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Business Strategy, Technological Capability, and MSME Performance: The Mediating Role of Competitive Advantage

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ABSTRACT

Micro, small, and medium enterprises operating within free trade zones face intensifying competitive pressures that demand both strategic clarity and technological readiness to sustain business performance. Despite growing scholarly attention to strategy and technology as performance drivers, their simultaneous examination within a mediated structural model remains limited in open industrial zone contexts. This study investigates the influence of business strategy and technological capability on MSME business performance in Batam City, Indonesia, with competitive advantage as a mediating variable. A quantitative explanatory design was employed, with data collected from 350 MSME respondents through a structured Likert-scale questionnaire and analyzed via Partial Least Squares Structural Equation Modeling using SmartPLS 4.1. All seven hypotheses were supported. Both constructs significantly and positively affect competitive advantage and business performance, with technological capability producing the strongest path coefficient in the model, particularly toward competitive advantage. Competitive advantage partially mediates both the strategy-performance and technology-performance relationships. The findings extend the Resource-Based View and Dynamic Capabilities Theory to the MSME free trade zone setting and offer guidance for practitioners and policymakers seeking to support technology-driven competitive development.

Keywords: *Business Performance, Business Strategy, Competitive Advantage, Free Trade Zone, Technological Capability*

INTRODUCTION

The sustainability of micro, small, and medium enterprises remains a pressing concern in developing economies, where structural constraints continue to limit productivity growth despite the substantial contribution of this sector to national output. In Indonesia, MSMEs are consistently reported to account for more than 60% of gross domestic product, a figure that has remained stable across successive government releases in recent years, while persistent barriers in strategic capability and technological readiness continue to constrain their long-term competitiveness (Ministry of Cooperatives and SMEs of the Republic of Indonesia, 2024). The OECD (2021) estimates that approximately 70% of SMEs in developing countries face chronic productivity constraints that are largely attributable to insufficient adaptation to technological change, a pattern that has widened the performance gap between digitally capable and digitally marginal enterprises.

Within this broader context, Batam City offers a particularly instructive setting for examining MSME performance. Batam was designated as a Free Trade Zone and Free Port under Law No. 36 of 2000 concerning Free Trade Zones and Free Ports, as amended by Law No. 44 of 2007, with Government Regulation No. 46 of 2007 serving as the principal operative instrument establishing the zone's administrative and economic framework. Batam's proximity to Singapore and Malaysia positions the zone within a critical node of Southeast Asian trade networks, and its enterprises benefit from associated fiscal and customs incentives. Data from the BPS (2025) indicate that more than half of active MSMEs in Batam experienced growth stagnation over the preceding three years, and fewer than 40% deploy digital technology systematically in their operations. These conditions point to a structural gap between the zone's economic potential and the operational realities facing its MSME population.

Business strategy and technological capability have been consistently identified as primary determinants of MSME competitive positioning and performance. Porter (1998) established that deliberate strategic choices around differentiation, cost efficiency, or market focus enable firms to achieve superior market positions, while Teece et al. (1997) extended this reasoning by arguing that sustainable advantage in dynamic environments depends on the organizational capacity to sense, seize, and reconfigure technology-based resources. Farida and Setiawan (2022) found that innovation-oriented business strategies strengthen competitive advantage and business performance among Indonesian MSMEs, and Triono et al. (2024) showed that entrepreneurial strategy significantly influences firm performance among Indonesian technology-based enterprises.

Despite this evidence, important gaps remain. Most prior studies have examined these constructs independently or within metropolitan MSME settings, leaving open industrial zone contexts comparatively underexplored (Djiu et al., 2024). Few studies have simultaneously positioned competitive advantage as a

mediating mechanism between strategic and technological antecedents and business performance within a unified model. Triono et al. (2023) noted that the strategic use of analytical and technological resources remains an underinvestigated driver of performance among Indonesian enterprises, while Hasan et al. (2024) found that Batam MSMEs remain constrained in competitiveness by insufficient digital technology adoption despite demonstrating strong customer retention.

This study therefore examines how business strategy and technological capability influence the business performance of MSMEs in Batam, both directly and indirectly through competitive advantage as a mediating variable. The analysis is grounded in the Resource-Based View, Dynamic Capabilities Theory, and competitive strategy frameworks, and employs PLS-SEM on 350 respondents. The study aims to contribute an integrated empirical model addressing the strategy-technology-performance pathway in a free trade zone context, while offering insights for practitioners and policymakers seeking to strengthen MSME competitiveness in open, internationally exposed markets. Triono et al. (2021) further found that digital engagement strategies meaningfully shape brand equity outcomes among Indonesian consumers, lending additional support to the broader argument that digitally anchored competitive resources are associated with durable firm-level performance benefits.

LITERATURE REVIEW

Theoretical Foundations

This study integrates three complementary theoretical layers. Strategic Management Theory establishes that organizational performance is shaped by deliberate choices about competitive positioning, resource allocation, and long-term direction (Hitt et al., 2020; Porter, 1998). The Resource-Based View argues that sustainable competitive advantage derives from internal resources that are valuable, rare, inimitable, and non-substitutable, shifting analytical focus from market conditions to firm-level asset configurations (Barney, 1991; Wernerfelt, 1984). Dynamic Capabilities Theory extends this logic by emphasizing organizational routines of sensing opportunities, seizing resources, and reconfiguring capabilities in response to environmental change, making it particularly relevant to the competitive openness of the Batam Free Trade Zone (Eisenhardt & Martin, 2000; Teece et al., 1997).

Variable Relationships and Empirical Evidence

Business performance reflects the ability of enterprises to sustain operations, adapt strategically, and generate value amid competitive pressure across financial and non-financial dimensions (Venkatraman & Ramanujam, 1986). Data from the BPS (2025) indicate that more than half of active MSMEs in Batam experienced

growth stagnation over a three-year period, underscoring the urgency of identifying internal mechanisms through which performance improvement can be achieved.

Business strategy constitutes the set of deliberate decisions through which a firm positions itself competitively, with differentiation, cost leadership, and focus as foundational generic options (Porter, 1998). Farida and Setiawan (2022) confirmed that innovation-oriented strategies directly strengthen competitive advantage and business performance among Indonesian MSMEs, while Gutiérrez-Broncano et al. (2024) found that hybrid strategies produce more sustained outcomes for SMEs under environmental uncertainty. Timotius (2023) demonstrated that business strategy strengthens competitive advantage among Indonesian MSMEs with the effect amplified by innovation, and Triono et al. (2024) established that entrepreneurial strategy significantly influences firm performance in the Indonesian context.

Technological capability reflects the organizational capacity to acquire, integrate, and leverage technology-based resources in support of competitive positioning and performance (Teece et al., 1997). Djiu et al. (2024) established that technological capability strengthens competitive advantage through digital media and information systems, while Prakasa and Jumani (2024) linked digital capability to performance through digital business transformation as mediator. Triono et al. (2023) identified data-driven culture as a key driver of analytics adoption among Indonesian enterprises, and Meier et al. (2025) cautioned that digital transformation must be strategy-aligned to generate durable competitive advantage.

Competitive advantage refers to a firm's capacity to deliver superior customer value through cost leadership, differentiation, or market focus (Porter, 1985). Susanti et al. (2023) established competitive advantage as a key mediator between innovation inputs and MSME performance in Indonesia, while Seow et al. (2025) confirmed its mediating role between strategic capabilities and sustainable SME performance. Agus et al. (2023) demonstrated that above-average MSME performance is driven by competitive advantages anchored in entrepreneurial orientation and dynamic capabilities, and Hasan et al. (2024) found that Batam MSMEs remain competitively constrained despite strong customer retention due to insufficient digital adoption.

Research Gap and Hypotheses Development

The evidence reviewed above reveals consistent support for positive relationships among all four constructs, yet three gaps persist. Most prior studies examined export-oriented or metropolitan MSMEs, leaving free trade zone contexts underrepresented. Few studies have simultaneously tested strategic and technological antecedents within a unified mediation model positioning competitive advantage as the central mechanism.

Drawing from the evidence reviewed, seven hypotheses are proposed. Business strategy is expected to positively affect business performance (H1) and

competitive advantage (H3), as strategic clarity enables firms to create value propositions that are difficult to replicate in competitively open environments (Agus et al., 2023; Farida & Setiawan, 2022; Gutiérrez-Broncano et al., 2024). Technological capability is expected to positively influence business performance (H2) and competitive advantage (H4), as digital resources provide rare and inimitable bases for differentiation (Djiu et al., 2024; Fang et al., 2024; Kim & Jin, 2024; Tsiu et al., 2025). Competitive advantage is expected to positively influence business performance (H5), as superior competitive positioning translates into stronger sales, profitability, and customer retention (Arsawan et al., 2022; Seow et al., 2025; Susanti et al., 2023). Finally, competitive advantage is expected to mediate the effects of both business strategy (H6) and technological capability (H7) on business performance, as strategic and technological inputs are channeled into performance outcomes through competitive positioning (Djiu et al., 2024; Fang et al., 2024; Farida & Setiawan, 2022; Seow et al., 2025; Tsiu et al., 2025). The conceptual framework depicting these relationships is presented in Figure 1.

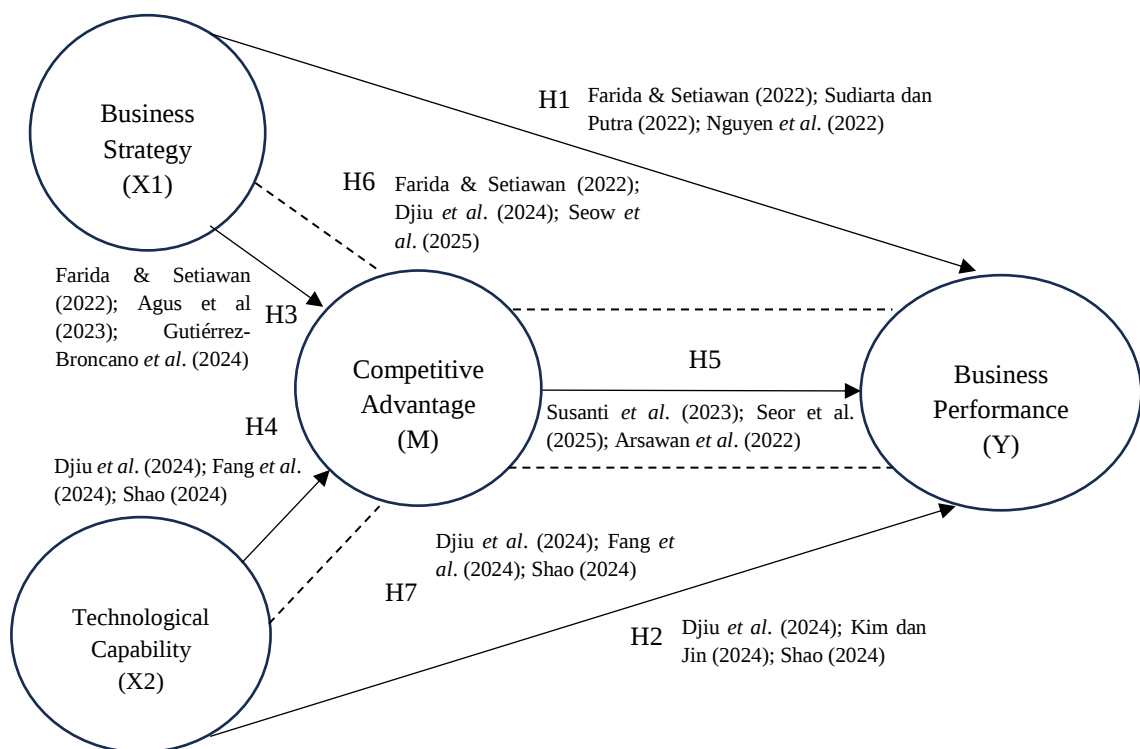


Figure 1 Conceptual Framework
Source: Author's Analysis (2025)

RESEARCH METHODOLOGY

This study employed a quantitative explanatory design aimed at testing directional relationships among business strategy, technological capability, competitive advantage, and business performance (Creswell & Poth, 2024). The

explanatory approach was selected because the primary objective was to examine causal and mediating mechanisms rather than to describe conditions, consistent with the positivist research paradigm (Saunders et al., 2023). Data were collected through a structured questionnaire using a five-point Likert scale from 350 MSME owners and operators in Batam City who had adopted at least one form of digital technology in their business operations. Respondents were drawn from MSMEs affiliated with Rumah BUMN Batam, the Batam Integrated Service Center, and Dinas Koperasi dan Usaha Mikro Kota Batam through purposive sampling, ensuring representation across business stages, sectors, and sizes within the local MSME ecosystem. The achieved sample size satisfies the conventional guideline that PLS-SEM requires at least ten times the largest number of structural paths directed at any single construct in the model (J. H. Hair et al., 2026). Because this convention has since been identified as a conservative heuristic rather than a statistically derived threshold, sample adequacy was additionally verified against the inverse square root method proposed by Kock and Hadaya (2018), which estimates minimum required sample size directly from anticipated path coefficient magnitudes at a specified significance level and statistical power. At a 5% significance level and 80% power, this method indicates a minimum requirement in the range of 155 to 160 respondents for path coefficients of the magnitude observed in this study, a threshold the achieved sample of 350 exceeds by a substantial margin, providing a more rigorous basis for sample size adequacy than the 10-times rule alone.

Business strategy was measured using ten indicators adapted from Farida and Setiawan (2022), capturing strategic planning, resource allocation, market adaptation, and competitive positioning. Technological capability was measured using eight indicators adapted from Djiu et al. (2024) and Teece et al. (1997), reflecting research and development investment, digital tool integration, data-based decision-making, and adoption of new operational methods. Competitive advantage was measured using ten indicators adapted from Farida and Setiawan (2022) and Porter (1985), encompassing product innovation, quality differentiation, competitive pricing, delivery reliability, and market positioning. Business performance was measured using eight indicators adapted from Venkatraman and Ramanujam (1986), including revenue growth, profitability, customer satisfaction, operational efficiency, and market share development. All constructs were treated as reflective measurement models, and the instrument was pilot-tested prior to full data collection to verify clarity and internal consistency (Bougie & Sekaran, 2019).

The data were analyzed using Partial Least Squares Structural Equation Modeling via SmartPLS 4.1, selected for its suitability with predictive research orientations and reflective measurement models in management research (J. H. Hair et al., 2026). Assessment followed two sequential stages. The measurement model was evaluated through outer loadings with a minimum threshold of 0.70, Average Variance Extracted exceeding 0.50 for convergent validity, the Fornell-Larcker

criterion and Heterotrait-Monotrait ratio below 0.90 for discriminant validity, and Cronbach's alpha alongside composite reliability both exceeding 0.70 for internal consistency (J. H. Hair et al., 2026). The structural model was assessed through Variance Inflation Factor values below 3.0 to confirm the absence of multicollinearity, followed by path coefficient estimation, R-square, Q-square predictive relevance, and model comparison using CVPAT and Bayesian Information Criterion. Hypothesis testing was conducted via bootstrapping with 5,000 subsamples at a two-tailed significance threshold of $p < 0.05$, with mediation assessed through the significance of indirect effects consistent with Hair et al. (2026).

RESULT AND DISCUSSION

A total of 350 valid responses were obtained from MSME owners and operators in Batam City. Female respondents constituted 52.3% of the sample, with 57.1% having operated their businesses for two to five years, indicating a sample concentrated at the growth rather than the inception stage. Descriptive analysis revealed uniformly high mean scores across all four constructs: business strategy (4.09), technological capability (4.04), competitive advantage (4.11), and business performance (4.09). The highest individual indicator was X1.8, adaptive and competitive strategy development (mean = 4.25), while the lowest was X2.3, creation of technologically superior products (mean = 3.98), suggesting that product-level technological innovation remains the least developed capability dimension among sampled MSMEs.

Outer Model Assessment

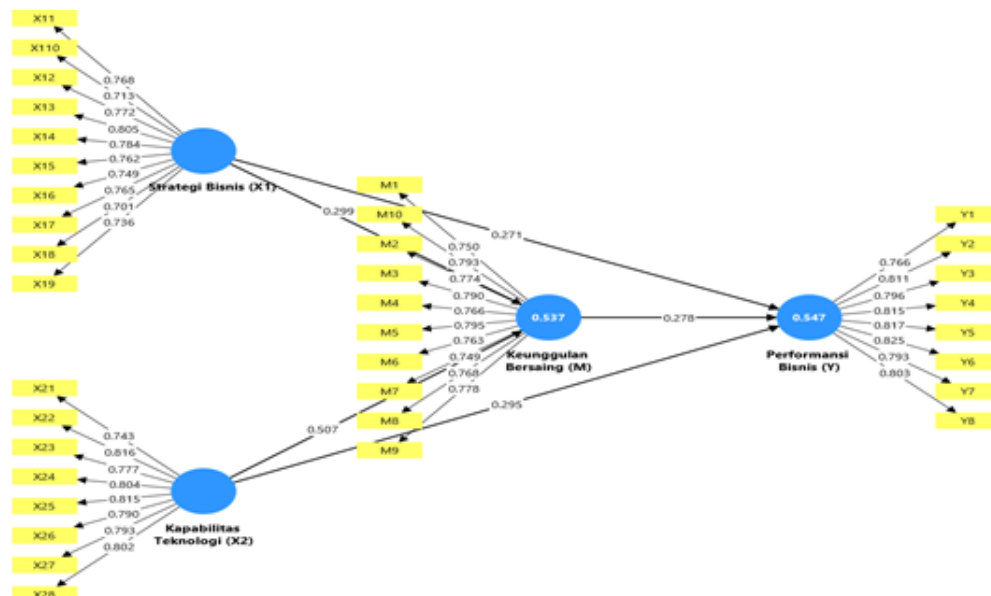


Figure 2 Outer Model
Source: Author's Analysis (2025)

Figure 2 presents the outer model depicting the reflective measurement structure of all four constructs and their respective indicator loadings. All indicator loadings ranged from 0.701 (X1.8) to 0.825 (Y6), exceeding the 0.70 minimum threshold and indicating sufficient reflective validity across all indicators (J. H. Hair et al., 2026). Table 1 presents the consolidated validity and reliability results. AVE values exceeded 0.50 across all constructs, supporting convergent validity; HTMT ratios remained below 0.90 with the highest at 0.754, supporting discriminant validity; and Cronbach's alpha alongside composite reliability both exceeded 0.70, indicating that the measurement model is valid and reliable for structural assessment.

Table 1 Measurement Model Results

Variable	AVE	Cronbach's Alpha	Composite Reliability	Max HTMT
Business Strategy (X1)	0.571	0.916	0.930	0.688
Technological Capability (X2)	0.628	0.915	0.931	0.754
Competitive Advantage (M)	0.597	0.925	0.937	0.703
Business Performance (Y)	0.646	0.922	0.936	0.717

Source: Author's Analysis (2025)

Inner Model Assessment

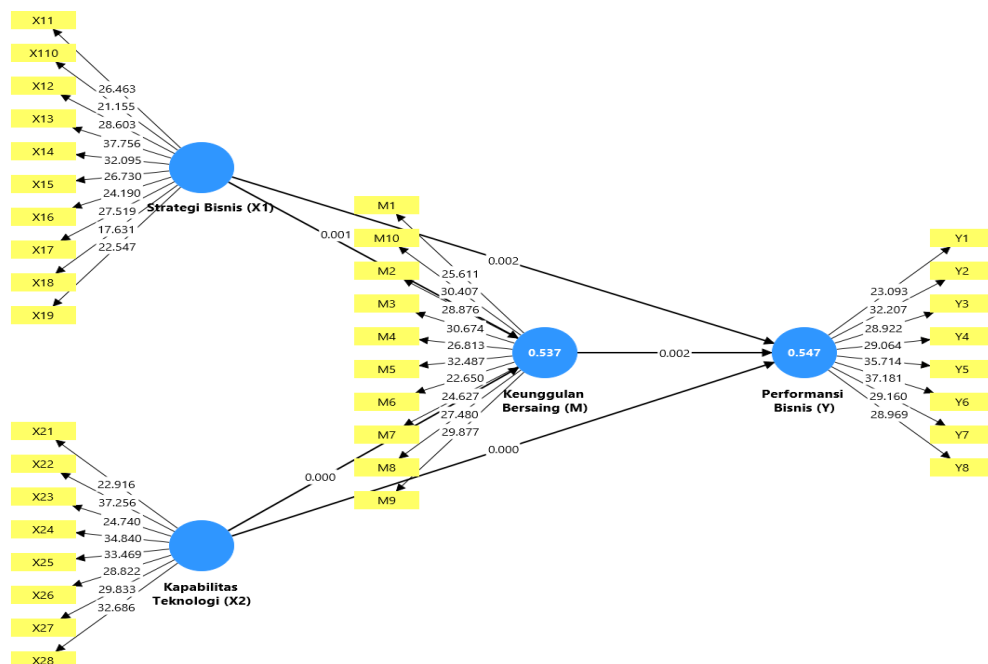


Figure 3 Inner Model
Source: Author's Analysis (2025)

Figure 3 presents the inner model depicting structural paths among the four latent constructs alongside R-square values for the two endogenous variables. VIF values ranged from 1.772 to 2.413, all below 3.0, indicating the absence of multicollinearity (J. H. Hair et al., 2026). As shown in Table 2, the model explained 53.7% of variance in competitive advantage and 54.7% in business performance, both within the moderate range (Ghozali, 2021), with positive Q-square values indicating adequate predictive relevance (Hair et al., 2022).

Table 2 Structural Model Fit

Construct	R-Square	Category	Q-Square
Competitive Advantage (M)	0.537	Moderate	0.521
Business Performance (Y)	0.547	Moderate	0.490

Source: Author's Analysis (2025)

Table 3 presents model comparison results between Model 1 (direct effects only) and Model 2 (with mediation). Model 1 produced a better fit on both criteria, with a more negative BIC (−255.005 versus −254.442, where a lower value indicates superior fit) and a lower CVPAT value (0.539 versus 0.552, where a lower value likewise indicates superior predictive fit). Despite this, Model 2 was retained as the primary analytical model because the study's central research question concerns the mediating role of competitive advantage, which only the mediated specification can test directly. This decision reflects a theory-driven choice made in full awareness of Model 2's marginally weaker fit statistics, consistent with the principle that model selection in confirmatory mediation research should be guided by the hypothesized causal structure under examination rather than fit indices alone, particularly when, as in this case, the indirect effects within the mediated model are themselves statistically significant.

Table 3 Model Comparison

Model	CVPAT	BIC
Model 1 (Direct effects only)	0.539	-255.005
Model 2 (With mediation)	0.552	-254.442

Source: Author's Analysis (2025)

Hypothesis Testing

Hypothesis testing was conducted via bootstrapping with 5,000 subsamples at $p < 0.05$. Tables 4 and 5 present the direct and indirect effect results respectively, corresponding to the structural paths depicted in Figure 2. All seven hypotheses were supported, with positive path coefficients and t-statistics exceeding 1.96.

Table 4 Direct Effect Results

Hypothesis	Path	β	T-Statistic	P-Value	Decision
H1	Business Strategy $\rightarrow$ Business Performance	0.271	3.026	0.002	Supported
H2	Technological Capability $\rightarrow$ Business Performance	0.295	3.697	0.000	Supported
H3	Business Strategy $\rightarrow$ Competitive Advantage	0.299	3.384	0.001	Supported
H4	Technological Capability $\rightarrow$ Competitive Advantage	0.507	6.806	0.000	Supported
H5	Competitive Advantage $\rightarrow$ Business Performance	0.278	3.053	0.002	Supported

Source: Author's Analysis (2025)

Table 5 Indirect Effect Results

Hypothesis	Path	β	T-Statistic	P-Value	Decision
H6	Business Strategy $\rightarrow$ Competitive Advantage $\rightarrow$ Business Performance	0.083	1.974	0.048	Supported
H7	Technological Capability $\rightarrow$ Competitive Advantage $\rightarrow$ Business Performance	0.141	2.842	0.005	Supported

Source: Author's Analysis (2025)

H1 and H3: The Role of Business Strategy

Business strategy significantly and positively influences business performance (H1: $\beta = 0.271$, $t = 3.026$, $p = 0.002$) and competitive advantage (H3: $\beta = 0.299$, $t = 3.384$, $p = 0.001$), indicating that the quality and consistency of strategic orientation is a meaningful determinant of both market positioning and business outcomes among Batam MSMEs. The path coefficient of 0.271 for H1 suggests that strategic capability is associated with a substantial share of the explained variance in business performance, a magnitude that carries practical significance in the resource-constrained MSME context.

Enterprises operating in the Batam FTZ compete directly against imported goods entering under preferential tariff treatment, against foreign-invested enterprises with larger capital bases, and against regional competitors from Singapore and Malaysia. In this environment, the absence of a formalized business strategy may represent a meaningful competitive disadvantage rather than a minor missed optimization, although the cross-sectional design of this study cannot establish this as a deterministic causal mechanism. MSMEs that rely on intuitive or

reactive decision-making rather than deliberate strategic planning may lack the directional clarity needed to allocate limited resources effectively, which could constrain their ability to build distinctive customer value propositions. The comparatively high mean score on indicator X1.8, adaptive and competitive strategy development (mean = 4.25), suggests that this dimension is the most strongly endorsed strategic competency among the institutionally affiliated respondents in this study, though this descriptive pattern should be interpreted as suggestive rather than as direct evidence of practitioners' underlying beliefs about competitive necessity.

These findings carry implications for the design of MSME development programs. If business strategy formulation is a significant predictor of both competitive advantage and business performance, then policy interventions focused exclusively on capital access, product training, or market linkage, without addressing strategic planning capacity, may be addressing only part of the performance challenge. Programs such as Rumah BUMN Batam and PLUT could consider integrating structured strategic planning modules, including market positioning workshops, competitive analysis tools, and long-term business planning templates, into their existing MSME development frameworks. These findings are consistent with Farida and Setiawan (2022) and Triono et al. (2024), both of whom established the strategy-performance link in Indonesian enterprise contexts, and extend this evidence to the specific competitive conditions of a free trade zone.

H2 and H4: The Dominance of Technological Capability

Technological capability exerts a significant positive effect on business performance (H2: $\beta = 0.295$, $t = 3.697$, $p = 0.000$) and produces the largest path coefficient in the entire structural model in its effect on competitive advantage (H4: $\beta = 0.507$, $t = 6.806$, $p = 0.000$). The magnitude of the technology-to-competitive-advantage path, at 0.507, is approximately 70% larger than the strategy-to-competitive-advantage path at 0.299, and its t-statistic of 6.806 indicates a comparatively robust and stable relationship across the bootstrapped samples. The authors interpret this pattern as offering insight into the competitive economics of the Batam FTZ, while recognizing that a single survey-based path estimate cannot by itself establish a structural economic mechanism.

Batam's proximity to Singapore, one of the world's most digitally advanced economies, may create both opportunity and pressure for local MSMEs. On the opportunity side, digital infrastructure and access to international digital platforms appear more readily available in Batam than in many other Indonesian cities, potentially lowering barriers to technology adoption. On the pressure side, this same proximity may expose Batam consumers and business buyers to the service standards and digital convenience associated with Singapore-based and regionally competitive enterprises. MSMEs that do not match these digital service expectations may face a growing disadvantage in digitally mediated customer

acquisition relative to competitors with stronger digital capability. The finding that fewer than 40% of Batam MSMEs deploy digital technology systematically suggests that a substantial share of enterprises may be operating below the level of digital engagement associated with stronger competitive positioning in this study's model (BPS, 2025).

The pattern of results suggests several practical considerations for technological capability development among Batam MSMEs, though these should be understood as interpretations consistent with the data rather than direct measurements within this study. MSMEs without digital marketing capability may rely more heavily on walk-in or referral-based customer acquisition, which could constrain market reach relative to digitally capable competitors. MSMEs without digital inventory, financial management, or logistics tools may carry higher per-unit operating costs due to manual process inefficiencies. At the competitive level, enterprises lacking technology-based differentiation, such as product customization or faster delivery, may face pricing pressure from lower-cost alternatives, although this study did not directly measure import pricing dynamics or competitive outcomes and this interpretation should be read as a plausible extension of the findings rather than a tested relationship. The lowest-scoring indicator in this construct, X2.3, creation of technologically superior products (mean = 3.98), suggests that Batam MSMEs have begun adopting digital operational tools but have not yet advanced substantially into technology-driven product innovation. These findings extend Djiu et al. (2024) and Prakasa and Jumani (2024) by indicating that, in a free trade zone context, the technology-competitive advantage relationship is not only significant but comparatively dominant relative to the strategy-competitive advantage relationship within this model.

H5: Competitive Advantage as a Performance Driver

Competitive advantage significantly and positively predicts business performance (H5: $\beta = 0.278$, $t = 3.053$, $p = 0.002$), indicating that stronger competitive positioning is associated with more favorable performance outcomes, including revenue growth, customer retention, and profitability. The mean score on competitive advantage (4.11) was the highest of all four constructs among sampled MSMEs, and this corresponds to the comparably high business performance mean (4.09), a pattern consistent with the theoretical predictions of both RBV and Dynamic Capabilities Theory.

This relationship may carry particular relevance in the Batam FTZ context, where competitive advantage achieved through product quality or pricing could be challenged over time by new imported substitutes or by the digital upgrading of rival enterprises. MSMEs that build competitive advantage on durable, less easily imitated foundations, such as deep customer relationships, proprietary production knowledge, or embedded digital service capabilities, may be more resilient to competitive displacement than those whose advantage rests on temporary cost or

location benefits, although this study did not directly test resilience over time given its cross-sectional design. For practitioners, investment in competitive advantage building, whether through quality certification, customer loyalty programs, or technology-driven service enhancement, may be more appropriately understood as a long-term performance-supporting mechanism rather than a short-term marketing activity. This finding is consistent with Seow et al. (2025) and Susanti et al. (2023), both of whom identified competitive advantage as an important performance-related mechanism in Indonesian and Southeast Asian SME contexts.

H6 and H7: The Mediating Role of Competitive Advantage

Competitive advantage significantly and partially mediates both the strategy-performance relationship (H6: $\beta = 0.083$, $t = 1.974$, $p = 0.048$) and the technology-performance relationship (H7: $\beta = 0.141$, $t = 2.842$, $p = 0.005$). Following Nitzl et al. (2016), this pattern is consistent with complementary partial mediation, in which both the direct and indirect effects are significant and point in the same direction, indicating that business strategy and technological capability each contribute to business performance through two distinct pathways, a direct pathway and an indirect pathway operating through competitive positioning. This dual-pathway structure suggests that neither strategic planning nor technological investment fully substitutes for the other in this model.

Some performance outcomes, such as operational cost reduction from digital process automation or revenue improvement from a more focused product-market strategy, may be generated more directly by strategy and technology, while other outcomes, such as sustained market share growth or customer loyalty under competitive entry, may depend more heavily on the durable competitive positions that strategy and technology help to build. In the Batam FTZ specifically, the direct performance benefits of technology may be more operational in nature, such as reduced transaction costs or expanded digital reach, while the indirect benefits may operate through competitive advantage by supporting differentiated customer experiences. This interpretation is offered as a plausible explanation for the observed pattern of partial mediation rather than as a directly tested mechanism.

The comparatively stronger indirect effect of technological capability (0.141) relative to business strategy (0.083) through competitive advantage suggests that, within this sample, technology investment is associated with a comparatively larger competitive positioning premium than strategy formulation when both are expressed through the mediation pathway. For MSME development policymakers in Batam, this finding may warrant consideration of sequencing in capacity-building interventions, such as prioritizing technology capability building as a leading driver of competitive advantage, complemented by strategy formulation assistance, although this implication should be treated as a tentative consideration given the study's cross-sectional design rather than a firm prescriptive recommendation. The total effect of technological capability on business

performance ($0.295 + 0.141 = 0.436$) exceeding that of business strategy ($0.271 + 0.083 = 0.354$) is consistent with this interpretation while confirming that both constructs remain independently significant predictors. These findings align with and extend Agus et al. (2023) and Djiu et al. (2024), adding the contextual observation that the competitive advantage mediation channel appears comparatively stronger for technology than for strategy within this free trade zone sample.

The overall pattern of findings is broadly consistent with the body of research cited in the introduction. The OECD (2021) observation that approximately 70% of SMEs in developing countries face persistent productivity constraints due to limited technological adaptation is consistent with the dominance of the technology-competitive advantage path in this model, suggesting that the digital capability gap may be a substantial performance-related factor for Batam MSMEs rather than a purely operational inconvenience. The contextual evidence Hasan et al. (2024) that Batam MSMEs demonstrate strong customer loyalty but underdeveloped competitive positioning due to insufficient digital adoption is consistent with the present finding that technological capability emerges as the dominant driver of the competitive advantage construct. Triono et al. (2023) identified the strategic use of technological resources as an underinvestigated performance driver among Indonesian enterprises, a gap this study addresses by quantifying the technology-to-competitive-advantage pathway at $\beta = 0.507$ as the strongest path in the model.

The findings suggest that the Batam FTZ, despite its structural advantages as a trade-liberalized industrial zone, may include a meaningful share of MSMEs that are commercially active yet competitively constrained at this point in time, based on the present cross-sectional snapshot. The combination of limited formalized strategy adoption, below-threshold digital capability deployment, and an open competitive environment may create conditions associated with MSME performance stagnation, although establishing this as a systemic trend would require longitudinal data beyond the scope of this study. Addressing this pattern may require interventions that simultaneously support strategic clarity and technological capability as complementary performance drivers, consistent with the role of competitive advantage as a mechanism through which both investments appear to translate into business performance in this model.

CONCLUSION

This study examined the influence of business strategy and technological capability on the business performance of MSMEs in Batam City, Indonesia, with competitive advantage as a mediating variable. Using PLS-SEM on 350 respondents, all seven hypotheses were supported, indicating that both business strategy and technological capability exert significant positive effects on competitive advantage and business performance, while competitive advantage

significantly mediates both relationships. Technological capability emerged as the dominant driver, producing the largest path coefficient in the structural model, particularly toward competitive advantage, suggesting a substantial role for digital resources in the competitive landscape of an internationally open Free Trade Zone. These findings are consistent with and lend empirical support to the integrated theoretical framework combining Strategic Management Theory, the Resource-Based View, and Dynamic Capabilities Theory as an explanatory lens for MSME performance in trade-liberalized environments.

The results carry meaningful implications for both theory and practice. Theoretically, this study extends the application of RBV and Dynamic Capabilities Theory to the comparatively underexplored context of MSMEs in a free trade zone, while contributing an integrated mediation model that simultaneously tests strategic and technological antecedents. Practically, MSME practitioners in Batam may benefit from treating technological capability not only as an operational tool but as a strategic priority with implications for competitive positioning and performance. Policymakers and development institutions may consider designing capacity-building programs that extend beyond basic digital adoption toward developing the internal routines through which technology is strategically integrated, alongside structured business strategy formulation support.

This study has limitations that warrant acknowledgment. The sample was drawn from institutionally affiliated MSMEs, which may not fully represent the broader Batam MSME population and could introduce selection bias toward more structured enterprises. The cross-sectional design precludes strict causal inference, and the moderate R-square values indicate that variables beyond the current model, including market orientation, entrepreneurial orientation, and human capital quality, may contribute meaningfully to performance variance. Future research is encouraged to broaden the geographic scope to other Indonesian special economic zones, incorporate longitudinal data to capture capability development over time, and explore additional mediating mechanisms such as innovation culture and digital business model transformation to further clarify the pathway from internal organizational resources to sustained competitive performance.

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