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Investigating The Interplay Of Technological Stance, Operational Flexibility, And Resource Acquisition In Fostering Msme Longevity

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ABSTRACT

This study aims to evaluate the influence of process adaptation, technology posture, and experimentation (PAE), and technology sourcing on proactive collaborative technology strategy and its impact on sustainable performance of MSMEs. Through comprehensive data analysis, it was found that technology posture has a significant influence on proactive collaborative technology strategy. MSMEs that have technological readiness, commitment to innovation, and management support for the use of technology tend to develop more collaborative and proactive technology strategies. Process adaptation and experimentation were also found to have a significant influence on proactive collaborative technology strategy. This shows the importance of flexibility and innovation in business processes as the key to successful technology adoption. In addition, effective technology sourcing, whether through purchasing, partnerships, or internal innovation, plays an important role in driving proactive collaborative technology strategy.The results of this study also show that proactive collaborative technology strategy has a significant impact on sustainable performance of MSMEs. A collaborative approach in technology strategy not only helps in effective technology adoption but also contributes to sustainable business performance in the long term. These findings provide important insights for MSMEs, stakeholders, and researchers in the field of technology management and innovation regarding the factors that influence the success of technology adoption in MSMEs

Keywords: Technology Posture, Technology Sourcing, PAE, Technology Strategy, Sustainable Performance.

1. Introduction

Technology plays a crucial role in modern business transformation, facilitating changes in how companies operate and compete in the global market (Kaplan & Norton, 2004). Over recent decades, advancements in technology—such as artificial intelligence (AI), big data analytics, cloud computing, and the Internet of Things (IoT)—have revolutionized operational paradigms across industries (Manyika et al., 2017).

These technologies not only enhance operational efficiency but also unlock new opportunities for business innovation and growth (Brynjolfsson & McAfee, 2014; Daryono, Meutia K. Dewi, & Udin U., 2024). Investments in technology drive companies to automate manual tasks and improve business process efficiency (Davenport, 2013), providing employees with the tools and data necessary to work more effectively (Katz & Krueger, 2016), and creating more competitive value propositions in the market (Porter, 1998; Daryono, D., Gunawan, R. S., & Gunawan, D. S., 2025).

Proactive Collaborative Technology Strategy is pivotal in achieving sustainable performance by enabling companies to proactively identify and leverage technological opportunities. This strategy involves collaborating with various stakeholders, including external partners, to develop innovative and relevant technological solutions that address business needs. Key aspects such as Technology Posture, Process Adaptation and Experimentation (PAE), and Technology Sourcing are integral to enhancing a company's ability to adapt and thrive in a dynamic business environment (Bharadwaj et al., 2013).

Technology Posture refers to a company's attitude and approach towards adopting new technologies. Companies with a proactive technology posture are typically quicker to embrace innovations and leverage technology for competitive advantage (Chesbrough, 2003). Process Adaptation and Experimentation (PAE) involve adjusting business processes and conducting experiments to improve efficiency and effectiveness (Kettinger et al., 1997). Meanwhile, Technology Sourcing encompasses strategies for acquiring technology from various sources, including internal development, partnerships, or acquisitions (Teece, 1986).

This article aims to identify and elucidate the key elements influencing Proactive Collaborative Technology Strategy in the context of modern business. Specifically, it will explore how Technology Posture, PAE, and Technology Sourcing contribute to enhancing Sustaining Performance. The article will discuss the importance of maintaining a proactive technology posture to identify and capitalize on new technological opportunities, how PAE aids companies in assessing the impact of adopted technologies and making necessary adjustments to maximize benefits, and examine various technology sourcing strategies—whether through internal development, strategic partnerships, or acquisitions—and how these strategies support innovation and Sustaining Performance (Eisenhardt & Martin, 2000).

2. Literature Review

The impact of inadequate technology adoption, including perceived information asymmetry and fears of vendor opportunism, on the perceived uncertainty experienced by SMEs in adopting new technologies must be examined. Additionally, the role of Proactive Collaborative Technology Strategy in the relationship between perceived uncertainty and long-term performance will also be investigated.

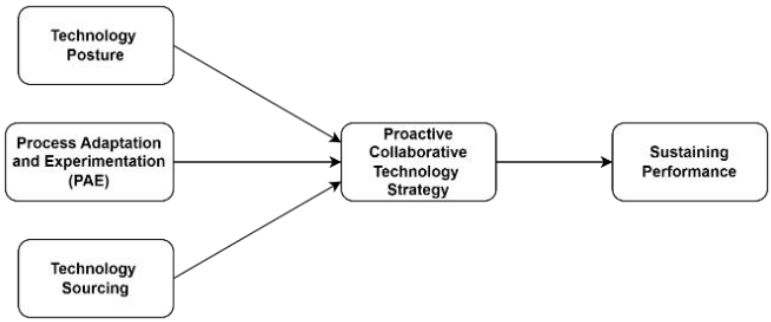

Figure 1 Research Framework

2.1. *Fundamental Concepts of Technology Posture*

Technology Posture refers to the approach an organization takes to manage, adapt, and utilize technology in pursuit of its business objectives. This approach encompasses assessing technological capabilities, planning technology development, and adjusting organizational structure and performance to optimize technology use (Gartner, 2019). Technology plays a critical role within organizations, particularly in supporting the achievement of strategic and operational goals. Well-managed technology can drive efficiency, innovation, and competitive advantage (Deloitte, 2020).

An illustrative example of successful technology posture implementation is seen in PUSINTEK, the Technology Center of the Ministry of Finance of the Republic of Indonesia. PUSINTEK developed an application based on the balanced scorecard concept to control workflow from leadership meetings and correspondence. This application facilitates financial policy direction and strategy formulation for national financial controllers. Additionally, research indicates that the use of cloud computing expands the role of IT departments. A survey by Cisco Consulting Services and Intel revealed that cloud adoption in companies is rapidly increasing, contributing 23% to total IT expenditures with an anticipated rise to 27% in the next three years. This shift underscores that technology is not merely a tool but an integral part of planning and procuring services, enhancing organizational agility in response to changing business environments.

Further studies explore the role of information technology in enhancing competitive advantage. Information technology improves the quality of information, monitors organizational performance, and fosters the creation of more competitive products or services. For instance, technologies that integrate various specialized services for client management have positively impacted clients, a trend observed in industries such as healthcare and financial services. Technology also facilitates communication and collaboration within organizations, such as through the implementation of supply chain management (SCM) and enterprise resource planning (ERP) systems, which enable significant advancements in the design of organizational IT structures.

H1: Technology Posture positively influences Proactive Collaborative Technology Strategy.

2.2. Process Adaptation and Experimentation (PAE)

Process Adaptation and Experimentation (PAE) refers to systematic efforts to modify and refine operational processes through well-planned experimentation (Fisher, 2004). Process

adaptation and experimentation are crucial for ensuring that technologies remain relevant and effective amidst dynamic business environments (Helfat & Peteraf, 2003).

Process adaptation involves altering existing work methods to enhance operational efficiency and effectiveness (Leonard-Barton, 1992). Experimentation entails testing various approaches or variables to identify the optimal solutions for implementation. (Thomke, 2003). The significance of process adaptation and experimentation lies in their ability to help organizations quickly respond to market and technological changes. Through PAE, companies can pinpoint areas needing improvement, test hypotheses about the best methods for such improvements, and implement changes based on empirical data (March, 1991).

Various techniques and methods can be employed for process adaptation and experimentation. One commonly used method is the Design of Experiments (DoE), which allows companies to conduct structured testing of factors affecting operational processes (Montgomery, 2017).

For example, in closed-loop systems, DoE can assess the efficiency of process control techniques, the impact of experimental factors on critical process phenomena, and how controlled variable settings influence process performance indicators (Myers, Montgomery, & Anderson-Cook, 2016). Another technique includes process simulation using specialized software like TE simulators, which enable users to pause, analyze, and make new decisions based on experimental results (Banks, Carson, Nelson, & Nicol, 2010).

H2 : Process Adaptation and Experimentation (PAE) positively influence Proactive Collaborative Technology Strategy.

2.3. Technology Sourcing

Technology Sourcing refers to the process by which companies acquire the necessary technologies for their operations and business development, whether from internal or external sources. Technology sourcing includes all forms of acquiring technical knowledge, equipment, software, and systems that support increased efficiency, innovation, and competitiveness (Veugelers & Cassiman, 1999). Key strategies in technology sourcing include internal sourcing, external sourcing, and a combination of both known as ambidexterity (O'Reilly & Tushman, 2013). Internal sourcing involves developing technology within the company through internal research and development (R&D). The primary advantage of this approach is full control over the innovation and development process and better protection of intellectual property. However, internal sourcing also comes with high costs and the risk of complete responsibility for potential failures. On the other hand, external sourcing involves obtaining technology from third parties through partnerships, joint ventures, acquisitions, or licenses. This approach helps companies access advanced technologies developed by external entities, reduces R&D costs, and accelerates time-to-market. Nevertheless, external sourcing poses challenges such as dependence on suppliers, technology integration issues, and potential loss of control over the innovation process.

Ambidexterity in technology sourcing combines the advantages of both internal and external approaches to balance exploration and exploitation. Exploration involves seeking and developing new, unfamiliar technologies, while exploitation focuses on utilizing existing technologies to enhance operational efficiency. According to Rothaermel and Alexandre (2009), companies that effectively manage ambidexterity in technology sourcing tend to perform better as they leverage a combination of internal and external knowledge for sustained innovation.

H3 : Technology Sourcing positively influences Proactive Collaborative Technology Strategy.

2.4. Proactive Collaborative Technology Strategy

Proactive Collaborative Technology Strategy emphasizes the importance of proactive collaboration among various stakeholders to achieve sustained performance. This strategy involves integrating technology and managing resources through the participation of both internal and external stakeholders. By building trust-based relationships and credibility, this strategy facilitates the integration of stakeholder perspectives into product design and development, encompassing habitat preservation, resource management, waste reduction, and energy conservation. Implementing a proactive collaborative strategy results in unique and hard-to-replicate organizational capabilities, such as enhanced company reputation, continuous innovation, cost reduction, and improved employee morale.

The trust established through this strategy can become a strategic asset, accelerating development approval processes, reducing project costs, and garnering community support, thereby creating a solid foundation for sustained performance excellence.

H4 : Technology Posture, PAE, and Technology Sourcing, mediated by Proactive Collaborative Technology Strategy, positively influence Long-term Performance.

3. Research Methodology

This study employs a quantitative approach using a questionnaire to examine Proactive Collaborative Technology Strategy within the business context. The primary focus of this research is to understand how Technology Posture, Process Adaptation and Experimentation (PAE), and Technology Sourcing contribute to enhancing Sustaining Performance in companies.

Data were collected via a research questionnaire distributed through Google Forms, sent to various SMEs across different industry sectors, which were identified as actively adopting new technologies. The distribution occurred via email in June 2024. A total of 450 responses were received, with 22 responses excluded due to incomplete information. Among the 450 valid respondents, 260 were male and 190 were female. The majority of respondents were within the age group of 20-35 years.

The study utilized a five-point Likert scale for measurement, where 1 represented "Strongly Disagree" and 5 represented "Strongly Agree." The consumer involvement scale used in this study was adapted from Zaichkowsky (1994).

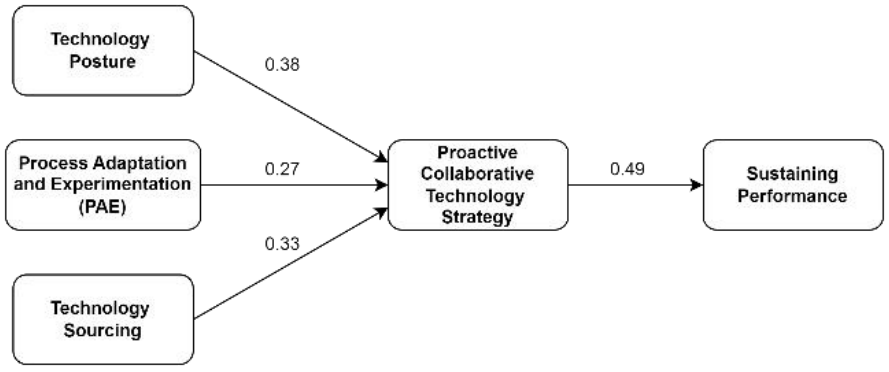

Figure 2 Path Analysis

4. Results

Before examining the path effects of the structural framework, confirmatory factor analysis (CFA) must be conducted. The CFA process involves evaluating the measurement model to assess unidimensionality, reliability, and validity of the measurement items. Following this, the chi-square test proposed by Singh (1995) will be employed to determine whether variations in technology adoption levels among SMEs impact the relationships between Technology Posture, Process Adaptation and Experimentation (PAE), Technology Sourcing, Proactive Collaborative Technology Strategy, and Long-term Performance.

Table 1 Creation of standardized indicators and convergent validity

Konstruk	Insdikator	Cronbach's a	Standardized Loadings	T value
Technology Posture	TP1	0.76	0.83	19.99
	TP2		0.78	18.45
	TP3		0.55	10.47
	TP4		0.88	20
Process Adaptation and Experimentation	PAE1	0.84	0.76	16.98
	PAE2		0.89	18.94
Technology Sourcing	TS1	0.86	0.78	14.4
	TS2		0.88	16.04
	TS3		0.76	15.55
Proactive Collaborative Technology Strategy	PTS1	0.78	0.76	16.77
	PTS2		0.81	17.09
	PTS3		0.79	16.86
Sustaining Performance	SP1	0.94	0.9	21.88
	SP2		0.84	20.97
	SP3		0.85	21.08

The analysis results indicate that the chi-square/degrees of freedom ratio (χ^2/df) is 1.96 (220.002/112), which is close to 2, suggesting a good fit of the model. The probability of error is 0.05, which is within acceptable levels. The goodness-of-fit index (GFI) is 0.95, and the adjusted goodness-of-fit index (AGFI) is 0.95. The comparative fit index (CFI) is 0.95, the non-normed fit index (NNI) is 0.95, and the normed fit index (NFI) is 0.95. According to model fit standards, these results indicate that the measurement model exhibits a satisfactory fit.

Reliability reflects the internal consistency of the indicators measuring a particular framework. Table 1 shows that the reliability of the scales in the measurement model is indicated by alpha coefficients greater than the recommended threshold of 0.7. Factor loadings' t-values are typically used to assess convergent validity. When t-values exceed 1.96 (at the 0.05 significance level), validity is considered achieved. Table 1 demonstrates that all t-values are greater than 1.96, confirming that the indicator variables in this study are robust and appropriate.

The standardized path coefficients of the proposed research model are reported in the figure above each arrow, indicating the effect of one variable on predicting another. The path

from Technology Posture to Proactive Collaborative Technology Strategy (β=0.38) is statistically significant and in the expected direction, supporting Hypothesis H1. This suggests that a strong technology posture in SMEs directly enhances the development of a proactive collaborative technology strategy.

Additionally, the path from Process Adaptation and Experimentation (PAE) to Proactive Collaborative Technology Strategy (β=0.27) is also statistically significant. This result supports Hypothesis H2, indicating that process adaptation and experimentation positively contribute to the development of a more collaborative and proactive technology strategy in SMEs.

The path from Technology Sourcing to Proactive Collaborative Technology Strategy (β=0.33) is statistically significant, supporting Hypothesis H3. This finding suggests that effective and efficient technology sourcing plays a crucial role in fostering a proactive collaborative technology strategy within SMEs.

Finally, the path from Proactive Collaborative Technology Strategy to Sustaining Performance (β=0.49) is statistically significant, supporting Hypothesis H4. This indicates that a proactive collaborative technology strategy has a significant positive impact on long-term performance, emphasizing the importance of a collaborative approach in technology strategy to maintain high performance over time.

5. Discussion

This study aims to evaluate the impact of Technology Posture, Process Adaptation and Experimentation (PAE), and Technology Sourcing on Proactive Collaborative Technology Strategy and its effect on the Sustaining Performance of SMEs. The analysis reveals that all proposed hypotheses are supported by the data, offering valuable insights into the factors that influence successful technology adoption in SMEs.

Technology Posture has been found to have a significant impact on Proactive Collaborative Technology Strategy (β=0.38). This finding indicates that SMEs with a strong technology posture—characterized by technological readiness, a commitment to innovation, and management support for technology adoption—are more likely to develop a collaborative and proactive technology strategy. This result aligns with previous literature, which asserts that a robust technology posture is a critical foundation for successful and sustainable technology adoption (Zahra & George, 2002).

Process Adaptation and Experimentation (PAE) also significantly influences Proactive Collaborative Technology Strategy (β=0.27). This suggests that SMEs actively engaged in adapting their processes and experimenting with new technologies are more likely to develop a proactive and collaborative technology strategy. This underscores the importance of flexibility and innovation in business processes as essential to successful technology adoption (Teece, Pisano, & Shuen, 1997).

Technology Sourcing is another significant factor affecting Proactive Collaborative Technology Strategy (β=0.33). This finding indicates that effective access to and use of technology resources, whether through acquisition, partnerships, or internal innovation, play a crucial role in fostering a proactive collaborative technology strategy. This supports the view that effective technology sourcing can drive innovation and collaboration within businesses (Grant, 1996).

Finally, Proactive Collaborative Technology Strategy has a significant impact on the Sustaining Performance of SMEs (β=0.49). This suggests that a collaborative approach to technology strategy not only facilitates effective technology adoption but also contributes to

sustained business performance over the long term. These findings are consistent with previous studies that emphasize the importance of collaboration and partnerships in achieving competitive advantage and sustainable performance (Dyer & Singh, 1998).

6. Conclusion

This study aims to evaluate the impact of Technology Posture, Process Adaptation and Experimentation (PAE), and Technology Sourcing on Proactive Collaborative Technology Strategy and its effect on the Sustaining Performance of SMEs. The analysis demonstrates that all proposed hypotheses are supported by the data, providing robust evidence of the importance of these factors in the successful adoption of technology in SMEs.

Firstly, a strong Technology Posture significantly and positively influences the development of Proactive Collaborative Technology Strategy. SMEs with high technological readiness and a commitment to innovation are more likely to devise effective and proactive technology strategies. Secondly, Process Adaptation and Experimentation (PAE) positively contributes to Proactive Collaborative Technology Strategy, highlighting the crucial role of flexibility and innovation in business processes for effective technology adoption. Thirdly, effective access to and utilization of technology resources significantly drive Proactive Collaborative Technology Strategy. This finding underscores the importance of efficient and effective technology sourcing in fostering innovation and collaboration within SMEs.

Moreover, Proactive Collaborative Technology Strategy is shown to have a significant impact on the Sustaining Performance of SMEs. This suggests that a collaborative approach to technology strategy not only facilitates effective technology adoption but also contributes to sustained business performance over the long term.

This study yields significant practical and theoretical implications for SMEs, stakeholders, and researchers in the fields of technology management and innovation.

Practical Implications:

1. Enhancing Technology Posture: SMEs should prioritize improving their technology posture by ensuring robust technological infrastructure and managerial support. This includes investing in training programs and skill development initiatives to better prepare employees for effective technology adoption.
2. Adopting Process Adaptation and Experimentation (PAE): SMEs are encouraged to integrate flexibility and innovation into their business processes. This involves experimenting with new technologies and adapting existing processes to enhance operational efficiency and effectiveness.
3. Ensuring Effective Technology Sourcing: SMEs should secure reliable access to appropriate technology resources through strategic partnerships, technology acquisitions, or internal development efforts. This approach helps in formulating more collaborative and proactive technology strategies.
4. Focusing on Collaborative Technology Strategies: SMEs should emphasize the importance of collaborative approaches in their technology strategies. This involves fostering partnerships with business associates, customers, and suppliers to leverage technology effectively and achieve sustainable performance.

Theoretical Implications:

1. Contributing to Technology Adoption Literature:This study enriches the literature on technology adoption by underscoring the significance of technology posture, process adaptation, and technology sourcing in shaping proactive collaborative technology strategies.

2. Providing a Conceptual Framework: The research presents a conceptual model that can serve as a foundation for further investigations into technology adoption in SMEs. This model offers a basis for adapting and testing theories across various contexts to gain a broader understanding of technology adoption dynamics.

Directions for Future Research:

1. Employing Comprehensive Methodologies: Future research could benefit from using more comprehensive methodologies, such as case studies or longitudinal analyses, to gain deeper insights into the dynamics of technology adoption within SMEs.
2. Exploring Additional Factors: Subsequent studies should consider exploring other influencing factors such as organizational culture, government support, and technological advancements, which may impact technology strategies and sustainable performance.

By addressing these areas, future research can build upon the findings of this study to offer a more nuanced understanding of the factors driving successful technology adoption and sustained performance in SMEs.

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