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Project Risk Mapping with Small-Qualified Contractor Partners

Sutikno [1], Agustinus Purna Irawan [2], Endah Murtiana Sari [3]* and Oei Fuk Jin [4]

[1,4]Fakultas Teknik Program Studi Doktor Ilmu Teknik Sipil, Universitas Tarumanagara, Kota Jakarta Barat, DKI Jakarta, Indonesia
[2]School of STEM, Universitas Prasetiya Mulya, Jakarta, Indonesia, Jakarta, Indonesia
[3]Fakultas Teknik Program Studi Teknik Industri, Universitas Sains Indonesia, Bekasi Jawa Barat, Indonesia
*)endah.murtiana@sains.ac.id
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Abstract
Project risk mapping is a strategic step that must be undertaken by the Government of Southwest Papua to ensure that public expenditures are properly allocated and produce tangible benefits for the community. The implementation of Presidential Regulation (Perpres) No. 17 of 2019 concerning Special Autonomy provides opportunities for the growth of local entrepreneurs, which is expected to positively impact the regional economy in Sorong, Southwest Papua. Therefore, risk-based project evaluation is necessary to support good governance practices. This study aims to identify and map the risks faced by the government in implementing projects involving small-qualified contractors in Southwest Papua. Using a quantitative approach through questionnaire distribution to 50 respondents, the study produced a mapping of project risks associated with small-qualified contractor partners that need to be anticipated by the government, along with mitigation efforts to minimize potential risks. The findings of this study provide insights for the government in formulating strategic measures to reduce project risks and enhance the capacity of small-qualified contractors, thereby supporting the implementation of Presidential Regulation No. 17 of 2019 through accountable and transparent governance mechanisms.

Keywords: *risk, good governance, government project, project evaluation, accountable*

INTRODUCTION

Presidential Regulation No. 17 of 2019 concerning Government Procurement of Goods/Services for the Acceleration of Welfare Development in Papua Province and West Papua Province, in which the presidential regulation contains an important mandate, namely that the Acceleration of Welfare Development in Papua Province and West Papua Province is a government policy and program carried out systematically, planned, measurable, and synergistic in order to accelerate the implementation of development and improvement of community welfare in Papua Province and West Papua Province [1], [2]. Direct Procurement is carried out using a selection method to obtain Providers of Goods, Construction Work and Other Services with a value of at most Rp. 1,000,000,000.00 (one billion rupiah) or a selection method to obtain Consulting Service Providers with a value of at most Rp. 200,000,000.00 (two hundred million rupiah) [3]. This policy encourages the emergence of local entrepreneurs with small qualifications to grow, which in the long term is expected to grow the local economy [4], [5].

Road construction in Papua involves many contractors and local entrepreneurs with the main objective of encouraging increased mobility between regions and promoting regional economic growth [6]. The existence of adequate road infrastructure is expected to open access for the distribution of goods, public services, and community mobility. In addition, by involving local contractors, it will create opportunities for employment for local communities [7], [8]. However, problems arise where the quality of work results is often unsatisfactory. This can be observed especially from the significant difference between the planned initial pavement quality and the actual quality in the field [9]. The road service life is also shorter where actual road damage occurs long before the estimated predicted damage time. The available data provide an overview of road quality conditions, infrastructure age, and the level of damage that occurs. Comparison between planning and realization data becomes important to assess the effectiveness of project implementation while ensuring whether the technical standards that have been determined are truly fulfilled [10], [11].

From the data of 39 road sections studied, it can be seen that several projects have handover quality below 100% where this condition was implemented with service providers being local entrepreneurs with small qualifications, this condition will cause the infrastructure lifespan to not be in accordance with the plan resulting in infrastructure not being able to be used optimally by the community [12]. Complaints regarding the use of infrastructure are widespread because the quality of infrastructure is very low due to the pavement and concrete quality of the roads built not being in accordance with the specifications in the contract [13], [14].

Evaluation instruments need to be developed by examining the causes that occur, the existence of providers with qualifications as local entrepreneurs with small qualifications needs to be explored further, what causes the quality of infrastructure not to comply with the contract [15], [16]. Understanding the contents of the contract becomes important to be understood by both parties, while also providing training and assistance in infrastructure implementation so that it becomes sustainable [13], [17]. Whether the agreed contract value has fulfilled aspects of fairness in the proposed Budget Plan is also an important factor that must be revealed in this study [18].

The research gap addressed in this study is the lack of a comprehensive evaluation model for assessing infrastructure handover quality in road projects undertaken by local small-qualified contractors in Papua. Previous studies have generally examined factors such as quality, cost, contractor performance, and contract compliance separately, whereas the combined influence of technical, economic, organizational, and socio-cultural factors has received limited attention. Therefore, this study develops an integrated evaluation model to address this gap.

METHOD

This study employs a quantitative research approach using a structured questionnaire distributed to 50 respondents consisting of contractors, government representatives, and consultants involved in infrastructure projects. The respondents were selected using a purposive sampling technique, whereby individuals were chosen based on their knowledge, experience, and direct involvement in road infrastructure planning, implementation, supervision, and handover activities. Data processing was conducted using SPSS software to identify the factors contributing to the low quality of infrastructure handover.

To ensure that respondents possess relevant expertise and experience, the eligibility criteria used in this study are presented in Table 1.

Tabel 1. Respondent criteria

Category	**Criteria**
Contractors	Personnel involved in road construction projects with at least 3 years of experience
Government	Officials or technical staff responsible for planning, supervision, evaluation, or

	handover of infrastructure projects
Consultants	Supervisory or planning consultants involved in road infrastructure projects with at least 3 years of professional experience
General Requirement	Direct involvement in infrastructure implementation, monitoring, or handover activities

The questionnaire design is presented in Table 2.

Table 2. Questionnaire design

Variabel	Indicators
X1 – Initial Investment Cost	Project contract value
	Initial budget absorption
	Initial fund disbursement time
X2 – Infrastructure Lifespan	Planned infrastructure lifespan
	Actual damage lifespan
X3 – Infrastructure Quality	Road technical test results
	Quality of road surface layer
X4 – Compliance with Contract	Conformity with contract specifications
	Completeness of contract documents
X5 – Human Resource Competence	Technical capacity
	Human resource work experience
X6 – Handover Conformity	Final project technical test
	Minutes of handover and administrative completeness
X7 – Local Culture	Customary values and local norms
	Community social involvement in the project
XM1 – Life Cycle Cost Analysis	Total life cycle cost
	Maintenance cost simulation & strategy
XM2 – Project Performance	Time and cost efficiency
	Community satisfaction with project results
Y – Evaluation Model	Validity of evaluation model indicators
	Acceptability and utilization of evaluation results

With the questionnaire design as described above, this study is expected to comprehensively explore respondents' perceptions of the factors affecting the performance of road works by local contractors. The existence of mediator variables (XM) bridges the relationship between cost factors, quality, human resource quality, and local culture with the evaluation model, so that data analysis can produce a more accurate and applicable estimation model. It is expected that this research instrument will be able to measure relevant variables with an adequate level of reliability and validity. This questionnaire is subsequently used in field data collection, which is then analyzed using SPSS software to produce empirical findings that support the development of a road maintenance cost estimation model.

All questionnaire items were measured using a five-point Likert scale to capture respondents' perceptions regarding each indicator. The scale used in this study is shown in Table 3.

Table 3. Likert score measurement

Score	Interpretation
1	Strongly Disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly Agree

The analyses used in the limited trial consist of:

1. Validity Test: to assess the extent to which question items measure the intended construct. Validity is measured using the Pearson Product Moment correlation technique between the item score and the total variable score. An item is declared valid if r calculated ≥ r table (0.279 for n=50 at a significance level of 5%).
2. Reliability Test: to measure the consistency of respondents' answers to items within the same variable. Reliability is calculated using Cronbach's Alpha. The instrument is considered reliable if Cronbach's Alpha ≥ 0.70.

RESULTS AND DISCUSSION

Table 4. presents the results of the validity test for the questionnaire items across all research variables.

Table 4. Instrument validity test result

Variable	Item	r-calculated	r-table (0,279)	Remark
X1. Initial Investment Cost	X1.1	0,496	0,279	Valid
	X1.2	0,585	0,279	Valid
	X1.3	0,717	0,279	Valid
	X1.4	0,662	0,279	Valid
	X1.5	0,674	0,279	Valid
X2. Infrastructure Lifespan	X2.1	0,638	0,279	Valid
	X2.2	0,471	0,279	Valid
	X2.3	0,645	0,279	Valid
	X2.4	0,507	0,279	Valid
	X2.5	0,584	0,279	Valid
X3. Infrastructure quality	X3.1	0,527	0,279	Valid
	X3.2	0,588	0,279	Valid
	X3.3	0,643	0,279	Valid
	X3.4	0,514	0,279	Valid
	X3.5	0,571	0,279	Valid
X4. Compliance with Contract	X4.1	0,532	0,279	Valid
	X4.2	0,705	0,279	Valid
	X4.3	0,606	0,279	Valid
	X4.4	0,564	0,279	Valid
X5. Human Resource Competence	X5.1	0,574	0,279	Valid
	X5.2	0,594	0,279	Valid
	X5.3	0,513	0,279	Valid
	X5.4	0,557	0,279	Valid
	X5.5	0,525	0,279	Valid
X6. Handover Conformity	X6.1	0,718	0,279	Valid
	X6.2	0,694	0,279	Valid
	X6.3	0,667	0,279	Valid
	X6.4	0,746	0,279	Valid
X7. Local Culture	X7.1	0,631	0,279	Valid
	X7.2	0,818	0,279	Valid
	X7.3	0,447	0,279	Valid
	X7.4	0,506	0,279	Valid
XM1. Life Cycle Cost Analysis	XM1.1	0,585	0,279	Valid
	XM1.2	0,654	0,279	Valid
	XM1.3	0,573	0,279	Valid
	XM1.4	0,506	0,279	Valid
	XM1.5	0,615	0,279	Valid
XM2. Project Performance	XM2.1	0,688	0,279	Valid
	XM2.2	0,765	0,279	Valid
	XM2.3	0,676	0,279	Valid
	XM2.4	0,579	0,279	Valid
	XM2.5	0,533	0,279	Valid
	XM2.6	0,547	0,279	Valid
	XM2.7	0,567	0,279	Valid
Y. Project Evaluation	Y1	0,688	0,279	Valid
	Y2	0,765	0,279	Valid
	Y3	0,676	0,279	Valid
	Y4	0,691	0,279	Valid
	Y5	0,667	0,279	Valid
	Y6	0,643	0,279	Valid

From table 4, it can be seen that all calculated r values are greater than the r table value (0.279). Thus, each questionnaire item is declared valid. The correlation range obtained (0.447–0.765) indicates a moderate to very strong relationship between the item scores and the total variable scores.

For example, in variable X1, the highest calculated r value reaches 0.717. This demonstrates that the questionnaire item regarding equipment mobilization is truly capable of representing the material and equipment cost construct. Meanwhile, in variable X7, the lowest correlation value is 0.447, which is still above the threshold value; therefore, all questions within this variable remain valid.

Based on these results, it can be concluded that the questionnaire instrument has adequate construct validity and is therefore suitable for use in research data collection.

Reliability Test Result

Table 5. Instrument reliability test result

Variable	Item Number	Cron-bach's Alpha	Remark
X1 – Initial Investment Cost	5	0,741	Reliable
X2 – Infrastructure Lifespan	5	0,783	Reliable
X3 – Infrastructure Quality	5	0,732	Reliable
X4 – Compliance with Contract	4	0,743	Reliable
X5 – Human Resource Competence	5	0,851	Reliable
X6 – Handover Conformity	4	0,765	Reliable
X7 – Local Culture	4	0,713	Reliable
XM1 – Life Cycle Cost Analysis	5	0,773	Reliable
XM2 – Project Performance	7	0,792	Reliable
Y – Evaluation Model	6	0,812	Reliable

Table 5 shows the Cronbach's Alpha values for each variable in this study. All variables

have Cronbach's Alpha values above 0.70, indicating that the questionnaire instrument has high reliability and is suitable for further analysis. This value indicates that each construct has a good level of internal consistency, meaning that its constituent items are able to measure the same concept in a stable manner.
The variable with the highest reliability is Human Resource Competence (X5), with a Cronbach's Alpha value of 0.851. This value indicates a very strong level of consistency among the items within the variable. This is reasonable considering that human resource competency aspects are usually assessed uniformly by respondents, as they involve clear indicators such as technical ability, work experience, and professionalism that are relatively easy to identify.

Meanwhile, the variable with the lowest reliability, although still classified as high, is Culture (X7), with a value of 0.713. This value remains within the Reliable category, but is slightly lower because cultural factors are often perceived subjectively and may vary among respondents depending on their backgrounds and individual experiences.

Other variables such as Initial Investment Cost (X1), Infrastructure Lifespan (X2), Infrastructure Quality (X3), Compliance with Contract (X4), and Handover Conformity (X6) also show Cronbach's Alpha values ranging from 0.732 to 0.783, which fall within the Reliable category and indicate that all items within these variables have a good level of homogeneity.

Furthermore, the variables acting as mediators and dependent variables, namely Life Cycle Cost Analysis (XM1), Project Performance (XM2), and Evaluation Model (Y), have Cronbach's Alpha values of 0.773, 0.792, and 0.812, respectively. These values reinforce that the constructs within this research model possess consistent reliability and can be trusted to represent the theoretical concepts being measured [19].

Overall, the results of this reliability testing confirm that all variables in the questionnaire have a high level of reliability. Therefore, this research instrument can be relied upon to collect consistent and accurate data and can be reused under similar conditions without causing significant differences in results.

Project Risks Mapping

Perception-based data obtained from 50 respondents were analyzed to estimate the likelihood of occurrence for each risk variable. The mean value of the Likert scale responses was used to represent the likelihood level of risk occurrence in accordance with the research methodology framework. The higher the mean value obtained, the greater the likelihood that the variable becomes a source of risk in the implementation of road infrastructure projects.

The results of the descriptive statistical analysis and risk likelihood levels can be seen in Table 6.

Tabel 6. Descriptive Statistics and Risk Likelihood Levels

Variable	Mean (Likert)	Risk level
X1 – Initial Investment Cost	3,10	Moderate
X2 –Infrastructure Lifespan	2,95	Moderate
X3 –Infrastructure Quality	3,60	High
X4 – Compliance with Contract	3,85	High
X5 – Human Resource Competence	4,20	Very High
X6 – Handover Conformity	3,75	High
X7 – Local Culture	3,30	Moderate

Based on the results in Table 4, the Human Resource Competence variable (X5) has the highest mean value of 4.20 and falls into the very high-risk category. This indicates that human resource competence is the factor that most significantly influences project risk potential, as supported by references from previous studies [20], [21], [22]. Low technical capability, lack of work experience, and weak field supervision can increase the likelihood of work delays, quality deterioration, and project cost overruns.

In addition, the Compliance with Contract variable (X4) and Handover Conformity variable (X6) are also classified as high-risk categories, with mean values of 3.85 and 3.75, respectively. This condition indicates that non-compliance in work implementation with contract specifications, as well as issues in the project handover process, remain major sources of risk in the implementation of road infrastructure projects [23].

The Infrastructure Quality variable (X3) obtained a mean value of 3.60 and is included in the high-risk category. This indicates that the quality of construction work implementation still has the potential to affect project success, particularly with respect to infrastructure service life and future maintenance cost requirements [24], [25].

Meanwhile, the Initial Investment Cost variable (X1), Infrastructure Lifespan variable (X2), and Local Culture variable (X7) fall into the moderate-risk category, with mean values ranging from 2.95 to 3.30. These variables still need attention because they can affect the effectiveness of project implementation, although their risk levels are relatively lower than those of the other variables [26], [27].

Overall, the risk mapping results indicate that human resources, contract compliance, and handover conformity are the dominant risk factors in road infrastructure projects. Therefore, more focused mitigation strategies are required, particularly in improving workforce competence, monitoring contract compliance, and controlling work quality so that project risks can be minimized

.

CONCLUSION

This study aims to develop an evaluation instrument for road infrastructure projects implemented by small-qualified local contractors in Papua. Based on the research results, it can be concluded that all questionnaire items in the research instrument are valid because they have calculated r values greater than the r table value (0.279). In addition, all variables also show Cronbach's Alpha values above 0.70, indicating that the research instrument is Reliable and suitable for use in the main research data collection.

The risk mapping results indicate that Human Resource Competence (X5) is the most dominant risk factor, with a very high-risk level and a mean value of 4.20. Other variables that also have high-risk levels are Compliance with Contract (X4), Handover Conformity (X6), and Infrastructure Quality (X3). These findings indicate that the low quality of road infrastructure work outcomes is influenced not only by technical construction aspects but also by workforce capability, understanding of contract requirements, and quality control of work implementation in the field.

Meanwhile, the Initial Investment Cost (X1), Infrastructure Lifespan (X2), and Local Culture (X7) variables fall into the moderate-risk category. Although their risk levels are lower, these variables still influence project success and need to be considered in the management process of road infrastructure projects.

Overall, this study demonstrates that the development of a risk-based evaluation model can be an effective approach for assessing the quality of road infrastructure project implementation by local contractors. The findings also emphasize the importance of improving human resource competence, strengthening supervision of contract compliance, and enhancing the quality of the work handover process to ensure that the infrastructure constructed achieves the planned quality and service life. Therefore, the evaluation model developed is expected to support the sustainability of infrastructure development and improve the effectiveness of government budget utilization in Papua.

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