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Identifying and Analyzing Risks of Under Bid Price Contracts on Government Construction Projects in West Sumatra

Amy Rahmadian Puteri[1*], Akhmad Suraji[2], Benny Hidayat[3]
[1,2,3] Civil Engineering, Faculty of Engineering, Universitas Andalas, Indonesia
*Corresponding Author, e-mail: rahmadianputri56@gmail.com

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ABSTRACT

This study analyzes the risks associated with under bid price contracts on construction projects in West Sumatra, a phenomenon that shows a significant increase from 7.28% in 2015 to 32% in 2020. This study is focused on the local context of West Sumatra, providing new insights into competitive dynamics and business practices that may be unique to this region, in contrast to previous studies that may be general or regional in nature. The research objective is to identify and analyze the risk factors that arise from this under bidding practice. Through a specially designed questionnaire survey distributed to 30 local contractors in West Sumatra, and data processing using the SIRISPRO application, this study quantified and identified three main risks: specification deviations and design changes, contract criticism, and price increases during execution. The results showed that contractors responded to these risks by conducting evaluation and inspection of specifications, correction of deviations, and evaluation of personnel and acceleration of work. The implication of these findings is the need to evaluate government project contract management policies, particularly related to bidding regulations and more comprehensive bid evaluation, to mitigate the risk of under bidding and ensure the sustainability of quality construction projects in West Sumatra.

Keywords: *Under Bid Price Contracts; Construction Project Risk; West Sumatra; Local Contractors; Public Policy.*

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INTRODUCTION

In government construction projects in West Sumatra, the practice of under bid pricing by contractors is a crucial issue that poses significant risks. This practice, characterized by a sharp increase in bids below 80% of the Self Estimate Price (HPS) from 7.28% in 2015 to 32% in 2020 [1] has great potential to disrupt the smoothness and quality of the project, even leading to financial and reputational losses for contractors and local governments. Risks that arise include unexpected material cost increases, work volume discrepancies that lead to disputes, and work damage due to compromised quality [2].
This research aims to:

1. Identify the risks posed by under bid price contracts owned by contractors on government construction projects in West Sumatra.
2. Analyze these risks from the contractor's perspective, including causal factors and their impact on the project.

The benefits of this research are that it can provide guidelines for contractors in carrying out risk management for under bid price contracts, and provide recommendations for local

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governments in formulating more effective policies related to the procurement of construction projects.

The increasingly widespread practice of under bidding is a serious concern, as shown by the data on the increase in bids below 80% of the HPS [1]. Azani N.'s (2023) [2] research highlights the impact of under bidding on contract termination and local losses, but has not comprehensively identified the specific risk factors faced by local contractors. This study fills that gap by identifying and analyzing the risks of under bid pricing from the perspective of contractors in West Sumatra, including the factors that trigger this practice and how they adapt to it.

The initial stage taken to determine risk factors is to identify risks. Risk identification is the process of recognizing and describing risks that have the potential to affect the objectives of a project. After identification, risk analysis is carried out to evaluate the potential impact and likelihood of risks occurring, and prioritize risks that require further action with the steps of risk identification, risk assessment, risk evaluation.

Risk is the possibility of an event that has a negative impact on the achievement of organizational goals based on DKI City Government No. 122 of 2020[3] concerning the implementation of risk management in the government of the Special Capital Region of Jakarta Province. In construction projects, risk is an event that can occur and can have an impact on the objectives of the project.

Based on ISO 31000: 2018 [4]on risk management that the risk management process consists of 5 (five) stages as shown in Figure 1.

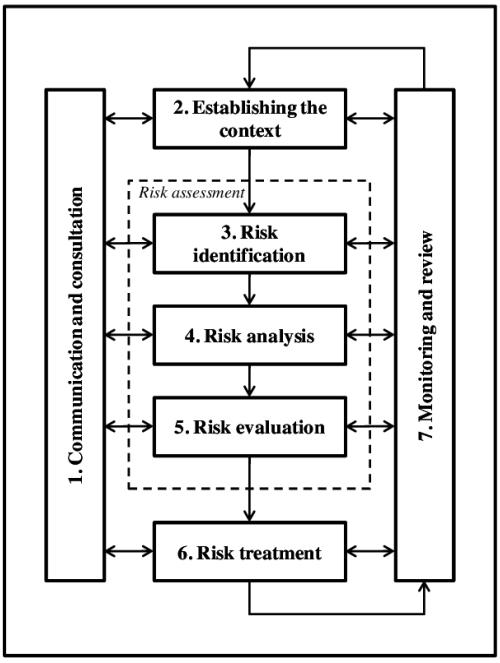

Figure 1. ISO 31000:2018 Risk Management Process

When doing risk identification, there are several things that need to be known, namely where the risks are, the causes of the risks and what methods can be used to identify risks. The methods that can be used in risk identification are as follows [5]:

- Documentation Reviews
- Checklists

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- Through interviews and group discussions
- Through surveys and questionnaires

To analyze risk is to use previously obtained information to determine how often the event or risk may occur and how much impact it may have. Risk analysis is the stage of estimating what will happen if a decision is made. A risk analysis can be done with the help of tools and techniques [6], including:

1. Qualitative Risk Analysis
   This method begins by conducting a probability analysis of the object to be studied and continues with a sensitivity analysis to assess changes in elements through the decision to be chosen.
2. Quantitative Risk Analysis
   Quantitative analysis begins with data collection activities using questionnaire and interview methods. After the results of the questionnaire are obtained, the next stage in the quantitative analysis method is to assess the level of risk importance to determine which risks are most influential on bridge construction projects. The equation for calculating the risk importance value can be seen in equation 1.

   $$R = P(xi) \text{ X } P(yi) \quad (1)$$

   information:
   R = Risk
   P(xi) = Probability of an event
   P(yi) = Potential scale of impact

Risk monitoring and control contains actions that can be taken to reduce potential risks. The process of selecting and developing the most effective risk treatment is:

- Identify options to reduce the likelihood or consequences of each extreme or high risk.
- Determine the benefits and costs of each option, including the likely impact on the organization if the risk occurs,
- Determining the best option for the project
- Developing a detailed Risk Action Plan

Risk control planning is the process of developing options and determining the most effective actions that are expected to increase opportunities and reduce risks that are viewed from the negative side, namely challenges.

METHOD

This research uses a quantitative approach with a survey method. Data was collected through questionnaires distributed to contractors operating in West Sumatra. The population in this study were all contractors involved in government construction projects in West Sumatra. Given the large population and limited resources, this study used purposive sampling technique or sampling based on objectives. The sample selection criteria are contractors with a small classification who have experience in handling under bid price contracts on government construction projects in West Sumatra with a project value below 10M and funds sourced from the APBN and APBD in West Sumatra. The number of samples selected was 30 contractors. This number is considered representative to describe the phenomenon under study, given the limited time and research resources. Data on contractors who bid below the bid price below 80% of the bid price is obtained from the grouping of contractors seen on the lpse.com web. The purposive sampling technique was chosen because this study aims to obtain in-depth information from contractors who have experience in handling under bid price contracts. The specific sample selection criteria ensured that the respondents had knowledge and experience relevant to the research topic.

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The questionnaire used in this study has gone through a validation and reliability process. Validation was conducted by seeking input from experts in the field of construction and risk management to ensure that the questions in the questionnaire were relevant and in line with the research objectives. Reliability was tested using Cronbach's Alpha method to measure the internal consistency of the questionnaire. The Cronbach's Alpha value obtained was 0.85, which indicates that the questionnaire has a high level of reliability. A rigorous validation and reliability process, including a pilot survey, ensured that the data collected was valid and reliable. This is important to ensure that the research results can be justified. The framework of this research includes the following figura 2:

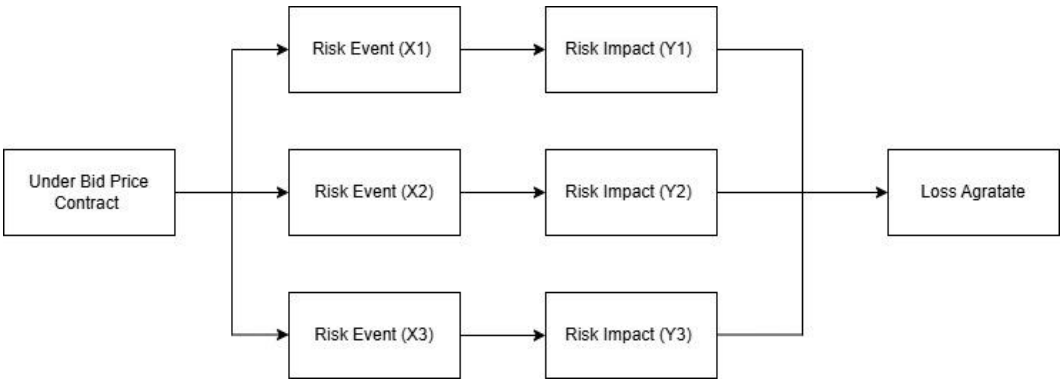

Figure 2. Framework of Thought

The data collected was analyzed quantitatively using the SIRISPRO [7] application. The risk analysis method used is qualitative risk analysis. This method was chosen because it is considered suitable for identifying and analyzing risks that are complex and not well structured, as well as limited quantitative data available. Qualitative risk analysis is carried out by assessing the impact and likelihood of occurrence of the risks that have been identified. This assessment was carried out based on the perceptions of experts and the experience of the contractors measured through a Likert scale (1-5). The probability value is used as a reference value to determine the probability of a risk occurring. The results of qualitative risk analysis with the SIRISPRO application are used to determine risk priorities and formulate appropriate mitigation strategies. The use of the SIRISPRO application consists of 7 elements, namely Risk Criteria, Risk Identification, Risk Analysis, Risk Evaluation, Risk Response, Risk Analysis, and Risk Evaluation. The use of qualitative risk analysis with the SIRISPRO application allows researchers to identify and analyze complex risks effectively, especially with limited data. A Likert scale was used to quantify the qualitative risk assessment.

Risk identification is an important first step in risk management to identify potential threats that can affect the success of a project or organization. In identifying the risks that exist for the risk of under bid price contract, it is done by literature study and using a pilot survey. The following are the results of the identification of literature studies to determine the risk factors resulting from the Under Bid Price Contract can be seen in table 1.

Table 1. Risk Factors Based on Literature

No	Variable	Source
1	Delayed mobilization [8]	Zou & Zhang (2009)
2	Specification deviation and design change [6]	Luo (2021)
3	The critical contract [9]	Bahadur Bista & Dahal (2018)
4	Price increases during project implementation [8]	Zou & Zhang (2009)

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5	Discrepancies between the volume of work in the contract and field conditions.[10]	Letarge dkk (2016)
6	Early deterioration of work results [11]	Farooqui & Ahmed (2018)
7	Strikes by the workforce while the project is in progress [6]	Luo (2021)
8	Lack of personnel who have experience in construction management [12]	Tariq Hussain Khan dkk (2015)
9	Payments to subcontractors/suppliers are late [9]	Bahadur Bista & Dahal (2018)
10	Pemutusan kontrak [13]	Tower (2015)
11	CCO request by service supplier [12]	Tariq Hussain Khan dkk (2015)
12	Cash flow of non-current contractors [8]	Zou & Zhang (2009)
13	Fall of workforce from height [13]	Tower (2015)

Probability values are used as reference values to determine the probability of a risk occurring. Table 2 is an example of the probability level for identifying risks [14] .

Table 2. Probability Criteria

Frequency	Qualitative Descriptions	Quantitative Descriptions	Probability		
			Mentions	Code	Rate
1 time in a project period	Almost impossible	Probability : 1% - 20%	Very Small	VS	1
1-2 times in a project period	Low probability of occurrence	Probability : 21% - 40%	Small	S	2
3-4 times in a project period	Probability of occurrence and non-occurrence are similar	Probability : 41% - 60%	Medium	M	3
4-5 times in a project period	Most likely to happen	Probability : 61% - 80%	Great	G	4
>5 times in a project period	Almost Certain to Occur	Probability : 81% - 99%	Very Large	VL	5

Impact is a deviation from project goals or objectives. The impact that will be studied is the impact on quality, cost, time, and work safety which will affect the total project cost. For an example of the impact scale, refer to Table 3 below[15] :

Table 3. Impact on Project Cost

Type of Impact	1	2	3	4	5
	Not Significant	Small	Medium	Great	Catastrophe
Cost	Over Budget > 0,1% - 0,5%	Over Budget > 0,5% - 1%	Over Budget > 1% - 1,5%	Over Budget > 1,5% - 2%	Over Budget > 2%

Identifying types of impacts includes the types of impacts that are relevant to the company's experience as seen in the internal and external context-setting results.Impact types include:

a. Impact on costs

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b. Impact on quality
c. Impact on time
d. Impact on work safety

Determine sufficient impact levels for each impact especially between adjacent levels [7].

Table 4. Contractor Outcome Risk Probability Criteria Value

Scale	Figures	Probability Value
Very Small	1	0.1
Small	2	0.3
Medium	3	0.4
Great	4	0.5
Very Large	5	0.9

Probability levels aim to establish sufficient probability so that risks can be assigned an appropriate probability value [7].

Table 5. Contractor Outcome Risk Impact Criteria Value

Type of Impact (%)	Likert Scale				
	1	2	3	4	5
	Not Significant	Small	Medium	Great	Katastrofe
Cost	0,5	1	1,5	2	2,5
Quality	0,5	1	1,5	2	2,5
Time	0,5	1	1,5	2	2,5
Work Safety	0,5	1	1,5	2	2,5

RESULTS AND DISCUSSION

This study identifies and analyzes the risks associated with under bid price contracts on construction projects in West Sumatra from the perspective of local contractors. Based on a survey of 30 contractors operating in West Sumatra and under bid price data for 2021-2023 obtained from LPSE (lpse.com) as shown in Figure 3, this study found 13 risk factors that significantly affect the success of projects with under bid price contracts.

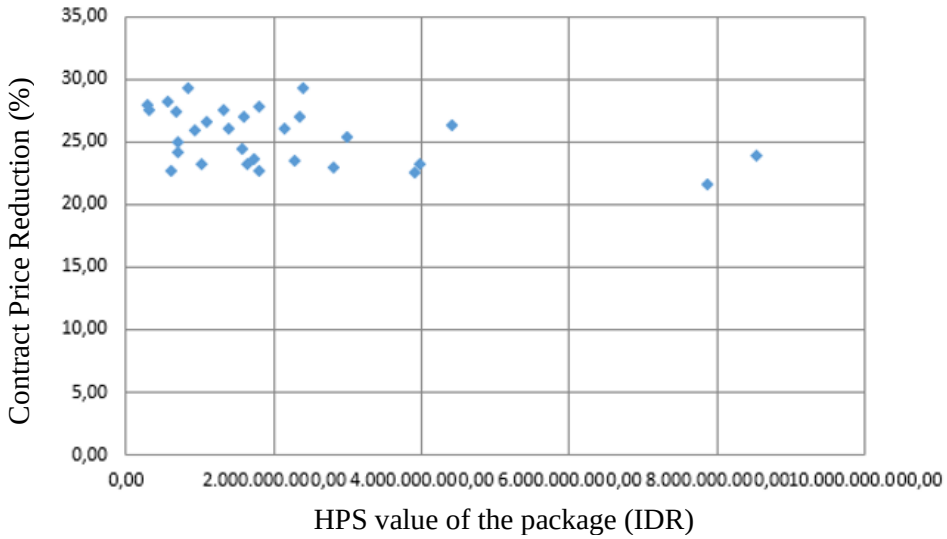

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Figure 3. Projects of Under Bid Price Contract in West Sumatra Province

The application work is carried out by distributing questionnaires to contractors, from the data obtained in the questionnaire then inputted into the SIRISPRO application.
Risk impact consists of 4 (four) factors, namely impact on quality, impact on cost, impact on time, impact on work safety. The risk impact assessment of the contractor is subjective in which the impact value is filled in directly by the contractor. After obtaining the probability and impact values of the existing risks, the potential loss calculation is carried out.

$$PL = \left(P_{(E0)} x P_{(E1M)}\right) + \left(P_{(E0)} x P_{(E1B)}\right) + \left(P_{(E0)} x P_{(E1W)}\right) + \left(P_{(E0)} x P_{(E1K)}\right) \quad (2)$$

Information:
PL = *potential Loss (%)*
$P_{(E0)}$= Probability of Risk Occurrence
$P_{(E1M)}$= Probability of Impact on Quality
$P_{(E1B)}$ = Probability Impact on Cost
$P_{(E1W)}$ = Probability Time on Impact
$P_{(E1K)}$ = Probability Impact on Work Safety
The application work is carried out by distributing questionnaires to contractors, from the data obtained in the questionnaire then inputted into the SIRISPRO application. The following are the results of the risk value from running the application.

Tabel 6 : Risk Score

No	Risk Code	Risk Source	Project Risk	Risk Triggering Factors	Probability (P)	Impact (I)				Potential Loss (%)	Risk Category
						Quality	Cost	Time	Work Safety		
1	X1	Project Procurement Management	Delayed mobilization	1. Late down payment guarantee	0,6	1,5	2,	2,	0,5	3.6	low
2	X2	Project Quality Management	Specification deviations and design changes	1. Insufficient cost budget 2. Difficulty meeting specs	0,6	2,	2,	2,	1,	4.2	Medium
3	X3	Manajemen Sumber Daya Proyek	Critical contract	1. Low productivity 2. Limited personnel	0,6	2,	2,	2,	1,	4.2	Medium
4	X4	Project Resource Management	Price increase during project implementation	1. Materials have increased 2. Material delivery process is	0,8	2,	2,	1,5	1,	5.2	Medium

				disrupted 3. The existence of inflation							
5	X5	Project Schedule Management	Discrepancies between the volume of work in the contract and field conditions.	1. There is pressure to submit bills	0,6	1,5	2,	2,	1,	3.9	low
6	X6	Project Quality Management	Early deterioration of work results	1. Out of specification	0,6	2,	2,	1,5	1,	3.9	low
7	X7	Manajemen Sumber Daya Proyek	Strikes by workers while the project is in progress	1. Workers' wages are not paid 2. Workers' wages are not in accordance	0,3	1,5	1,5	1,5	1,	1.65	low
8	X8	Project Resource Management	Lack of personnel who have experience in construction management	1. Productivity levels of workers and equipment decrease 2. Inexperienced subcontractors	0,6	1,5	1,5	1,5	1,5	3.6	low
9	X9	Manajemen Biaya Proyek	Payment to subcontractors/suppliers is late	1. Under-budgeted contractor costs 2. Late term payment	0,6	1,5	1,5	1,5	1,	3.3	low

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10	X10	Project Schedule Management	Contract termination	1. Improper implementation method 2. Lack of funding for the work	0,6	1,5	2,	2,	1,	3.9	low
11	X11	Project Schedule Management	CCO request by the provider	1. Service users have difficulty fulfilling the contract	0,6	1,5	2,	2,	1,	3.9	low
12	X12	Project Cost Management	Cash flow of non-current contractors	1. Delayed advance payment	0,6	1,5	2,	1,5	1,	3.6	low
13	X13	Project Risk Management	Workers fall from heights	1. Workers get sick 2. Not meeting work safety standards	0,3	1,	1,	1,	1,5	1.35	low

Based on Table 1, the three main risks with the highest risk scores are:

1. X4 - Price increase during project execution: This risk has the highest loss potential (5.2%) and is triggered by a combination of internal (material price increase) and external (inflation, delivery disruption) factors.
2. X2 - Specification deviations and design changes: This risk has a loss potential of 4.2% and is triggered by budget constraints and difficulty meeting specifications. Under bidding exacerbates this risk as contractors are encouraged to look for ways to reduce costs, including by compromising quality or changing designs without approval.
3. X3 - Critical contract: This risk also has a loss potential of 4.2% and is triggered by low productivity and personnel limitations. Under bid price contracts often have strict clauses that are unfavorable to the contractor, increasing the risk of disputes or contract termination.

The findings of this study are largely in line with previous research conducted by Azani N (2023) which also identified under bid price has a lot of influence and triggers the termination of the contract which results in the risk of regional losses. The difference may lie in the weighting of each risk, which can be influenced by the local context and project characteristics. This research specifically highlights the risks associated with under bid price contracts in West Sumatra, which have not been widely explored in previous research, especially in relation to their impact on small contractors.

The results of this study provide practical implications for project contract risk management, especially in the context of under bidding.

1. For Contractors: Contractors need to be more careful in preparing price quotes, considering fluctuations in material prices, labor productivity, and potential design changes. The use of contingency plans and good cash flow management is essential.
2. For the Government: Local governments need to review the procurement and bid evaluation process for construction projects. Focus not only on the lowest price, but also on the contractor's ability to complete the project with good quality. An early warning system mechanism to detect potentially dangerous under bidding should also be considered. In addition, risk management training for small contractors can help improve their capacity to manage project risks.

CONCLUSION

This study successfully identified and analyzed the risks associated with under bid price contracts on construction projects in West Sumatra from the perspective of local contractors. Based on a survey of 30 contractors, this study identified 13 risk factors that significantly affect the success of projects with under bid price contracts. The three highest risks identified were:

1. Deviations in specifications and design changes: This risk arises from insufficient cost budget and difficulty in meeting predetermined specifications.
2. Critical contracts: This risk is triggered by low productivity and limited competent labor.
3. Price increase during project execution: This risk is caused by rising material prices, disruptions in the material delivery process, and inflation.

Contractors in West Sumatra respond to these risks in various ways, including:

1. Evaluating and scrutinizing the specifications and technical requirements of the work that has been carried out.
2. Correcting deviations from specifications and evaluating field personnel.
3. Accelerating work by adding personnel and adequate equipment.
4. Preparing and increasing construction costs and providing warning letters prior to Change Order (SCO).
5. Conducting price surveys before submitting price quotations.

These findings underscore the importance for contractors to be more careful in preparing price quotations and anticipating potential risks that may arise from under bid price contracts.

This study has several limitations, including:

1. The number of contractors involved in the survey (30 respondents) may not be fully representative of the entire population of contractors in West Sumatra.
2. This study only used the questionnaire survey method. The use of other methods, such as in-depth interviews or case studies, may provide deeper insights into the risk of under bid price.
3. This research only focuses on the contractor's perspective. Perspectives from other parties, such as project owners or consultants, are also important to consider.

Future research can address these limitations by:

1. Increasing the sample size and involving more contractors of different scales and specialties.
2. Using diverse data collection methods, such as in-depth interviews with experts or case studies on projects that experienced problems due to under bid price.
3. Involving other parties involved in construction projects, such as project owners, consultants, and local governments, to gain a more comprehensive understanding of the risk of under bid price.
4. Further research on the factors that influence contractors' decision to take under bid price contracts, including internal company factors and external conditions of the construction market.

5. Develop a predictive model to identify potential under bid price risks at the project planning stage.

The results of this study have important implications for government construction project management policy in West Sumatra. Local governments need to consider revising regulations related to the procurement of goods and services, especially those related to the bidding process. Stricter policies are needed to prevent under bidding practices that harm contractors and project quality. In addition, local governments also need to improve supervision of the implementation of construction projects to ensure that contractors comply with established quality standards.

REFERENCE

[1] S. S. & P. Yaya, "Penawaran Penyedia Di Bawah 80% Hps: Permasalahan Dan Alternatif Solusi," 2021.
[2] N. Azani, "Studi Kertekaitan Under Bid Price, Pemutusan Kontrak, Dan Resiko Kerugian Daerah," 2023.
[3] Pergub Dki No 122 Tahun 2020, "Pergub Dki No.122 Tahun 2020," 2020.
[4] L. J. Susilo, *Iso 31000 : 2018*. Indonesia: Jakarta : Grasindo, 2018.
[5] Project Management Institute, *The Standard For Project Management And A Guide To The Project Management Body Of Knowledge (Pmbok Guide)*. 2021.
[6] C. Luo, "Analysis Of The Potential Risks Of Winning The Bid At A Low Price In Construction Project Management," 2021.
[7] S. Febrianto Niusli, "Model Proses Manajemen Risiko Pembengkakan Biaya Proyek Konstruksi Gedung Akibat Pandemic Di Kota Padang," 2022.
[8] P. X. W. Zou And G. Zhang, "Managing Risks In Construction Projects:Life Cycle And Stakeholder Perspectives," *International Journal Of Construction Management*, Vol. 9, No. 1, Pp. 61–77, 2009, Doi: 10.1080/15623599.2009.10773122.
[9] S. Bahadur Bista And K. R. Dahal, "A Review On Assessment Of Low Bidding In Bridge Construction Of Nepal," *International Journal Of Research-Granthaalayah*, Vol. 6, No. 10, P. 71, 2018, Doi: 10.5281/Zenodo.1475391.
[10] B. Letarge, E. T. Quezon, And Y. C. Macarubbo, "Evaluation On The Performance Of Lowest Responsive Bid Contract And The Quality Of Materials Used On Governmental Building Projects In Jimma Town," *Int J Sci Eng Res*, Vol. 7, 2016, [Online]. Available: Http://Www.Ijser.Org
[11] R. U. Farooqui And S. M. Ahmed, "Assessing Impacts Of Low-Bid Environment On Performance Of Public Work Projects: A Case Study Of Pakistan."
[12] B. Tariq Hussain Khan, A. Qadir Khan, T. Hussain Khan, T. Hussain Khan A, And A. Qadir Khan Σ, "Effects Of Lowest Bidding Bid Awarding System In Public Sector Construction Projects In Pakistan," *Type: Double Blind Peer Reviewed International Research Journal Publisher: Global Journals Inc*, Vol. 15, 2015.
[13] M. & B. D. Tower, "Risk Pricing In Construction Tenders – How, Who, What," 2015.
[14] I. Duha, *Tren Penawaran Dibawah 80% Hps Untuk Memenangkan Paket Tender Pekerjaan Konstruksi Studi Kasus Pada Balai Pelaksana Pemilihan Jasa*. 2023.
[15] P. Studi, T. Sipil, W. Boy, R. Erlindo, D. Ridho, And A. Fitrah, "Jurnal Rivet (Riset Dan Invensi Teknologi) Faktor-Faktor Penyebab Keterlambatan Proyek Konstruksi Gedung Kuliah Pada Masa Pandemi Covid 19," 2021.