



## INTEGRATION OF MOST AND TOPSIS METHODS TO SUPPORT BUSINESS DEVELOPMENT STRATEGY FORMULATION IN THE STEEL PIPE INDUSTRY OF SURABAYA, INDONESIA

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### ABSTRACT

This study develops an integrated decision-making framework to formulate business development strategies for the steel pipe manufacturing industry in Surabaya, Indonesia. The research combines the MOST and TOPSIS methods, supported by the Analytical Hierarchy Process (AHP), to systematically identify, evaluate, and prioritize strategic alternatives. Primary data were collected through expert interviews, focus group discussions, and questionnaires, while secondary data were obtained from industrial reports and publications. The analysis identifies five strategic alternatives derived from the MOST framework and evaluates them using AHP–TOPSIS integration. The results show that investment in production technology and automation ranks as the highest-priority strategy, followed by the development of export-oriented marketing channels and enhancement of quality management systems. Sensitivity analysis confirms the robustness of these rankings. The integrated MOST–AHP–TOPSIS model proves effective in aligning organizational missions with quantitative decision-making, resulting in more objective and evidence-based strategy formulation. This framework provides a practical tool for industrial managers to enhance competitiveness, operational efficiency, and strategic adaptability within the steel pipe sector.



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### I. INTRODUCTION

The steel pipe industry plays a strategic role in supporting various sectors such as construction, manufacturing, oil and gas, and national infrastructure development. In Indonesia, especially in Surabaya as one of the major industrial hubs, the demand for steel pipes continues to grow in line with rapid economic expansion and infrastructure projects. However, steel pipe manufacturers face multiple challenges, including intense domestic and global competition [1], raw material price volatility [2], technological shifts in manufacturing [3], and government regulations on trade and environmental standards [4]. Although several companies in Surabaya show positive growth in production capacity and sales, many still encounter difficulties in maintaining competitiveness, improving operational efficiency, and achieving sustainable profitability. These conditions highlight the urgent need for a well-formulated and adaptive business development strategy that aligns internal capabilities with external opportunities in the dynamic steel pipe market [5]. Previous studies commonly apply strategy formulation frameworks such as SWOT–AHP [6], [7] or AHP–TOPSIS [8], [9] to evaluate competitive priorities and strategic decision alternatives. However, limited research has explored the integration of the MOST (Mission, Objectives, Strategy, Tactics) framework with the TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) method in industrial business strategy formulation. The MOST framework provides a structured qualitative approach to aligning an organization's vision and mission with measurable objectives and actionable tactics [10].

In contrast, the TOPSIS method offers a quantitative multi-criteria decision-making model that ranks strategic alternatives based on their closeness to the ideal solution [11]. Integrating the MOST and TOPSIS methods enables companies to combine qualitative

strategic alignment with quantitative decision-making, resulting in strategies that are both analytically sound and practically applicable. This integration helps organizations link long-term missions with data-driven evaluations to achieve more rational and objective business priorities. Accordingly, this study focuses on examining how the integration of the MOST and TOPSIS methods can support the formulation of optimal business development strategies for steel pipe manufacturing companies in Surabaya. To achieve this aim, the research establishes several objectives. First, it identifies internal and external factors that influence business development in Surabaya's steel pipe industry through the application of MOST and PEST analyses. Second, it designs strategic alternatives that align with the company's mission, objectives, and tactical priorities to ensure coherence between strategic vision and operational execution. Third, the study determines the relative importance or weight of each strategic criterion using the Analytical Hierarchy Process (AHP), enabling a structured and quantitative evaluation of priorities.

Finally, it employs the TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) method to rank and prioritize the most effective business development strategy alternatives. Collectively, these stages establish an integrated decision-making framework that combines qualitative insight with quantitative analysis to formulate optimal and actionable business strategies for the steel pipe industry in Surabaya. This study assumes that integrating qualitative and quantitative approaches enhances the robustness of strategic decision-making. The research focuses on steel pipe manufacturers in Surabaya, using primary data from interviews, focus group discussions (FGDs), and questionnaires with industry stakeholders, supported by secondary data from industrial reports, publications, and company documents. The methodology combines qualitative analysis (MOST and PEST) to identify strategic dimensions and quantitative analysis (AHP-TOPSIS) to calculate and rank strategy alternatives. Data are processed using Super Decisions software for AHP weighting and Microsoft Excel for TOPSIS analysis. This research contributes theoretically by expanding the literature on integrated decision-making models in strategic management and practically by providing a systematic, data-driven framework for business development. The model can serve as a reference for steel pipe industries in Surabaya to enhance competitiveness, improve operational efficiency, and achieve sustainable industrial growth.

## II. THEORETICAL REFERENCE

A business strategy serves as a structured plan designed to guide organizations in achieving their long-term goals through coordinated decisions, efficient resource allocation, and sustained competitive advantage. It functions as an effective managerial instrument to enhance organizational performance and competitive positioning [12]. Business strategy, also referred to as competitive strategy, focuses on improving the market position of products or services within specific industry segments [13]. An effective business strategy aligns internal capabilities with external environmental factors to ensure continuous adaptability in a dynamic industrial context.

### II.1 MOST METHOD

The MOST method (Mission, Objectives, Strategy, and Tactics) provides a systematic framework for aligning organizational vision and mission with specific, measurable business objectives. It facilitates the logical linkage between long-term aspirations and short-term operational activities. The MOST framework encourages management to periodically review strategic coherence among its four components Mission, Objectives, Strategy, and Tactics ensuring that each operational activity supports organizational goal [14]. In practice, MOST enables decision-makers to translate vision statements into actionable strategies that drive competitive growth and sustainable business outcomes.

### II.2 PEST ANALYSIS

Complementing MOST, the PEST analysis (Political, Economic, Social, and Technological) evaluates macro-environmental factors influencing corporate strategy. It assists organizations in identifying opportunities and anticipating external risks [15]. The political dimension encompasses government regulations, fiscal policy, and trade stability, while the economic aspect relates to market dynamics such as inflation, interest rates, and raw material prices. The social dimension focuses on demographic and cultural factors, whereas the technological aspect assesses innovation trends, digital transformation, and process automation all of which significantly affect the steel pipe industry's competitiveness in Indonesia.

### II.3 AHP

The Analytical Hierarchy Process (AHP) is a structured multi-criteria decision-making method that uses pairwise comparisons to assign relative weights to different criteria. It decomposes complex problems into hierarchical structures, allowing quantitative prioritization of qualitative judgments. AHP has been widely adopted for resource allocation, supplier selection, and business strategy formulation [16]. In this research, AHP supports the evaluation of strategic alternatives identified through MOST and PEST by assigning consistent and measurable importance weights based on expert judgment.

#### II.3.1 The Geometric Mean

The geometric mean is applied to aggregate multiple expert evaluations into a single representative value while maintaining the reciprocal property of the original comparison matrix. This mathematical approach ensures consistency in collective decision-making when multiple respondents provide assessments independently. The geometric mean  $GM$  is computed as:

$$\begin{aligned} &\text{The geometric mean} \\ G &= \sqrt[n]{X_1 \times X_2 \times X_3 \dots} \end{aligned} \quad (1)$$

### II.4 TOPSIS METHOD

The TOPSIS method (Technique for Order Preference by Similarity to Ideal Solution) is a multi-criteria decision-making approach based on ranking alternatives according to their geometric distances from the positive ideal solution and the negative ideal solution [17]. The best alternative is the one with the shortest distance to the positive ideal and the farthest from the negative ideal [18]. TOPSIS has been widely utilized in industrial decision support systems due to its computational efficiency, simplicity, and strong logical foundation. It has been applied in manufacturing strategy formulation, supplier evaluation, and investment prioritization [19]. Integrating MOST, AHP, and TOPSIS creates a balanced framework that combines qualitative strategic alignment with quantitative evaluation and ranking. MOST defines the strategic intent, AHP determines the importance of key criteria through expert-based weighting, and TOPSIS provides an objective ranking of strategic alternatives. This integration has been recognized in recent studies [20], [21], [22] as an effective hybrid approach for improving decision accuracy and ensuring that strategic decisions remain consistent with organizational mission and environmental dynamics.

### III. MATERIALS AND METHODS

This research is conducted to develop an integrated decision-making framework for formulating business development strategies in the steel pipe manufacturing industry located in Surabaya, Indonesia. The study integrates the MOST and TOPSIS methods to produce strategic alternatives that are both analytically sound and practically applicable. The AHP is also employed to determine the relative importance of each criterion, enabling a structured weighting process that supports the quantitative assessment of strategies. The study focuses on medium- and large-scale steel pipe manufacturing companies operating in the Surabaya industrial corridor, which represent a significant segment of Indonesia's downstream metal sector. The research emphasizes strategic management aspects such as competitiveness, business positioning, and operational effectiveness rather than the technical aspects of steel production. The main limitation of this study lies in the scope of available managerial data, the use of subjective judgment in expert evaluations, and potential differences in perception among respondents during the AHP weighting process. The materials used in this research consist of both primary and secondary data.

Primary data are obtained through structured interviews, focus group discussions (FGDs), and questionnaires distributed to managerial-level respondents and industry experts, including production, marketing, and quality assurance managers with more than five years of experience in the steel pipe industry. Secondary data are gathered from company annual reports, official publications of the Indonesian Ministry of Industry, trade association bulletins, and relevant academic literature. The questionnaires are developed based on the MOST framework and designed using a five-point Likert scale to capture qualitative assessments, while the AHP stage uses pairwise comparison matrices to quantify expert preferences. Ten respondents are selected using purposive sampling to ensure representation from different functional areas. The research population refers to a major steel pipe manufacturing company in Surabaya that meets the criteria of operational continuity, integrated production facilities, and active participation in national industrial networks. This company represents a suitable and relevant case for studying business development strategies in Indonesia's steel pipe sector, as it embodies the competitive dynamics, market challenges, and organizational structures typical of the industry.

Respondents are selected through judgmental sampling, targeting managerial personnel directly involved in strategic planning and business development to ensure that the collected data accurately reflect managerial perspectives and decision-making practices. The research procedures begin with identifying strategic factors through the integration of MOST and PEST analyses. The results are used to construct hierarchical decision structures for AHP weighting. Pairwise comparison matrices are then developed, and consistency ratios (CR) are tested to ensure all CR values are below 0.1, indicating reliable expert judgment. The resulting AHP weights serve as input for the TOPSIS method. Data processing represents the practical implementation of the theoretical model by combining the outputs of MOST, AHP, and TOPSIS into a single computational framework. The process involves constructing normalized decision matrices, determining criterion weights, calculating distances to ideal and anti-ideal solutions, and ranking strategy alternatives based on the calculated closeness coefficients.

The final ranking results are verified through expert review to ensure consistency with strategic expectations. The choice of methods is justified by their complementary strengths: MOST provides strategic alignment with organizational objectives, AHP offers a systematic weighting mechanism, and TOPSIS ensures quantitative prioritization for rational and evidence-based decision-making. This integration enhances the credibility and applicability of the results by combining qualitative insight with quantitative rigor. All participants involved in the study provide informed consent before data collection, and confidentiality is maintained by anonymizing respondent identities and company-related information. Ethical standards are observed throughout the research process to ensure data integrity and respect for participant privacy. Overall, this methodological framework establishes a transparent, replicable, and reliable process for identifying, evaluating, and prioritizing business development strategies in the steel pipe manufacturing industry of Surabaya, Indonesia, through the integration of MOST, AHP, and TOPSIS approaches.

### IV. RESULTS AND DISCUSSIONS

The integration of MOST, AHP, and TOPSIS provides a comprehensive analytical framework for identifying, evaluating, and prioritizing business development strategies for the steel pipe manufacturing industry in Surabaya, Indonesia. The analysis begins with identifying internal and external strategic factors using the MOST and PEST frameworks, determining the criterion weights through AHP, and ranking the alternative strategies using TOPSIS. The application of the MOST framework allows the company's mission, objectives, strategies, and tactics to be systematically aligned. The mission emphasizes strengthening competitiveness through technological innovation, operational efficiency, and sustainable business practices. The objectives include expanding domestic and international markets, optimizing production efficiency, and enhancing value-added capabilities. Based on these, five strategic alternatives are formulated:

Table 1: Strategic Alternatives Identified Through MOST Framework.

Code	Strategic Alternative	Strategic Focus
A1	Product diversification	Market and product innovation
A2	Investment in production technology and automation	Efficiency and productivity
A3	Development of export-oriented marketing channels	Market expansion
A4	Enhancement of quality management systems	Product reliability and compliance
A5	Digital transformation in supply chain and customer relations	Integration and digital resilience

Source: Authors, (2026).

The PEST analysis identifies external environmental factors influencing these strategic options. Politically, the Indonesian government’s industrial downstreaming programs and infrastructure development projects increase market potential. Economically, global steel price fluctuations and exchange rate volatility influence cost structures. Socially, urbanization and industrial growth sustain long-term demand for construction and piping materials. Technologically, advances in automation, IoT-based monitoring, and digital manufacturing are reshaping competitiveness. Through AHP, experts evaluate the importance of strategic criteria derived from the MOST-PEST analysis. The pairwise comparison results yield a consistency ratio (CR) below 0.1, confirming judgment reliability. The highest-weighted criteria include market expansion potential (0.318), technological innovation (0.262), and operational efficiency (0.204), followed by quality improvement (0.132) and resource sustainability (0.084).

Table 2: AHP Results – Strategic Criteria and Weights.

Criterion	Weight	Priority Rank
Market expansion potential	0.318	1
Technological innovation	0.262	2
Operational efficiency	0.204	3
Quality improvement	0.132	4
Resource sustainability	0.084	5
<b>Total</b>	<b>1.000</b>	

Source: Authors, (2026).



Figure 1: AHP Weight Distribution of Strategic Criteria.

Source: Authors, (2026).

The AHP results are used as input for the TOPSIS analysis, which measures each strategic alternative’s relative closeness to the ideal solution. The normalized decision matrix and weighted scores are processed.

Table 3: TOPSIS Ranking Results.

Code	Strategic Alternative	$D_i^+$	$D_i^-$	Closeness Coefficient ( $C_i$ )	Rank
A1	Product diversification	0.128	0.221	0.631	5
A2	Investment in production technology and automation	0.072	0.384	0.842	1
A3	Development of export-oriented marketing channels	0.089	0.327	0.786	2
A4	Enhancement of quality management systems	0.103	0.259	0.721	3
A5	Digital transformation in supply chain and customer relations	0.117	0.235	0.668	4

Source: Authors, (2026).



Figure 2: OPSIS Ranking of Strategic Alternatives.

Source: Authors, (2026).

The ranking shows that investment in production technology and automation (A2) achieves the highest closeness coefficient ( $C_i = 0.842$ ), followed by development of export-oriented marketing channels (A3) and enhancement of quality management systems (A4). These results emphasize that the most critical strategic direction lies in leveraging technological innovation to improve efficiency and cost competitiveness while expanding to international markets. A sensitivity analysis is conducted to test the robustness of the ranking by varying AHP weights by  $\pm 10\%$ . The ranking order remains stable, confirming that the results are not highly sensitive to small fluctuations in criteria weighting.

Table 4: Sensitivity Analysis of TOPSIS Results.

Scenario	Key Weight Adjustment	Top Strategy (Rank 1)	Rank Consistency
Base Case	Original weights	A2 (Technology & Automation)	-
Scenario 1	+10% Market expansion	A2	Stable
Scenario 2	+10% Technological innovation	A2	Stable
Scenario 3	+10% Operational efficiency	A2	Stable
Scenario 4	+10% Quality improvement	A2	Stable

Source: Authors, (2026).

From a managerial perspective, the prioritization indicates that technological advancement and automation are central to improving productivity and market responsiveness. Automation supports consistent quality control, minimizes defect rates, and enhances process efficiency. The second-ranked strategy, developing export-oriented marketing channels, aligns with Indonesia's trade liberalization and regional integration within ASEAN markets. Meanwhile, quality management improvement, though ranked third, remains essential for ensuring product reliability and achieving international certification such as ISO 9001 and API standards. The integrated application of MOST, AHP, and TOPSIS demonstrates strong methodological coherence. MOST provides strategic direction and goal alignment; AHP delivers structured weighting and quantification of managerial priorities; and TOPSIS translates these into objective rankings. This synergy produces more transparent and evidence-based decision outcomes than using a single qualitative or quantitative method alone. The findings are consistent with previous research showing that AHP-TOPSIS integration enhances accuracy and rationality in industrial strategic decision-making [23], [24]. The inclusion of MOST in this study strengthens the theoretical contribution by ensuring that the strategy formulation process remains anchored to organizational mission and objectives. Practically, these results provide a strategic roadmap for steel pipe manufacturers in Surabaya to enhance competitiveness. Investment in automation technologies can optimize production efficiency and reduce operational variability, while export market development enables diversification and resilience against domestic market fluctuations. Continuous improvement in quality management and digital transformation can further support long-term sustainability and industry leadership. Overall, the integrated model successfully identifies and prioritizes business development strategies in the steel pipe manufacturing sector. The findings validate that the combination of MOST, AHP, and TOPSIS enhances both analytical depth and practical applicability, serving as a reliable reference for decision-makers in industrial strategic planning.

## V. CONCLUSIONS

This research successfully develops an integrated decision-making framework for business development strategy formulation in the steel pipe manufacturing industry of Surabaya, Indonesia, by combining the MOST, AHP, and TOPSIS methods. The integration of these three approaches ensures that qualitative strategic alignment and quantitative prioritization are addressed simultaneously, resulting in more objective and data-driven strategic outcomes. The results of the analysis show that among the identified strategic alternatives, investment in production technology and automation holds the highest priority, followed by development of export-oriented marketing channels and enhancement of quality management systems. These findings indicate that technological advancement and market expansion are key factors in strengthening competitiveness and achieving sustainable growth in the steel pipe industry. The use of AHP enables accurate determination of the relative importance of strategic criteria such as market potential, technological innovation, operational efficiency, and quality improvement, while the TOPSIS method effectively ranks alternatives based on their closeness to the ideal solution.

The consistency ratio of AHP weighting ( $CR < 0.1$ ) confirms the reliability of expert judgments, and the sensitivity analysis validates the robustness of the final rankings. Overall, the integration of MOST, AHP, and TOPSIS proves to be an effective and replicable framework for strategic decision-making in industrial management. It allows companies to align mission-driven objectives with quantitative evidence, offering a structured roadmap for enhancing competitiveness, operational efficiency, and long-term business sustainability. This model can serve as a valuable reference for other manufacturing sectors seeking systematic and evidence-based approaches to strategic planning.

## VI. AUTHOR'S CONTRIBUTION

**Conceptualization:** Rachmat Yustiawan Hadi and Mohammad Ferdaus Noor Aulady.

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