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STRATEGIC PORTFOLIO TRANSFORMATION USING BOSTON CONSULTING GROUP MATRIX IN ENGINEERING INDUSTRY

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Abstract

This study examines the business portfolio of PT Wasa Mitra Engineering using the Boston Consulting Group (BCG) Matrix within the context of digital transformation and energy transition. The research adopts a quantitative descriptive approach based on secondary data derived from company reports, industry trends, and competitor analysis. Two key indicators market growth rate and relative market share are employed to evaluate and classify the firm's core business units. The findings reveal a transitional portfolio structure, in which industrial electrical services function as Cash Cows, providing stable revenue streams, while smart electrical systems and automation demonstrate strong potential as Stars due to their alignment with Industry 4.0 developments. Renewable energy services are categorized as Question Marks, reflecting high growth potential but limited competitive positioning, whereas fossil-based energy services fall into the Dogs category due to declining market relevance amid sustainability pressures. This study contributes to the strategic management literature by extending the application of the BCG Matrix into industries characterized by simultaneous digital and energy transitions. It highlights the importance of integrating classical portfolio frameworks with contemporary strategic contexts to support adaptive decision-making. The findings offer practical insights for firms in engineering and related sectors to balance short-term financial stability with long-term growth by prioritizing high-potential segments and reallocating resources from declining business units.

TRANSFORMASI PORTOFOLIO STRATEGIS MENGGUNAKAN MATRIKS BCG DALAM INDUSTRI REKAYASA

Abstrak

Penelitian ini bertujuan untuk menganalisis portofolio bisnis PT Wasa Mitra Engineering menggunakan Matriks Boston Consulting Group (BCG) dalam konteks transformasi digital dan transisi energi. Penelitian ini menggunakan pendekatan deskriptif kuantitatif dengan memanfaatkan data sekunder yang diperoleh dari laporan perusahaan, tren industri, serta analisis kompetitor. Dua indikator utama, yaitu tingkat pertumbuhan pasar dan pangsa pasar relatif, digunakan untuk mengevaluasi dan mengklasifikasikan unit bisnis utama perusahaan. Hasil penelitian menunjukkan adanya struktur portofolio yang bersifat transisional, di mana layanan kelistrikan industri berperan sebagai Cash Cows yang menghasilkan pendapatan stabil, sementara sistem kelistrikan cerdas dan otomasi menunjukkan potensi kuat sebagai Stars seiring dengan perkembangan Industri 4.0. Layanan energi terbarukan dikategorikan sebagai Question Marks, yang mencerminkan potensi pertumbuhan tinggi namun posisi kompetitif yang masih terbatas, sedangkan layanan energi berbasis fosil termasuk dalam kategori Dogs akibat menurunnya relevansi pasar di tengah tekanan keberlanjutan. Penelitian ini memberikan kontribusi pada literatur manajemen strategis dengan memperluas penerapan Matriks BCG pada industri yang mengalami transformasi digital dan transisi energi secara simultan. Hasil penelitian ini menekankan pentingnya integrasi kerangka portofolio klasik dengan konteks strategis kontemporer guna mendukung pengambilan keputusan yang adaptif. Selain itu, temuan ini memberikan implikasi praktis bagi perusahaan di sektor rekayasa dan industri terkait dalam menyeimbangkan stabilitas keuangan jangka pendek dengan pertumbuhan jangka panjang melalui prioritas pada segmen berpotensi tinggi serta realokasi sumber daya dari unit bisnis yang menurun.

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INTRODUCTION

The acceleration of global industrial transformation, particularly within the engineering and energy sectors, has significantly altered the competitive landscape in recent years. One of the most prominent shifts is the transition toward sustainable energy systems and digitalized industrial processes. According to the International Energy Agency (2024), global investment in energy transition technologies has surpassed USD 1.7 trillion annually, reflecting a structural shift from fossil-based energy toward renewable and low-carbon systems. Simultaneously, the proliferation of Industry 4.0

technologies such as automation, artificial intelligence, and smart infrastructure—has redefined how firms create and sustain competitive advantage (Kraus et al., 2022). These developments generate both growth opportunities and strategic uncertainty, particularly for firms operating in engineering, procurement, and construction (EPC) industries.

In emerging economies such as Indonesia, the transformation is further intensified by national policies promoting infrastructure development and energy transition. Firms like PT Wasa Mitra Engineering, which operate across diverse business segments including industrial electrical services, automation systems, renewable energy, and fossil-based power generation, are required to manage increasingly complex business portfolios. The coexistence of mature, high-revenue segments and emerging, high-growth opportunities creates strategic challenges in terms of resource allocation and long-term positioning. Without a structured portfolio management approach, firms risk misallocating resources and failing to capitalize on high-growth sectors.

From a theoretical standpoint, portfolio analysis frameworks such as the Boston Consulting Group (BCG) Matrix have long been utilized to evaluate business units based on market growth and competitive position (Madsen, 2020). However, despite its widespread adoption, recent literature highlights several limitations in the contemporary application of the BCG Matrix. First, many studies continue to apply the framework in relatively stable industries, such as consumer goods and manufacturing, without accounting for high levels of technological disruption and environmental uncertainty (Yıldız et al., 2023). Second, the BCG Matrix is often criticized for its static nature, as it does not explicitly incorporate dynamic capabilities or organizational adaptability, which are critical in rapidly changing environments (Teece, 2020).

More importantly, there remains a significant research gap in the application of portfolio analysis within industries undergoing simultaneous digital transformation and sustainability transition, particularly in the EPC sector. Recent studies have emphasized the importance of integrating strategic management tools with digital transformation frameworks to better capture evolving competitive dynamics (Verhoef et al., 2021; Vial, 2021). However, empirical evidence demonstrating how traditional tools such as the BCG Matrix can be adapted and applied in such contexts is still limited. Furthermore, research focusing on emerging markets remains underrepresented, despite the fact that these markets often experience more rapid structural changes compared to developed economies (Kraus et al., 2022).

Additionally, prior studies tend to treat portfolio analysis as a classification exercise rather than a strategic transformation tool. For instance, while the BCG Matrix effectively categorizes business units into Stars, Cash Cows, Question Marks, and Dogs, it provides limited guidance on how firms should transition between these categories in response to external disruptions. This limitation is particularly relevant in industries such as energy and engineering, where technological advancements and regulatory pressures can rapidly alter market conditions (Yıldız et al., 2023). Therefore, there is a need for research that not only applies the BCG framework but also contextualizes it within broader strategic transformation processes.

Based on these gaps, this study aims to analyze the business portfolio of PT Wasa Mitra Engineering using the BCG Matrix to identify the strategic position of each business unit and to formulate context-specific strategic recommendations. Specifically, this study seeks to: (1) measure market growth rate and relative market share for each business segment; (2) classify business units into BCG quadrants; and (3) interpret the results within the context of digital transformation and energy transition.

This study advances the central argument that the relevance of the BCG Matrix in contemporary industries depends on its integration with dynamic and context-sensitive strategic perspectives, particularly in environments characterized by technological disruption and sustainability pressures. It is posited that firms with a balanced portfolio supported by strong Cash Cows and strategically developed Stars are better positioned to achieve sustainable competitive advantage, provided that they actively transform Question Marks into growth drivers and systematically manage declining business units.

The contribution of this study is twofold. First, it provides empirical evidence on the application of the BCG Matrix in the EPC industry, which remains underexplored in the existing literature. Second, it extends the theoretical relevance of classical portfolio analysis by integrating it with contemporary strategic issues, namely digital transformation and energy transition. By doing so, this study not only addresses existing research gaps but also offers practical insights for firms facing similar strategic challenges in rapidly evolving industries.

METHODS

3.1 Research Design

This study employs a quantitative descriptive research design to examine the business portfolio of PT Wasa Mitra Engineering through the application of the Boston Consulting Group (BCG) Matrix. This approach is appropriate as it allows for a systematic and objective evaluation of each business unit based on quantifiable indicators, namely market growth rate and relative market share. By adopting a quantitative perspective, the study minimizes subjectivity in strategic classification and ensures that the positioning of each business unit is grounded in empirical data. The descriptive nature of the research further enables a comprehensive interpretation of the firm's strategic condition without manipulating the observed variables.

3.2 Research Object and Unit of Analysis

The object of this study is PT Wasa Mitra Engineering, an engineering, procurement, and construction (EPC) company operating across multiple service segments . The unit of analysis consists of four main business segments that represent the company's core operational activities, namely industrial electrical projects, smart electrical systems and industrial automation, renewable energy services, and fossil-based power plant services. Each of these business units is treated as an independent strategic entity, allowing for a more granular analysis of their respective market positions. This segmentation reflects the diversity of the company's portfolio and enables the identification of differentiated strategic implications across business lines.

3.3 Data Type and Sources

This research relies on secondary data obtained from a combination of internal and external sources to ensure data credibility and comprehensiveness. Internal data include company reports related to financial performance, project execution, and operational activities. These are complemented by external data such as industry reports, competitor analysis, and publicly available information on market trends, particularly within the engineering and energy sectors. The data collected span a period of approximately three to five years, allowing the study to capture temporal trends and variations in market growth. The use of multiple data sources also facilitates triangulation, thereby enhancing the validity of the analysis.

3.4 Operational Definition of Variables

The variables used in this study are operationalized to ensure clarity and replicability. Market growth rate is defined as the annual percentage increase in the size or demand of a particular market segment. It is calculated by comparing the market size in the current period with that of the previous period, thereby capturing the rate of expansion or contraction within the industry. This indicator is essential in determining whether a business unit operates in a high-growth, moderate-growth, or low-growth environment.

Relative market share, on the other hand, measures the competitive position of the company in relation to its largest competitor within a given market segment. This variable is calculated as the ratio of the company's market share to that of the leading competitor. A value greater than one indicates a dominant position, while a value below one suggests a weaker competitive standing. Together, these two variables form the basis for positioning each business unit within the BCG Matrix.

3.5 Data Analysis Procedure

The data analysis process in this study is conducted through a structured sequence of steps to ensure methodological rigor and replicability. Initially, the relevant business units are identified and categorized based on their operational characteristics and market orientation. Following this, historical data related to market performance, revenue, and project volume are collected and standardized to ensure comparability across units. The next stage involves calculating the market growth rate for each business segment using time-series data, which provides insight into the dynamics of the respective markets.

Subsequently, the relative market share of each business unit is determined by comparing the company's performance with that of its largest competitor in the same segment. Once both indicators have been calculated, each business unit is mapped onto the BCG Matrix by positioning market growth rate on the vertical axis and relative market share on the horizontal axis. This mapping process results in the classification of each unit into one of four categories: Stars, Cash Cows, Question Marks, or Dogs. The final stage involves interpreting these classifications to derive strategic implications for the company.

3.6 Validity and Reliability

To ensure the robustness of the findings, this study applies several measures of validity and reliability. Data triangulation is achieved by integrating information from multiple sources, including internal company data and external industry reports. Consistency checks are performed to verify the alignment of data across different sources, while benchmarking against industry standards is used to validate the classification thresholds. These procedures enhance the credibility of the analysis and ensure that the results are both reliable and reproducible.

RESULT

4.1 Business Portfolio Mapping Using BCG Matrix

The analysis of PT Wasa Mitra Engineering's business portfolio was conducted using the Boston Consulting Group (BCG) Matrix framework, which evaluates business units based on market growth rate and relative market share. The results reveal a differentiated positioning of each business segment, reflecting the company's strategic

transition across various industry dynamics. To provide a clearer overview, the classification of each business unit is presented in Table 1.

Table 1. BCG Matrix Classification of Business Units

Business Unit	Market Growth Rate	Relative Market Share	BCG Position
Industrial Electrical Projects	Moderate	High	Cash Cows
Smart Electrical Systems & Automation	High	Moderate	Stars (Potential)
Renewable Energy Services	Very High	Low	Question Marks
Fossil-Based Power Plants	Low	Moderate	Dogs

4.2 Interpretation of Portfolio Position

The results demonstrate that industrial electrical projects occupy the *Cash Cow* position, characterized by high relative market share but moderate growth. This indicates that the company has established a strong competitive position in a relatively mature market segment. Such business units generate stable and predictable cash flows, which are essential for supporting investments in other, more dynamic segments.

In contrast, smart electrical systems and industrial automation are positioned within the *Stars* quadrant, albeit still in a potential stage. This segment operates in a high-growth market driven by trends such as Industry 4.0, digital transformation, and smart infrastructure development. Although the company's relative market share is not yet dominant, the growth trajectory suggests strong potential for future leadership if supported by sustained investment in technology and human capital.

Meanwhile, the renewable energy segment falls into the *Question Marks* category. Despite experiencing very high market growth due to global and national energy transition policies, the company's current market share remains relatively low. This indicates a gap between market opportunity and organizational capability. Without strategic intervention, such as partnerships, capability development, and market penetration strategies, this segment risks failing to capitalize on its growth potential.

Lastly, fossil-based power plant services are categorized as *Dogs*, reflecting both low market growth and limited competitive advantage. This condition is largely influenced by the global shift toward cleaner energy sources and increasing regulatory constraints on fossil fuel usage. Although the company still possesses experience and operational capability in this segment, its long-term strategic value is declining.

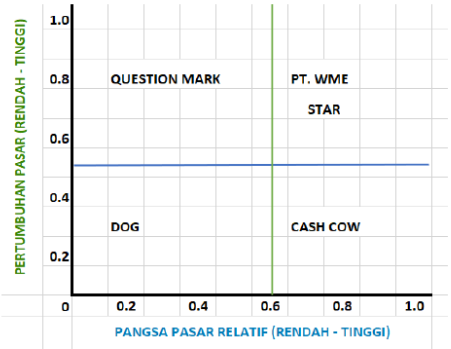

Figure.1 Position of PT Wasa Mitra Engineering in the BCG matrix

4.3 Strategic Portfolio Dynamics

The overall distribution of business units across the BCG Matrix indicates that PT Wasa Mitra Engineering is currently in a transitional strategic phase. The coexistence of Cash Cows and emerging Stars suggests a relatively balanced portfolio; however, the presence of Question Marks and Dogs highlights the need for strategic reallocation of resources. From a portfolio perspective, the company's financial sustainability is currently supported by mature business segments, while its future growth depends heavily on its ability to scale up high-potential sectors such as automation and renewable energy. This duality underscores the importance of aligning short-term financial stability with long-term strategic transformation.

The analysis of the business portfolio of PT Wasa Mitra Engineering using the Boston Consulting Group (BCG) Matrix reveals a heterogeneous distribution of business units across different strategic positions, reflecting both the company's current competitive strengths and its ongoing transformation in response to industry dynamics . The classification is based on two primary dimensions, namely market growth rate and relative market share, which together provide a comprehensive view of the strategic value and future potential of each business segment.

The results indicate that industrial electrical projects are positioned within the *Cash Cow* quadrant, characterized by a high relative market share in a market with moderate growth. This positioning suggests that the company has established a strong and stable competitive advantage in this segment, supported by accumulated experience, reputation, and operational efficiency. As a result, this business unit serves as a primary source of stable revenue and cash flow, playing a crucial role in sustaining the company's financial performance. In mature industries such as conventional industrial electrical services, maintaining efficiency and service quality becomes more critical than aggressive expansion, as growth opportunities tend to be limited.

In contrast, the smart electrical systems and industrial automation segment is categorized within the *Stars* quadrant, albeit still in a developing stage. This segment operates in a rapidly growing market driven by the increasing adoption of Industry 4.0 technologies, digitalization, and smart infrastructure systems. Although the company's relative market share is currently moderate, the high growth rate of this sector indicates significant potential for future expansion and market leadership. The positioning of this segment as a potential Star underscores the importance of continuous investment in advanced technologies, digital capabilities, and human resource development to strengthen the company's competitive position.

Furthermore, the renewable energy business unit is classified as a *Question Mark*, reflecting a condition where market growth is very high, yet the company's relative market share remains low. This finding highlights a strategic gap between external opportunities and internal capabilities. The renewable energy sector is experiencing rapid expansion due to global sustainability trends and government policies promoting clean energy transition. However, the company has not yet fully capitalized on these opportunities, likely due to limited experience, technological capability, or market penetration. Without strategic intervention, such as forming partnerships, enhancing technical competencies, and increasing investment, this segment may struggle to achieve a stronger competitive position despite its promising market outlook.

On the other hand, fossil-based power plant services fall into the *Dogs* quadrant, characterized by low market growth and relatively weak competitive positioning. This result reflects broader industry trends, including the global shift toward renewable energy

and increasing regulatory pressure on fossil fuel-based industries. Although the company still possesses technical expertise in this area, the declining attractiveness of the market limits its long-term strategic value. Consequently, this segment is less likely to contribute significantly to future growth and may require a gradual reduction in resource allocation.

Overall, the distribution of business units across the BCG Matrix indicates that PT Wasa Mitra Engineering is currently undergoing a strategic transition from reliance on conventional energy-related services toward more technology-driven and sustainable business segments. The coexistence of strong Cash Cows and emerging Stars suggests that the company maintains a relatively balanced portfolio; however, the presence of Question Marks and Dogs highlights the need for careful strategic decision-making, particularly in terms of resource allocation and capability development. This transitional configuration emphasizes the importance of aligning short-term financial stability with long-term growth objectives in order to ensure sustainable competitive advantage in an evolving industry landscape.

DICUSSION

The findings of this study highlight that the business portfolio of PT Wasa Mitra Engineering reflects a transitional strategic configuration, which is consistent with the broader transformation occurring in the engineering and energy sectors. The identification of industrial electrical services as *Cash Cows* confirms the theoretical proposition that mature business segments with high market share tend to generate stable cash flows, thereby serving as the financial backbone of the firm (Madsen, 2020). This aligns with prior studies emphasizing that firms in capital-intensive industries often rely on established segments to sustain liquidity and support investment in emerging areas (Kraaijenbrink, 2022). In this context, the company's strong position in conventional electrical projects demonstrates the continued relevance of operational efficiency and reputation in maintaining competitiveness within mature markets.

At the same time, the positioning of smart electrical systems and industrial automation within the *Stars* quadrant reflects the increasing importance of digital transformation in shaping competitive advantage. This finding is consistent with recent literature that identifies Industry 4.0 technologies, including automation and smart systems, as key drivers of growth in engineering and construction industries (Kraus et al., 2022). The high growth potential of this segment suggests that firms capable of integrating digital capabilities and advanced engineering solutions are more likely to achieve sustainable competitive advantage. However, the relatively moderate market share observed in this study indicates that PT Wasa Mitra Engineering is still in the process of consolidating its position, which necessitates continuous investment in technological capabilities and human capital development. This supports the argument by Teece (2020) that dynamic capabilities, particularly the ability to sense and seize emerging opportunities, are critical in rapidly evolving markets.

The classification of renewable energy services as *Question Marks* further reinforces the notion that high-growth markets do not automatically translate into strong competitive positioning. Despite the rapid expansion of renewable energy driven by global decarbonization agendas and policy incentives, firms often face significant barriers to entry, including technological complexity, capital requirements, and regulatory challenges (Yıldız et al., 2023). The findings suggest that PT Wasa Mitra Engineering has yet to fully leverage these opportunities, highlighting a gap between external market potential and internal organizational readiness. This observation is consistent with

Rothaermel (2021), who argues that firms must align their internal capabilities with external opportunities to effectively capture value from emerging markets. Therefore, strategic actions such as forming alliances, investing in specialized competencies, and enhancing innovation capacity are essential to transform this segment into a future growth driver.

Conversely, the identification of fossil-based power plant services as *Dogs* reflects the declining strategic relevance of traditional energy sectors in the context of global sustainability transitions. This finding aligns with the growing body of literature indicating that industries reliant on fossil fuels are experiencing structural decline due to environmental regulations and shifting market preferences (Kraus et al., 2022). While such segments may still provide residual value in the short term, their long-term prospects are limited, necessitating a gradual reallocation of resources. The concept of "harvesting" strategies, as suggested in classical portfolio theory, remains applicable in this context, allowing firms to maximize remaining returns while minimizing further investment (Madsen, 2020).

From a theoretical perspective, the novelty of this study lies in its contextualization of the BCG Matrix within the engineering, procurement, and construction (EPC) industry undergoing simultaneous digital and energy transitions**.** Unlike previous studies that apply the BCG framework in relatively stable or consumer-oriented industries, this research demonstrates how portfolio analysis can be adapted to sectors characterized by technological disruption and sustainability pressures. Furthermore, this study integrates traditional portfolio analysis with contemporary strategic management perspectives, particularly dynamic capabilities and digital transformation, thereby extending the applicability of the BCG Matrix in modern industrial contexts. This contribution is significant as it provides empirical evidence on how firms in emerging economies can strategically reposition their business portfolios to remain competitive in rapidly changing environments.

In addition, this study offers a nuanced understanding of how different business units within a single firm may simultaneously experience divergent strategic trajectories, ranging from stability (*Cash Cows*) to growth (Stars), uncertainty (*Question Marks*), and decline (*Dogs).* This multidimensional perspective enriches the existing literature by highlighting the importance of strategic balance and adaptability in portfolio management, particularly in industries facing structural transformation.

Based on the findings, several strategic recommendations can be proposed**.** First, the company should prioritize investment in smart electrical systems and automation by strengthening technological capabilities, enhancing workforce competencies, and adopting digital engineering practices. Second, the renewable energy segment should be developed through targeted strategies, including strategic partnerships, pilot projects, and capability-building initiatives to accelerate market penetration. Third, the industrial electrical segment should be maintained with a focus on efficiency and service quality to ensure stable cash flow generation. Finally, fossil-based business units should be managed through a gradual harvesting strategy, reallocating resources toward high-growth and sustainable sectors. By implementing these strategies, PT Wasa Mitra Engineering can achieve a more balanced and future-oriented business portfolio, thereby enhancing its long-term competitiveness and resilience.

CONCLUSION

This study examines the business portfolio of PT Wasa Mitra Engineering using the Boston Consulting Group (BCG) Matrix to understand the strategic positioning of its core business units within a rapidly transforming industrial environment. The findings reveal that the company's portfolio reflects a transitional strategic configuration, characterized by the coexistence of stable revenue-generating units and emerging growth-oriented segments. Industrial electrical services were identified as *Cash Cows*, providing consistent financial support, while smart electrical systems and automation exhibited strong potential as *Stars* due to their alignment with digital transformation trends. In contrast, renewable energy services were categorized as *Question Marks*, indicating high growth potential but limited competitive positioning, whereas fossil-based energy services fell into the *Dogs* category, reflecting declining strategic relevance in the context of global energy transition.

From a theoretical perspective, this study demonstrates that the BCG Matrix remains a relevant analytical tool when applied within contemporary contexts, particularly when interpreted through the lens of digital transformation and sustainability transition. By situating a classical portfolio framework within a dynamic industrial setting, this research extends the applicability of traditional strategic management tools and provides empirical support for their continued use in complex and evolving markets. The study also highlights that portfolio analysis should not be treated as a static classification exercise, but rather as a strategic mechanism for guiding organizational transformation and resource reallocation.

From a managerial standpoint, the results suggest that firms operating in engineering and energy-related industries must adopt a balanced portfolio strategy that integrates short-term financial stability with long-term growth objectives. Maintaining efficiency in mature business units is essential to sustain cash flow, while proactive investment in high-growth and technology-driven segments is critical for future competitiveness. At the same time, emerging sectors such as renewable energy require deliberate capability development and strategic partnerships to enhance market positioning, whereas declining segments should be managed through gradual resource reallocation.

Despite its contributions, this study has several limitations. The analysis is based on secondary data and focuses on a single case study, which may limit the generalizability of the findings. Additionally, the use of the BCG Matrix, while useful, simplifies complex market dynamics into two primary dimensions, potentially overlooking other relevant strategic factors such as innovation capability and institutional influences.

Future research is therefore encouraged to expand this study by incorporating multi-case comparisons, integrating additional strategic frameworks such as SWOT or dynamic capability analysis, and utilizing primary data to enhance analytical depth. Furthermore, quantitative approaches examining the relationship between portfolio configuration and firm performance could provide more robust empirical validation.

In conclusion, this study underscores the importance of adaptive portfolio management in navigating industrial transformation and provides a practical as well as theoretical foundation for firms seeking to align their business strategies with evolving market demands.

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