. Suggestions
In the implementation of road construction project in Sarmi-Jayapura Regency, based on predetermined factors and variables, it is suggested that after this research, socialization must be conducted between the occupants and the people affected by the construction of the road so that there is no obstacle in the implementation of road construction.

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