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Beyond Winning the Tender: Evaluating Tender Strategies for Improved Return on Investment Using TOPSIS

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Abstract*. This study analyzes the relationship between tender strategy and Return on Investment (ROI) in construction service projects at PT Nuga Sigma Potenzia (NSP). Moving beyond winning the tender, selecting an appropriate strategy is essential for project financial performance, as bidding decisions directly impact profit optimization. This descriptive quantitative study employs a case study design, analyzing eight completed projects from the 2023–2025 period. Financial data were obtained from internal documents to calculate ROI, while strategy quality was evaluated through internal expert assessments. Strategy effectiveness was mapped using the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method. The findings indicate a positive alignment between tender strategy effectiveness and actual project profitability, though the relationship is non-linear across all cases. Strategies emphasizing cost estimation accuracy, technical document quality, and team readiness generate a higher ROI than those solely focused on the lowest bid price. These findings provide practical implications for PT NSP in establishing a multi-criteria decision-making framework to evaluate tender practices.*

Keywords*: Construction Service Project; Project Financial Performance; Return on Investment; Tender Strategy; TOPSIS Method.*

1. INTRODUCTION

The construction sector in Indonesia is one of the strategic sectors that plays an essential role in supporting national economic growth. This sector is not only associated with infrastructure development but also contributes to industrial facilities, maintenance projects, rehabilitation activities, and various economic activities requiring construction services. Based on Gross Domestic Product (GDP) distribution by industrial sector during the 2020–2023 period, the construction sector contributed an average of approximately 10.21% to Indonesia's national GDP (Statistics Indonesia**,** 2024). This contribution indicates that the construction sector remains one of the key pillars of Indonesia's economic development.

The growth of the construction sector has been followed by an increasing number of companies engaged in construction services at both national and regional levels. This condition has intensified competition among companies, particularly in projects obtained through tender mechanisms. Tendering has become a primary channel for construction firms to secure projects; therefore, the ability to prepare competitive bids, understand client requirements, and develop adequate technical and financial proposals is a critical success factor (Bohari et al., 2021). Tender competition does not only require low pricing strategies but also strong technical capability, relevant project experience, quality planning, and resource readiness for project execution.

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Tender strategy is a crucial component of decision-making in construction firms, as it is directly related to project acquisition opportunities and profit achievement. The tendering process is not merely about bid pricing, but also involves considerations of risk, competition level, win probability, and the firm's internal capacity to execute the project (Hanák et al., 2021). An effective tender strategy must balance price competitiveness, cost estimation accuracy, technical documentation quality, resource readiness, and the company's ability to complete projects within targets (Issah & Dadzie, 2024). Without a well-structured analysis, tender strategies may lead to project loss or acquisition of projects with suboptimal profit margins.

In the construction industry, winning a tender does not always guarantee financial success. Companies may win projects with competitive pricing, yet still face low profitability due to inaccurate cost estimation, weak cost control, or cost overruns during project execution (Dong et al., 2025). Tendering decisions are inherently multidimensional, involving trade-offs between win probability, competition intensity, project risk, and profitability targets (Hanák et al., 2021). Therefore, evaluating tender strategies should also be linked to project financial performance indicators to ensure that firms are not only focused on winning projects but also on achieving optimal profitability.

One of the key indicators used to evaluate project financial performance is Return on Investment (ROI). ROI measures the ability of a project to generate profit relative to the investment or cost incurred. In project management, ROI is widely used to assess project feasibility and attractiveness based on the financial benefits obtained compared to the resources invested (Surbakti & Asyriana, 2025). Achieving optimal ROI in construction projects requires accurate cost planning, effective cost control, and strong risk management from the early stages of the project. Proper cost planning and control are essential to maintain project profitability and minimize deviations from financial performance targets (Project Management Institute, 2021). Without a clear structure and integrated components, planning loses its applicability within an organization. Effective planning requires not only the establishment of objectives but also a well-defined conceptual framework that outlines its supporting elements (Chayadi, 2025).

PT Nuga Sigma Potenzia (NSP) is a construction service company specializing in industrial construction projects with technical and client-specific requirements. In its business operations, PT NSP regularly participates in tender processes as the main mechanism for project acquisition. The projects handled by PT NSP involve varying levels of technical complexity and risk, requiring precise tender strategy formulation, cost estimation accuracy,

human resource readiness, proposal quality, and early-stage risk management. In practice, although the company is relatively consistent in winning tenders, the Return on Investment across projects shows significant variation. This indicates that the implemented tender strategies do not always result in optimal financial performance.

This issue highlights the need for a more systematic and measurable evaluation of tender strategies. At the company level, tender strategy evaluation is generally still based on experience, practical judgment, and internal assessment. While these approaches remain important, they are not sufficient to fully capture the relationship between tender strategy quality and actual financial outcomes. Therefore, an analytical method that can evaluate tender effectiveness based on multiple criteria is required. One suitable approach is the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS). TOPSIS is a Multi-Criteria Decision-Making method introduced by Hwang and Yoon (1981), which determines the best alternative based on its closeness to the ideal positive solution and distance from the negative ideal solution (Chen, 2021).

Previous studies on construction tendering have generally focused on tender winning probability, bidding strategies, risk evaluation, or contractor selection (Mac-Barango, 2022). However, studies that specifically link tender strategy to actual project financial performance, particularly using ROI as an indicator, remain limited. In addition, PT NSP does not yet have a structured multi-criteria evaluation framework that connects tender decisions with realized project financial outcomes. This gap forms the basis for conducting this study, especially in the context of construction service companies facing competitive pressure while pursuing project profitability.

The novelty of this study lies in the integration of multi-criteria tender strategy evaluation with actual project financial performance measurement using Return on Investment in a construction company case study. Unlike previous studies that mainly focus on tender winning or cost risk analysis, this research links tender strategy with realized project financial outcomes. By applying the TOPSIS method, this study ranks the effectiveness of internal tender strategies based on technical, financial, and managerial criteria in a structured manner. Therefore, this study aims to analyze the relationship between tender strategy and Return on Investment in construction service projects at PT Nuga Sigma Potenzia using the TOPSIS method. The findings are expected to provide practical contributions for the company in evaluating tender strategies, improving bidding decision quality, and strengthening coordination among marketing, proposal, and project management functions.

2. THEORETICAL REVIEW

Tender strategy

Tender strategy refers to the approach used by companies in preparing project bids, including aspects of pricing, technical quality, resource readiness, risk management, and communication with clients (Gantika et al., 2025). This strategy is not only concerned with winning projects but also determines cost structure, profit margin estimation, and the company's readiness to execute the project after contract award. In the construction service context, tender strategy is a critical part of decision-making, as firms must simultaneously consider price competitiveness, technical capability, work experience, and project risk exposure.

An effective tender strategy should be developed systematically so that bidding decisions are not solely driven by the lowest price, but also by project feasibility and profitability considerations. The tendering process in construction projects involves multidimensional factors such as competition intensity, win probability, project risk, and corporate profitability targets (Hanák et al., 2021). Thus, tender strategy reflects the company's ability to balance project acquisition opportunities with long-term financial sustainability after project execution.

Tender strategy is also closely related to project governance quality, as decisions made during the bidding stage significantly influence project execution. Strengthening tender management and implementing a structured contractor selection process can improve project effectiveness and help companies control risks from the early stage (Ismail, 2024). Therefore, tender strategy should not be viewed merely as an administrative bidding activity, but as an integral part of project governance that affects both technical and financial performance.

Return on Investment as Project Financial Performance

Return on Investment (ROI) is a financial indicator used to measure the level of return generated from an investment based on the ratio between profit and costs incurred. ROI is commonly used to assess investment efficiency by evaluating how effectively an investment generates financial returns. In construction projects, ROI is used to evaluate project financial performance by comparing net profit to total project costs (Sadek 2022).

ROI plays an important role in evaluating project success because projects won through tenders do not necessarily generate optimal profits. Decisions made at the tender stage, such as bid pricing, cost estimation, resource allocation, and risk management, will affect the project's cost structure and margin. Therefore, ROI not only reflects the final outcome of

project execution but can also indicate the impact of the tender strategy that has been implemented from the early stages. Kerzner explains that ROI can be used to assess the attractiveness and feasibility of a project investment based on the financial benefits obtained compared to the costs incurred (Widadi & Sibarani, 2025).

In this study, the Return on Investment (ROI) formula is used to measure the level of project investment return based on net profit and total project cost. In general, ROI is calculated by comparing the difference between investment benefits and investment costs relative to total investment cost, multiplied by 100 percent (Sadek 2022). In the context of construction projects, the formula is adapted as follows:

$$ROI = \frac{\text{Net Profit}}{\text{Total Project Cost}} \times 100\%$$

A higher ROI value indicates better project financial performance. A high ROI reflects that the implemented tender strategy is able to generate an efficient cost structure, accurate pricing estimation, and adequate profit margins. Conversely, a low ROI may indicate weaknesses in cost estimation accuracy, aggressive bidding pressure, or suboptimal project risk management.

Relationship Between Tender Strategy and Project ROI

Tender strategy is closely related to project ROI because decisions made at the bidding stage directly influence project cost, risk exposure, and potential profitability. Well-designed tender strategies that consider cost estimation accuracy, technical readiness, document quality, and risk management can help companies secure projects that are not only technically feasible but also financially profitable (Binshakir et al., 2023). In contrast, overly price-driven tender strategies may increase the likelihood of winning bids but reduce profit margins if not supported by accurate cost calculations.

In construction tendering practice, competitive pressure often forces companies to reduce bid prices to remain competitive. However, a cost-focused tendering system may lead to pricing levels that negatively affect service quality and project profitability (Govender, Laryea, and Watermeyer 2023). This condition highlights the importance of balancing price competitiveness and financial feasibility in tender strategy formulation. Failure to achieve this balance may result in project acquisition with suboptimal ROI during execution.

The relationship between tender strategy and ROI is not direct but is formed through a series of decisions that influence project implementation. Tender decisions define initial cost boundaries, profit targets, planning quality, and resource readiness (Faraji et al., 2022). Therefore, evaluating tender strategy requires a multi-criteria approach that captures various dimensions simultaneously. In this study, this relationship is analyzed by comparing ROI values across several PT Nuga Sigma Potenzia projects and evaluating tender strategy effectiveness using a multi-criteria approach.

Multi-Criteria Decision Making in Tender Strategy Evaluation

Multi-Criteria Decision Making (MCDM) is a decision-making approach used to evaluate multiple alternatives based on several criteria. This approach is relevant when decisions cannot be determined by a single factor but require consideration of multiple interrelated aspects. In managerial contexts, MCDM helps decision-makers structure criteria, assign weights, compare alternatives, and prioritize decisions systematically (Taherdoost & Madanchian, 2023).

In construction projects, MCDM is particularly suitable for evaluating tender strategies, as bidding decisions involve technical, financial, and managerial criteria. These criteria may include cost estimation accuracy, bid document quality, team readiness, risk management, technical capability, and potential project profitability (Fawzy et al., 2024). Each criterion has different levels of importance and contributes to overall project success. Therefore, MCDM enables a more comprehensive and objective evaluation of tender strategies

One of the widely used MCDM methods is the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS). TOPSIS is a decision-making method that ranks alternatives based on their distance from the ideal positive solution and negative ideal solution (Ciardiello & Genovese, 2023). This method allows simultaneous evaluation of multiple criteria, producing a ranked order of alternatives from the most to least effective. TOPSIS is widely applied due to its systematic, transparent, and flexible structure in solving complex decision-making problems (Taherdoost & Madanchian, 2023).

In this study, TOPSIS is used to evaluate and rank the effectiveness of tender strategies across several construction projects at PT Nuga Sigma Potenzia. The evaluation considers technical, financial, and managerial criteria related to tender strategy quality. The resulting TOPSIS ranking is then compared with project ROI values to determine the extent to which effective tender strategies contribute to optimal financial performance.

Previous Studies

Several previous studies relevant to this research topic were used as references in examining tender strategy, bidding decision-making, project risk evaluation, and the application of multi-criteria methods in construction tender processes. These studies indicate that tender strategy is a complex decision-making process, as it is not only related to bid price but also involves risk considerations, competition intensity, company capability, and project profitability targets.

Research on factors influencing contractors' bidding strategies in public construction procurement shows that bidding decisions are not solely determined by price, but are also influenced by competition level, win probability, project risk, and corporate profit targets. This study employed a quantitative approach through contractor surveys and statistical analysis to identify the determinants of bidding strategy. The results indicate that bidding strategy is a multidimensional strategic decision that must be systematically evaluated to ensure that companies are not only focused on winning tenders but also on sustaining project financial performance (Hanák et al., 2021).

Another study examined tender strategy decision-making in construction projects by emphasizing cost estimation accuracy, time risk, and optimal profit determination. Using a quantitative approach based on historical project data, including cost and schedule performance records, the study applied reliability analysis to estimate the probability of cost overruns and schedule delays. The findings show that tender strategies incorporating quantitative risk considerations can help contractors set more accurate bid prices and optimize expected profits (Towner & Baccarini, 2025). This is relevant to the present study as it highlights that cost estimation accuracy and risk management are critical components of tender strategy that affect project profitability and return.

In addition to internal factors, tender strategy is also influenced by external conditions, particularly competition intensity in the bidding process. Research on contractors' bidding behavior in competitive construction tenders shows that the number of bidders and competition intensity significantly affect bidding strategies and pricing decisions. Using a machine learning-based quantitative approach and historical tender data, the study found that higher competition levels increase pressure on pricing strategies and profit margins (Oo et al., 2025). This supports the importance of systematic tender strategy evaluation, as bidding decisions are shaped not only by internal company readiness but also by market dynamics.

In the context of tender evaluation, Multi-Criteria Decision Making (MCDM) approaches have been widely applied to support complex decision-making processes involving multiple criteria. A study on a hybrid Fuzzy AHP-TOPSIS model for public procurement demonstrated that combining weighting and ranking methods can improve the structure of tender evaluation. Using procurement documents and expert judgment data, the study applied Fuzzy AHP to determine criteria weights and TOPSIS to rank alternatives. The results indicate that the hybrid model provides consistent ranking outcomes and supports decision-makers in selecting the best alternative based on technical and financial criteria (Özyürek & Erdal, 2023). This study is relevant as it confirms the applicability of TOPSIS in multi-criteria tender evaluation contexts.

The application of TOPSIS has also been used in decision support systems for selecting tender winners in construction projects. This study applied a quantitative MCDM approach using procurement data and interviews, analyzed with the TOPSIS method. The findings show that TOPSIS can consistently rank bidding alternatives and support a more structured contractor selection process (Putri & Nusraningrum, 2022). This further strengthens the justification for using TOPSIS in this study.

Based on the reviewed literature, it can be concluded that tender strategy is a strategic decision influenced by pricing, cost estimation accuracy, project risk, competition intensity, win probability, and profitability targets. Previous studies have extensively discussed bidding strategy, cost and time risk, contractor bidding behavior, and the application of TOPSIS in tender evaluation or contractor selection. However, studies that specifically link tender strategy quality with actual project financial performance using Return on Investment (ROI) remain limited. Furthermore, most existing studies focus on winning probability or ranking alternatives rather than integrating multi-criteria tender evaluation with realized financial outcomes.

Therefore, this study addresses this gap by evaluating the effectiveness of tender strategies using the TOPSIS method and linking the results with actual Return on Investment values in construction projects at PT Nuga Sigma Potenzia. The novelty of this study lies in its focus not only on tender decision-making or winning probability but also on its relationship with realized project financial performance. This research is expected to provide practical contributions for companies in developing a more structured, systematic, and profit-oriented tender strategy evaluation framework.

3. RESEARCH METHODOLOGY

Research Design

This study employs a quantitative approach with a case study design at PT Nuga Sigma Potenzia (PT NSP). The case study approach is selected because the research focuses on an in-depth analysis of the relationship between tender strategy and project financial performance measured using Return on Investment (ROI). This study integrates ROI analysis as a financial performance indicator and a Multi-Criteria Decision Making (MCDM) approach using the TOPSIS method to evaluate the effectiveness of tender strategies.

Object, Population, and Sample

The object of this study is construction projects undertaken by PT NSP that were obtained through competitive tendering processes. The population consists of all completed projects executed by the company. The sample was selected using a purposive sampling technique based on the following criteria: (1) projects obtained through competitive tendering, (2) completed projects, (3) availability of complete cost and revenue data, and (4) relatively similar project characteristics. Eight completed projects met all inclusion criteria, including complete financial records, comparable project characteristics, and consistent tender documentation; therefore, all eligible projects were included as the unit of analysis in this study.

Data Types And Sources

Primary data were obtained through expert judgment involving three internal experts directly engaged in the company's tender process, namely a Marketing Manager, a Project Manager, and an Estimator, each with more than five years of experience in construction tendering. The experts independently evaluated the quality of tender strategies using a five-point Likert scale based on three predefined criteria: cost estimation accuracy, technical document quality, and team readiness with risk management. The final score for each criterion was determined through consensus among the experts. Secondary data were collected from company documents, including project contracts, cost reports, and Project Cost Reports (PCR), which were used to calculate the Return on Investment (ROI) of each project.

Operational Definition of Variables

This study uses two main variables, namely tender strategy as the independent variable and Return on Investment (ROI) as the dependent variable.

Table 1. Operational Definition of Research Variables.

Variable	Analytical Aspect	Indicator	Scale
Tender Strategy	Cost estimation accuracy	Degree of alignment between estimated cost and actual project cost	1–5 Likert
Tender Strategy	Technical document quality	Completeness of work methods, schedule, and technical specifications	1–5 Likert
Tender Strategy	Team readiness & risk management	Availability of human resources and project risk mitigation	1–5 Likert
ROI	Project financial performance	Net profit relative to total project cost	Ratio (%)

ROI is calculated using the following formula

$$ROI = (Net\ Profit/\ Total\ Project\ Cost) \times 100\%$$

Net profit is obtained from the difference between contract value and total project cost, while total cost includes all direct and indirect costs incurred during project execution.

Data Collection Technique

Data collection was conducted using two methods: documentation and expert judgment. Documentation was used to obtain project financial data, while expert judgment was applied to assess tender strategy based on the predefined evaluation criteria.

Data Analysis Technique

Data analysis was conducted in two main stages: ROI analysis and TOPSIS analysis. Return on Investment (ROI) analysis was used to measure project financial performance based on the ratio between net profit and total project cost. A higher ROI value indicates better financial performance of the project.

The weights of the TOPSIS evaluation criteria were determined through expert judgment involving three internal experts. Each expert independently assigned weights to the three evaluation criteria based on their professional experience in construction tendering. The individual weights were then averaged and normalized so that the total weight equaled 1 before being applied in the TOPSIS analysis.

Subsequently, the TOPSIS method was used to evaluate the effectiveness of tender strategy based on three main criteria: cost estimation accuracy, technical document quality, and team readiness with risk management. The analytical steps include normalization of the decision matrix, weighting of criteria, determination of positive ideal and negative ideal solutions, and calculation of Euclidean distances to obtain the preference value (closeness

coefficient). The closeness coefficient (Ci) is used to rank the effectiveness of tender strategies, where a higher Ci value indicates a more effective strategy.

4. RESULTS AND DISCUSSION

Data Collection Process, Location, and Research Period

This study was conducted at PT Nuga Sigma Potenzia (PT NSP), a company engaged in industrial construction services. The research objects consist of eight construction projects obtained through competitive tendering processes. The analysis period covers 2023 to 2025, reflecting the company's operational conditions across multiple project cycles. Data collection was carried out using internal company documentation, including contract documents, Project Cost Reports (PCR), and tender administrative records. In addition, tender strategy assessment data were obtained through expert judgment from internal personnel directly involved in both the tendering process and project execution.

Criteria Weights for TOPSIS Analysis

The determination of criteria weights was conducted using expert judgment and subsequently normalized so that the total weight equals 1.

Table 2. TOPSIS Criteria Weights

Criterion	Description	Weight
K1	Cost estimation accuracy	0.37
K2	Quality of technical documents and proposal	0.27
K3	Risk management and team readiness	0.35
	Total	**1.00**

The weighting results indicate that cost estimation accuracy has the highest weight, suggesting that financial accuracy is the most dominant factor in evaluating tender strategy effectiveness

Tender Strategy Assessment Data

The tender strategy assessment data were obtained from the recap of expert judgment evaluations based on the three main criteria.

Table 3. Tender Strategy Assessment

Project Code	Cost Accuracy	Technical Document & Proposal Quality	Risk Management & Team Readiness
P1	4	4	4
P2	3	4	3
P3	4	4	5
P4	4	4	4
P5	3	3	3
P6	4	4	5
P7	5	5	5
P8	4	4	4

Based on the table, there is variation in tender strategy quality across projects. Project P7 shows the highest score across all criteria, while Project P5 records the lowest values. This indicates differences in planning quality and strategic readiness among the evaluated projects.

Project Return on Investment (ROI) Calculation

The financial performance analysis in this study employs the Return on Investment (ROI) approach to measure the level of return generated from each analyzed project. ROI is calculated based on the ratio between net profit and total project cost. Net profit is obtained from the difference between the contract value and total project cost, while total cost includes all direct and indirect expenditures incurred during project execution. All ROI calculations were conducted using Microsoft Excel based on financial data obtained from internal company documents. The results of ROI calculations for the eight projects are presented in Table 4.

Table 4. ROI Calculation Results.

Code	Year	Contract Value	Total Cost	Profit	ROI (%)
P1	2023	3,300,000,000	2,640,000,000	660,000,000	25
P2	2023	2,990,000,000	2,541,500,000	448,500,000	18
P3	2024	1,970,100,000	1,457,874,000	512,226,000	35
P4	2024	1,803,000,000	1,424,370,000	378,630,000	27
P5	2025	2,345,000,000	1,993,250,000	351,750,000	18
P6	2025	1,200,000,000	924,000,000	276,000,000	30
P7	2025	1,502,000,000	991,320,000	510,680,000	52
P8	2025	3,200,000,000	2,144,000,000	1,056,000,000	49

Based on Table 4, ROI values range from 18% to 52%, indicating variation in financial performance across projects. Project P7 achieves the highest ROI, followed by P8 and P3, while P2 and P5 record the lowest values. This variation reflects differences in cost management efficiency and profit generation capability across projects. Overall, projects with higher ROI demonstrate better execution efficiency and cost control. Interestingly, P7 achieves the highest ROI despite not having the largest contract value, indicating that financial performance is more strongly influenced by cost efficiency and profit margins than by contract size. Conversely, P2 and P5 exhibit low ROI despite moderate contract values, suggesting potential inefficiencies in cost management or suboptimal execution strategies. Overall, the variation in ROI values highlights differences in financial performance across projects, which forms the basis for further analysis of the relationship between tender strategy and financial performance using the TOPSIS method.

Project Financial Performance Analysis

The project financial performance analysis is conducted based on ROI values to examine variations across PT Nuga Sigma Potenzia's projects. The results show that ROI ranges from 18% to 52%, indicating significant differences in financial performance among projects. The highest-performing project is P7 (52%), while P2 and P5 record the lowest performance (18%). These differences indicate that profitability is not directly proportional to contract value. From an efficiency perspective, high-ROI projects such as P7 demonstrate more effective cost management compared to low-ROI projects. This suggests that cost efficiency and profit margins have a stronger influence on financial performance than contract size. In addition, no linear relationship is observed between contract value and ROI. Some projects with large contract values do not necessarily generate high ROI, indicating that execution efficiency is the dominant factor determining financial outcomes. Furthermore, project complexity does not consistently correspond to lower ROI, as several complex projects still achieve strong financial performance when supported by effective planning and control.

Tender Strategy Effectiveness Analysis Using TOPSIS

The evaluation of tender strategy effectiveness in this study uses the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method. This method is applied to determine the ranking of tender strategy effectiveness for each project based on its closeness to the positive ideal solution and distance from the negative ideal solution. The analysis is conducted using tender strategy assessment data, criteria weights, and processed decision matrix results. Detailed calculations are presented in the appendix, while this section focuses on the main analytical results. The evaluation is based on three main criteria: cost estimation accuracy, technical document quality, and risk management along with team readiness. These criteria represent the core aspects of tender strategy formulation that influence project execution effectiveness and financial performance.

Decision Matrix and Normalization

The decision matrix in the TOPSIS analysis is constructed based on the tender strategy assessment data presented in Subsection 4.2.3. This matrix serves as the initial dataset containing the performance values of each project against the evaluation criteria, namely cost estimation accuracy (K1), technical document quality (K2), and risk management and team readiness (K3). Subsequently, matrix normalization is performed to standardize the scale

across all criteria. Normalization is required because each criterion has different units and value ranges, making direct comparison inappropriate. Based on the calculation results, the normalization denominators for each criterion are obtained as follows: K1 = √123 = 11.09, K2 = √130 = 11.40, and K3 = √141 = 11.87.

Table 5. Normalized Decision Matrix.

No	Code	K1	K2	K3
1	P1	0.36	0.35	0.34
2	P2	0.27	0.35	0.25
3	P3	0.36	0.35	0.42
4	P4	0.36	0.35	0.34
5	P5	0.27	0.26	0.25
6	P6	0.36	0.35	0.42
7	P7	0.45	0.44	0.42
8	P8	0.36	0.35	0.34

All values have been standardized to a uniform scale, allowing objective comparison across projects. Overall, P7 exhibits the highest relative values across all criteria, particularly in risk management and team readiness (K3). This indicates that the tender strategy applied in this project demonstrates better preparedness compared to other projects. Meanwhile, P3 and P6 show stable and relatively high values across all criteria, indicating a well-balanced tender strategy. In contrast, P2 and P5 present lower values, particularly in K1 and K3, suggesting weaknesses in cost estimation accuracy and risk management. The next stage involves constructing the weighted normalized decision matrix, obtained by multiplying the normalized matrix by the respective criterion weights. This step incorporates the relative importance of each criterion into the evaluation process. The weights used in this study are K1 = 0.37, K2 = 0.27, and K3 = 0.35.

Table 6. Weighted Normalized Decision Matrix.

No	Code	K1	K2	K3
1	P1	0.13	0.14	0.09
2	P2	0.09	0.14	0.06
3	P3	0.13	0.14	0.11
4	P4	0.13	0.14	0.09
5	P5	0.09	0.10	0.06
6	P6	0.13	0.14	0.11
7	P7	0.16	0.18	0.11
8	P8	0.13	0.14	0.09

It can be observed that after applying the criteria weights, P7 still demonstrates the highest values across almost all criteria. This indicates that the tender strategy in this project is not only superior individually but also remains dominant after considering the relative importance of each criterion. In addition, P3 and P6 maintain consistent and balanced performance, while P2 and P5 remain in the lowest category. These results indicate that the

differences in tender strategy effectiveness remain consistent even after weighting adjustments. Thus, the weighted normalized decision matrix provides a more realistic representation of tender strategy evaluation by incorporating criterion priorities. The results of this stage serve as the basis for determining the positive ideal solution and negative ideal solution in the subsequent TOPSIS analysis.

Determination of Positive and Negative Ideal Solutions

At this stage, the positive ideal solution (A^+) and negative ideal solution (A^-) are determined based on the weighted normalized decision matrix. Since all criteria are classified as benefit criteria, the A^+ values are obtained by selecting the maximum values, while the A^- values are obtained from the minimum values for each criterion. Based on the results, the ideal solution values are as follows:

a. Cost Estimation Accuracy (K1): $A^+ = 0.16$ (represented by Project P7) and $A^- = 0.09$ (represented by Projects P2 and P5).
b. Technical Document and Proposal Quality (K2): $A^+ = 0.18$ (P7) and $A^- = 0.10$ (P5).
c. Risk Management and Team Readiness (K3): $A^+ = 0.11$ (P3, P6, and P7) and $A^- = 0.06$ (P2 and P5).

Overall, the positive ideal solution is dominated by Project P7, indicating the best performance across most criteria. Conversely, the negative ideal solution is mainly represented by Projects P2 and P5, indicating the lowest performance among the evaluated alternatives.

Distance Calculation to Ideal Solutions

The next step is to calculate the distance of each alternative from the positive ideal solution (D^+) and the negative ideal solution (D^-) using the Euclidean distance method. This calculation aims to determine the relative closeness of each project to the ideal condition. A smaller D^+ value and a larger D^- value indicate that an alternative is closer to the ideal solution. As an illustration, the results for each alternative are presented in Table 7.

Table 7. Distance to Ideal Solutions.

No	Code	D^+	D^-
1	P1	0.054	0.064
2	P2	0.095	0.040
3	P3	0.050	0.075
4	P4	0.054	0.064
5	P5	0.117	0.000
6	P6	0.050	0.075
7	P7	0.000	0.117
8	P8	0.054	0.064

Project P7 has a D^+ value of 0, indicating that it is located exactly at the positive ideal condition. This suggests that P7 represents the best-performing alternative among all projects. In contrast, P5 has a D^- value of 0, indicating that it is the farthest from the positive ideal solution or closest to the worst condition. Furthermore, Projects P3 and P6 show relatively low D^+ values and higher D^- values, indicating a good level of closeness to the ideal condition. Meanwhile, P2 exhibits a relatively larger distance from the positive ideal solution, indicating less optimal tender strategy performance.

Preference Value (Ci) Calculation and Comparative Analysis with ROI Performance

The preference value (Ci) is calculated to determine the relative closeness of each alternative to the ideal solution, where a higher value indicates greater effectiveness of the tender strategy. The TOPSIS ranking results are then directly compared with the actual Return on Investment (ROI) values and rankings of each project to evaluate the consistency between strategic planning and realized financial performance. The integrated results of this comparative analysis are presented in Table 8.

Table 8. Integrated Results of TOPSIS Preference Values and ROI Performance Comparison.

No	Project Code	D^+	D^-	Ci Value	TOPSIS Rank	ROI (%)	ROI Rank
1	P7	0.000	0.117	1.000	1	52	1
2	P3	0.050	0.075	0.600	2	35	3
3	P6	0.050	0.075	0.600	2	30	4
4	P4	0.054	0.064	0.542	4	27	5
5	P8	0.054	0.064	0.542	4	49	2
6	P1	0.054	0.064	0.542	4	25	6
7	P2	0.095	0.040	0.296	7	18	7
8	P5	0.117	0.000	0.000	8	18	7

Based on Table 8, there is a general tendency toward alignment between the effectiveness of tender strategies and actual financial performance outcomes. Project P7 consistently ranks first in both approaches, with a perfect Ci value of 1.000 and the highest ROI of 52%. Conversely, Projects P2 and P5 consistently occupy the lowest positions in both rankings. This pattern indicates that well-structured tender strategies that balance cost estimation accuracy, technical quality, and risk management contribute positively to higher project profitability.

However, the relationship between TOPSIS results and ROI performance is not entirely linear across all projects. Project P8 demonstrates strong financial performance (ROI of 49%, ranked 2nd), while its tender strategy evaluation places it only in the middle ranking (4th position). Conversely, Projects P3 and P6 show better TOPSIS rankings compared to their ROI positions. These variations suggest that final project financial performance is not solely

determined during the tender stage but is also significantly influenced by field execution dynamics, operational efficiency, and cost control effectiveness during project implementation.

Overall, the integration of TOPSIS-based tender evaluation and ROI analysis provides a more comprehensive performance assessment framework for PT Nuga Sigma Potenzia. This combined approach enables management to evaluate not only bidding strategy effectiveness but also its linkage to realized financial outcomes, thereby offering a more holistic perspective on project performance evaluation.

Discussion

The results of the analysis indicate that the effectiveness of tender strategy measured using the TOPSIS method tends to align with project financial performance measured through ROI. Projects with higher TOPSIS preference values generally exhibit better ROI performance, as observed in Project P7, which ranks first in both indicators. This suggests that effective tender strategies characterized by accurate cost estimation, adequate technical documentation quality, and strong team readiness and risk management contribute to improved project financial performance. Conversely, projects with low TOPSIS values, such as P2 and P5, also demonstrate low ROI performance.

The discrepancy observed in Project P8 indicates that project profitability is also influenced by factors occurring after the tender stage, such as project execution efficiency, cost control practices, and operational management. Consequently, an effective tender strategy alone does not fully determine financial success, although it provides an important foundation for achieving favorable project outcomes. This finding is consistent with previous studies stating that project financial performance is affected by cost control, operational efficiency, and field conditions (Baributsa & Njenga, 2023)

From a practical perspective, the proposed evaluation framework enables construction companies to assess tender strategies using multiple criteria while simultaneously considering their implications for financial performance. This approach supports more informed bidding decisions and encourages companies to prioritize long-term profitability rather than focusing solely on winning contracts.

For PT Nuga Sigma Potenzia, the proposed framework may serve as a practical decision-support tool for improving tender evaluation, prioritizing projects with stronger profitability potential, and enhancing coordination among the marketing, estimation, and project management functions.

This study reinforces the concept that Return on Investment (ROI) is a profitability indicator reflecting capital efficiency rather than merely the magnitude of investment (Sadek, 2022). In this context, projects with higher contract values do not necessarily generate higher ROI, indicating that cost efficiency and project management effectiveness are more influential than project scale. Furthermore, the findings support the application of multi-criteria approaches in tender evaluation (Özyürek & Erdal, 2023). The use of the TOPSIS method demonstrates that tender strategy evaluation should not be limited to price considerations, but must also incorporate technical and managerial aspects simultaneously. In line with this, lowest-bid tendering approaches alone are insufficient to ensure project success (Ismail, 2024). The results show that unbalanced tender strategies tend to result in lower ROI, highlighting the importance of a more comprehensive evaluation approach.

These findings suggest that tender strategy should be viewed as an integral component of project management rather than merely a procurement activity. Accurate cost estimation, comprehensive technical proposals, and adequate team readiness established during the tender stage provide a stronger foundation for effective project execution and profitability. may contribute to reducing the likelihood of cost overruns and improve financial performance throughout the project lifecycle.

The findings are also consistent with previous research indicating that project characteristics and competition intensity influence bidding strategies (Oo et al., 2025). The variation between TOPSIS and ROI results in this study suggests that the effectiveness of tender strategy is influenced not only by internal company factors but also by external conditions such as market competition and project characteristics. Additionally, overly competitive bidding strategies may reduce profit margins and negatively affect project execution quality (Govender et al., 2025). The present study shows a similar pattern, where projects with low ROI may reflect the impact of suboptimal bidding strategies under competitive pressure.

Unlike previous studies that primarily evaluated bidding success or contractor selection, this study integrates tender strategy evaluation with realized financial performance. This integrated perspective demonstrates that successful tendering should be assessed not only by the ability to secure projects but also by the ability to generate sustainable financial returns. Accordingly, the proposed framework extends the scope of tender evaluation from procurement success to long-term project value creation.

5. CONCLUSION AND RECOMMENDATIONS

Conclusion

This study demonstrates that managerial success in construction projects extends beyond winning tenders and depends on how strategic decisions during the bidding stage influence actual financial performance. The analysis of eight construction projects at PT Nuga Sigma Potenzia during the 2023–2025 period reveals substantial variations in Return on Investment (ROI), ranging from 18% to 52%.

The application of the TOPSIS method proved effective in evaluating and ranking tender strategy effectiveness based on multiple criteria. Project P7 was identified as the best-performing alternative, while Project P5 showed the lowest performance. Overall, the findings indicate a positive association between effective tender strategies and higher ROI, suggesting that strategies emphasizing cost estimation accuracy, technical proposal quality, and risk management contribute to project profitability beyond merely securing project awards.

By integrating tender strategy assessment with actual ROI performance, this study proposes a practical multi-criteria decision-support framework that enables companies to evaluate bidding decisions from both operational and financial perspectives and to safeguard project profitability from the pre-construction stage.

Nevertheless, the findings should be interpreted within the scope of this study, which was limited to eight completed projects from a single construction company. In addition, the evaluation criteria and their respective weights were determined through expert judgment, which may involve a degree of subjectivity. Future studies are encouraged to involve larger datasets, multiple organizations, alternative weighting techniques, and additional evaluation variables to enhance the robustness and generalizability of the proposed framework.

Recommendations

Based on the findings related to improving investment returns, PT Nuga Sigma Potenzia is advised not to focus solely on winning tenders through the lowest price strategy, but rather to strengthen the overall quality of tender strategies. This can be achieved by improving cost estimation accuracy, optimizing technical proposal documentation, and strengthening pre-project risk management, which have been identified as key determinants of higher ROI.

The company is also recommended to adopt this multi-criteria decision-making model using the TOPSIS method as a continuous decision-support tool in tender selection processes. For future research development, researchers are encouraged to expand the sample size of projects and incorporate external variables such as market competition intensity. In addition, methodological enhancements by combining other approaches such as AHP, Fuzzy TOPSIS, or advanced statistical modeling are highly recommended to improve the generalizability of the tender strategy evaluation framework across broader construction industry contexts.

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