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Does Dynamic Capability Lead to Sustainable Innovation Performance in Smes?

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ABSTRACT

These researchers analyzed micro, small, and medium enterprises (MSMEs) in Bantul Regency, Indonesia, to determine whether dynamic capabilities have a positive impact on sustainable innovation performance. In general, MSMEs in Indonesia play a crucial role in sustaining a resilient economy, which has proven to be able to withstand uncertain conditions. In developing countries such as Indonesia, MSMEs are expected to effectively manage both internal and external resources to achieve a sustainable competitive advantage. In this study, data were collected from 176 MSMEs that met the criteria of possessing dynamic capabilities in four main aspects: sensing capabilities, learning capabilities, integrating capabilities, and coordinating capabilities. The respondents in this study were managers or owners of MSMEs. Using regression analysis, the researchers found that these four aspects had a positive effect on the sustainable innovation performance of MSMEs in Bantul Regency. Thus, it has been proven that managing all aspects of dynamic capabilities is a strategic step to improve MSME performance, especially in terms of sustainable innovation.

Keywords: Coordinating Capability, Dynamic Capabilities, Innovation Performance, Integrating Capability, Learning Capability, Sustainable Sensing Capability

INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) play a significant role in strengthening and sustaining Indonesia's national economy. The current conditions in Indonesia are ideal for MSMEs to fulfill this role. This aligns with a statement by the Coordinating Ministry for Economic Affairs, which clearly identifies MSMEs as a crucial component and strategic pillar of the national economy (https://money.kompas.com/). MSMEs are required to contribute to and participate in achieving Indonesia's economic growth objective of 5.2%, which the government utilizes as the basis for preparing the 2025 State Budget (RAPBN) (State Secretariat, https://www.setneg.go.id). MSMEs are also anticipated to bring solutions to the problem of a lack of employment prospects for the bulk of Indonesia's people resources. All Indonesians can benefit from the numerous advantages that MSMEs offer. However, despite their immense potential, MSMEs face several challenges, including limited financial resources, regulatory changes, and the need to enhance digital skills.

Despite Indonesia's significant increase in MSMEs, (Widyastuti, Ferdinand, & Kunang, 2025) observe that these organizations remain primarily classified as small businesses, frequently encountering difficulties in scaling to larger operations. (Nasoha et al., 2024) indicate that MSMEs in Indonesia account for 60.42% of the nation's total investment and have significant economic stability. MSMEs can endure and sustain the economic framework even in the midst of a crisis.

The dynamic capabilities of MSMEs involve four critical factors: sensing, learning, integration, and coordination skills. Several studies imply that the adoption of dynamic capabilities will lead to sustainable and innovative performance for MSMEs. This study aims to investigate the issues outlined in the above description, specifically whether dynamic capabilities, characterized by their four key attributes, will have a positive impact on sustainable innovative performance, focusing on MSMEs in Bantul Regency, Special Region of Yogyakarta, Indonesia.

LITERATURE REVIEW

Sustainable Innovation Performance (SIP)

Sustainable Innovation Performance (SIP) is a model used to measure the ability of MSMEs to generate and implement innovation. SIP states that all technologies implemented must contribute to sustainable development. This is achieved by avoiding harmful ecological impacts. Additionally, SIPs must provide both sustainable social benefits and financial returns.

SIP is based on the Triple Bottom Line (TBL) concept. TBL focuses on three interconnected pillars (Bhatti, Rehman, Shamsi, & Shamim, 2025). (Orellano, Lambey-Checchin, Medini, & Neubert, 2021) adds that SIP is defined as “SMEs or individuals who do not only think about profit.” SMEs and individuals are encouraged to produce unique goods or services that increase profit value while remaining committed to environmental protection and social development.

Sustainable innovation has become a crucial strategic decision for effectively addressing and overcoming global environmental challenges (Tegethoff et al., 2025). This priority is based on the idea that Eco-Innovation can utilize resources more efficiently, reduce emissions, and, therefore, increase profits in the long term (Tegethoff et al., 2025).

From the Resource-Based View (RBV) perspective, sustainable innovation is considered a strategic asset that provides sustainable competitive advantage. Further empirical research demonstrates that industrial businesses, when prioritizing environmentally friendly innovation, would have a considerable boost in organizational performance. (Zhang et al., 2025) "found in their research that sustainable innovation in SMEs is often reactive and technical in nature, not yet fully integrated into the strategic management framework or long-term vision". However, an emerging focus recognizes sustainability as a socio-technical challenge that affects crucial organizational components, such as markets and technology.

Critiques suggest that "fewer works have examined sustainability in its fuller sense, encompassing not only ecological but also social and economic perspectives (Harsanto, et. al, 2023). In contrast to environmental innovation or eco-innovation, SI has a broader scope, incorporating the environmental, societal, and economic facets of innovation. Fundamentally, SI is often characterized as innovation that improves sustainability performance".

Dynamic capabilities

The theory of dynamic capabilities (DCs) (Teece, 2007) holds significant relevance in the study of SIP. Dynamic capabilities represent an organization's distinct ability to integrate, construct, and strategically reconfigure both internal and external competencies to effectively navigate rapidly shifting environments. Within the context of sustainable innovation, DCs empower firms to maintain continuous adaptation and develop inventive solutions that align precisely with sustainability objectives. Consequently, superior SIP is ultimately the result of an innovation process underpinned by a firm's dynamic capabilities and anchored in "the Triple Bottom Line (TBL) framework, ensuring the simultaneous creation of enduring economic, social, and environmental value".

The concept of dynamic capability, originally introduced by (Teece, 2007), elucidates "an organization's power to sense opportunities and threats, seize available opportunities, and reconfigure and protect its essential knowledge assets, competencies, and internal resources. This proactive mechanism is necessary for firms to remain adaptive to complex and volatile external changes. The ultimate goal of possessing these capabilities is to maintain a sustained competitive advantage within dynamic market conditions".

According to (Teece, 2007), DCs "enable companies to assimilate, build, and re-engineer both internal and external skills to effectively address environmental turbulence and generate novel value. This vital process unfolds through three primary phases: continuously identifying prospective opportunities, capturing those opportunities, and reforming the business to maintain relevance and competitiveness. This idea underlines the crucial relevance of a firm's ability to strategically reengineer its resources and capabilities as a responsive measure against unforeseen external developments".

To effectively adapt to changing conditions, a company must be able to strategically integrate, develop, and reorganize its resource base, encompassing both internal and external assets (Teece, 2007; Taghizadeh, et al., 2024). This approach explains that different business outcomes can be achieved by organizations using the same resources and operating under equivalent economic conditions. This idea was later expanded upon by (Eisenhardt & Martin, 2000), who stated that DCs are organizational procedures and practices that oversee the acquisition, reconfiguration, integration, and divestment of resources necessary to respond to market changes. Adapting the firm's resource composition to environmental changes is the main goal of these skills. Although the Resource-Based View (RBV) is the foundation of dynamic capabilities (DCs), DCs place

more emphasis on the renewal and adaptation of resources than the RBV does (Pavlou & El Sawy, 2011).

In response to increasingly complex pressures for change, organizations must develop internal capabilities that allow them to maintain flexibility and relevance. Recent studies indicate that dynamic capabilities comprise four primary components that mutually support one another. First, sensing capabilities enable organizations to identify vital signals from their environment, including market and technological developments, thereby allowing them to anticipate changes at an early stage (Engelmann, 2024). Second, through the learning process, organizations can assess and enhance their existing capabilities while also creating new knowledge that aligns more effectively with their strategic objectives (Li & Wang, 2022). Third, integration capabilities are essential for coordinating cross-functional resources and expertise to create innovative and sustainable formations (Aichouni et al., 2024). Ultimately, coordination ensures that the entire transformation process functions cohesively and harmoniously across all components of the organization. These four aspects form an essential foundation for organizations seeking to maintain competitiveness in an increasingly dynamic business environment.

The reconfiguration process primarily focuses on enhancing efficiency, ensuring timeliness, and attaining appropriateness. Researchers frequently utilize these four categories, and many believe that companies can employ them to navigate the complex and ever-changing nature of the sustainability process, which is characterized by unexpected changes (Eikelenboom & de Jong, 2019).

Sensing Capability "is defined as the firm's proficiency in spotting, interpreting, and capitalizing on environmental opportunities (Pavlou & El Sawy, 2011). This involves actively searching for and exploring new technologies, marketing products and services domestically and globally, gaining deep knowledge about competitors, customers, and the general environment".

Learning Capability centers on "the firm's capacity to renew its existing operational capabilities by incorporating new knowledge (Pavlou & El Sawy, 2011). This involves acquiring fresh knowledge, knowledge brokering (Eisenhardt & Martin, 2000) brainstorming, and capitalising on opportunities through continuous learning (Teece, 2007). Therefore, robust learning capability enables a firm to identify opportunities for new products and execute tasks with greater speed and efficiency".

Integrating capability "refers to a firm's proficiency in consolidating individual knowledge to form new operational capabilities at the unit level (Pavlou & El Sawy, 2011). This capability facilitates configurations through three key mechanisms: contribution (disseminating individual input within the organization), representation (visualizing roles, actions, and the fit of unit activities), and interrelation (combining individual inputs to refine reconfigured operational capabilities through collective action, (Helfat & Peteraf, 2003)".

Coordinating capability "is defined by (Pavlou & El Sawy, 2011) as the ability to orchestrate and deploy tasks, resources, and activities in the new operational capabilities (p. 246). The functions of this capability include allocating resources to specific tasks (Helfat & Peteraf, 2003), making appropriate personnel appointments, and identifying complementarities and synergistic relationships among various tasks and resources (Eisenhardt & Martin, 2000)".

Dynamic capabilities and sustainability innovation performance

Several foundational studies "explore the role of dynamic capabilities (DCs) in enhancing the sustainability performance of Small and Medium Enterprises (SMEs). For instance, (Eikelenboom & de Jong, 2019) analyzed the association between integrative dynamic capacities and the social, environmental, and economic performance characteristics within MSMEs". Their findings show that integrative DCs play a significant role in enabling SMEs to overcome resource limits, resulting in increased overall sustainability performance across all three TBL (Triple Bottom Line) dimensions. Extending this line of inquiry, (Taghizadeh et al., 2024) examined how specific DCs—including sensing, learning, integrating, and coordinating capabilities—act as precursors for sustainable innovation performance in SMEs, confirming that these capabilities are essential drivers for sustainability-oriented innovation.

Regional studies also confirm similar findings. Complementary qualitative research conducted by (Liliani & Wiliana, 2018) on SMEs in Surabaya, Indonesia, utilized adaptable, absorptive, and inventive capacities as proxies for DCs. They concluded that these SMEs employed dynamic capabilities largely to adjust to evolving business contexts, which creates a fundamental foundation for ongoing business survival. Further reinforcing the mediating role of DCs, the researchers investigated the function of DCs in linking environmental dynamism and managerial talents to SME performance, demonstrating that DCs are crucial in enhancing firm performance amid turbulent environmental changes.

The core concept of sustainable innovation performance (SIP) is defined (Javed, Du, & Farooq Islam, 2025) "as the launch of a new or significantly improved product or service, in terms of features, intended use, materials, technical characteristics, ease of use, or other environmental, social, and economic attributes. SIP necessitates the integration of innovative practices that are socially responsible, ecologically conscious, and economically viable. This integration enables SMEs to compete by simultaneously minimizing negative social and environmental footprints while promoting long-term economic viability. Thus, SIP requires consistency across the firm's philosophy, products, processes, and value proposition to concurrently create economic, environmental, and social value".

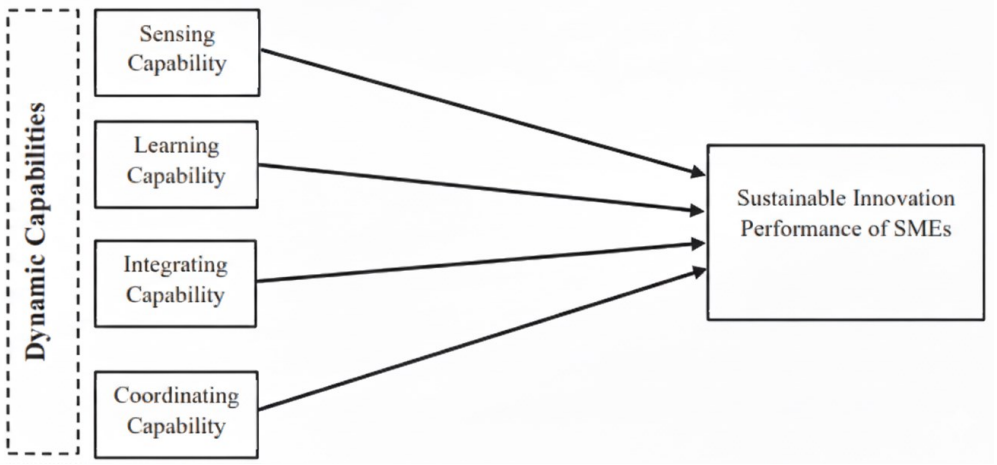
Researchers have established that SIP can be effectively driven by dynamic capabilities. Conversely, research by (Eikelenboom & de Jong, 2019) On MSMEs, emphasis was placed on the primary importance of external integrative dynamic capabilities for achieving sustainable performance across the TBL pillars. Building upon this, this study posits that specific DCs—sensing, learning, integrating, and coordinating—are all critical in the SME context, leading us to investigate which particular DC contributes most significantly to SIP.

An MSME can notice and adopt technical capabilities ahead of competition by regularly exercising its sensing capability. "Organizations that focus on sensing can deepen their insight into existing customer needs and identify underserved market segments (Taghizadeh et al., 2024). Many studies have found that SMEs consistently exploiting sensing capabilities may generate more innovative products and achieve rapid market entry (Zhang et al., 2025).

Notably, integrating individual abilities into the firm's broader capacities fosters a shared understanding and collective value for the organization and society (Hernández-Linares, et. al, 2024; (Pavlou & El Sawy, 2011; Teece, 2007. "An organization's ability to recognize and effectively combine resources into existing work processes is an important part of the integrative capabilities that support innovative resource reconfiguration (Aichouni et al., 2024) along with orchestrating individual tasks and activities (Pavlou &

El Sawy, 2011) enables new product development teams to enhance product quality, market share, and overall project effectiveness in pursuit of sustainability goals". Based on this theoretical discourse, we have generated the following assumptions and constructed a corresponding conceptual model (Figure 1) to find the most effective dynamic capacity for sustainable innovation performance.

Figure 1. The Conceptual Model



Hypotheses Development

The ability to detect is formally defined as a company's ability to identify, interpret, and capitalize on opportunities arising from internal processes and the external environment (Pavlou & El Sawy, 2011). Academic literature confirms that MSMEs that consistently apply the ability to detect opportunities are better prepared to develop innovations and achieve rapid market entry (Zhang et al., 2025). This early awareness is crucial because successful sustainable innovation depends on recognizing trends—such as the need for reduced packaging or the adoption of circular economy models—before competitors do (Taghizadeh et al., 2024). As a result, strong sensing capabilities ensure that a company's innovative efforts are strategically aligned with evolving sustainability demands, transforming early market intelligence into proactive and responsible development in both products and operational processes.

Hypothesis 1: "Sensing capability is positively related to the sustainable innovation performance of SMEs".

Learning capability is characterized as the organizational proficiency in revitalizing existing operational capacities by generating and integrating novel insights and knowledge (Pavlou & El Sawy, 2011). The development of sustainable products or services requires companies to actively build a deep understanding of environmentally friendly technologies and internalize green knowledge through a continuous learning process that is integrated into organizational practices (Li & Wang, 2022). Furthermore, a mature understanding of learning capability strengthens a firm's capacity to monitor and report progress on new product initiatives, thereby minimizing ecological and social externalities, ultimately leading to superior sustainable innovation performance (Mongko, 2021).

Hypothesis 2: "Learning capability is positively related to the sustainable innovation performance of SMEs".

Integration capability is defined as the ability of a micro, small, and medium enterprise (MSME) to combine diverse flows of knowledge and resources to create new internal organizational capacity (Pavlou & El Sawy, 2011) Achieving inherently superior

sustainable innovation performance (SIP) requires the removal of conventional departmental barriers, ensuring that financial viability, ecological stewardship, and social justice goals are pursued simultaneously. Integration capability facilitates this necessary synthesis by combining individual contributions and ensuring that diverse functional expertise is effectively disseminated. Strategic identification and integration of resources with existing activities fosters a shared value system that benefits both the company and society (Hernández-Linares et al., 2024). (Eikelenboom & de Jong, 2019) specifically emphasize the relevance of dynamic integrative capabilities in helping SMEs overcome resource deficits and improve their social, environmental, and economic outcomes.

Hypothesis 3: "Integrating capability is positively related to the sustainable innovation performance of SMEs."

Coordinating capability is "defined as the organizational command necessary to direct and deploy tasks, resources, and activities within the newly established operational capacities (Pavlou & El Sawy, 2011)". For successful sustainable innovation efforts, this capability is non-negotiable for effective strategy execution. It involves the disciplined allocation of resources to defined tasks (Helfat & Peteraf, 2003) and the identification of complementary and synergistic relationships among various resources and activities (Eisenhardt & Martin, 2000), all to guarantee that sustainable outcomes are delivered efficiently. "This capability enables firms to access and distribute resources at lower costs and respond to external changes with greater flexibility—a necessity when navigating the demanding and unpredictable landscape of sustainable innovation". Therefore, coordinating capability directly supports the successful activation and deployment of sustainability-focused innovations, significantly elevating the overall sustainable innovation performance of SMEs.

Hypothesis 4: "Coordinating capability is positively related to the sustainable innovation performance of SMEs".

RESEARCH METHOD

Population and Sample

The target demographic for this academic investigation comprises all active Micro, Small, and Medium Enterprises (MSMEs) situated within Bantul Regency, Special Region of Yogyakarta. The focus of the research is on the manufacturing of Batik and handicrafts. As defined by (Sekaran & Bougie, 2020) a study sample represents a smaller subset of the overall population from which findings are extrapolated. The data gathering phase is scheduled to occur between 2024 and 2025.

The selection approach adopted is purposive sampling, aimed at targeting 176 MSME owners or senior managers. These MSMEs must satisfy preset criteria, such as having been operational for a minimum of one year and bearing direct responsibility for both strategic policy-making. The sample size of 176 aligns with accepted criteria (Hair, et. al, 2019 for multiple regression analysis, ensuring significant statistical power to fully test the hypothesized correlations.

Instrument Tests

Validation testing serves to confirm the extent to which a research tool accurately measures the variable it purports to assess (Sugiyono, 2019) An item is deemed valid if the computed correlation coefficient exceeds the threshold value of 5% at the 5% level of significance. The research will involve 176 participating MSME representatives who will complete the survey instrument. Validation will be performed via Pearson's Product-Moment Correlation method. All items have been tested to meet the 5% significance standard, thereby establishing their validity.

(Sugiyono, 2019) defines assessment consistency (reliability) as the stability and dependability of the collected data. This test verifies that measurement outcomes remain highly reproducible when administered repeatedly. A construct demonstrates adequate reliability if its internal consistency, measured by Cronbach's Alpha, registers a value of 0.70 or higher. The test results show that each variable included in this study achieved a Cronbach's Alpha value of more than 0.70, indicating high internal consistency and reliability of the instrument.

Data analysis technique

A quantitative methodology is employed, emphasizing the collection and systematic processing of numerical data, which is essential for testing the research hypotheses. The statistical operations will be carried out using the Statistical Package for the Social Sciences (SPSS) software package, widely accepted for business and social science data analysis. The principal statistical procedure will be multiple linear regression analysis.

The mathematical model representing this relationship is defined as follows:

$$Y = a + bX_1 + bX_2 + bX_3 + bX_4 + e$$

Where,
Y = purchase intention
a = a constant
b = slope
X_1 = Sensing capability
X_2 = Learning capability
X_3 = Integrating capability
X_4 = Coordinating capability
e = error term

RESULTS

The research includes surveying owners and managers of MSMEs. The data analysis, performed using multiple linear regression, assessed the individual influence of four dynamic capacities on the sustainable innovation performance of MSMEs. The important findings are described in Table 1.

Table 1. Results of Multiple Linear Regression Analysis

Coefficients[a]						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.274	.219		5.820	.000
	Sensing Capability	.222	.029	.374	7.598	.000
	Learning Capability	.304	.022	.688	13.853	.000
	Integrating Capability	.165	.023	.358	7.293	.000
	Coordinating Capability	.180	.024	.369	7.559	.000
a. Dependent Variable: Sustainable Innovation Performance						

The formulation of this regression equation is:

$$Y = 1.274 + 0.222X_1 + 0.304X_2 + 0.165X_3 + 0.180X_4 + e$$

DISCUSSION

The Influence of Sensing Capability on Sustainable Innovation Performance

Based on the empirical findings, sensing capability demonstrates a notable and positive association with sustainable innovation performance (SIP). This outcome confirms that an enterprise's ability to identify and interpret fluctuations in its operational and ecological environment is a primary requirement for generating innovations that are both competitive and enduring (Taghizadeh et al., 2024). This validation is strongly consistent with frameworks that emphasize the critical necessity of proactive intelligence gathering for strategic adaptation. Firms that effectively sense shifts in consumer demand favoring environmentally responsible products or changes in regulatory mandates are best positioned to modify their production or offerings, thereby elevating their SIP. By predicting market movements, MSMEs can adjust their strategies preemptively, an action deemed crucial for sustaining a competitive edge in volatile conditions (Taghizadeh et al., 2024).

The Influence of Learning Capability on Sustainable Innovation Performance

Learning capability has the highest score as the most decisive element among all dynamic capabilities studied, exhibiting the strongest positive effect on SIP. This effect demonstrates that the organizational capacity for generating, acquiring, and internalizing new knowledge is the primary factor in achieving sustainable outcomes (Mongko, 2021) Since sustainable innovation often requires mastering new technologies, implementing greener production methods, or ensuring ethical supply chains, the capacity for swift learning and integration of this complex information is indispensable. This evidence powerfully corroborates earlier regional research that identified *innovative* and *absorptive* capacities as central pillars for strengthening overall firm performance and guaranteeing enduring competitive viability (Mongko, 2021). The mandate for continuous organizational learning is thus established as the single most critical investment for MSMEs aiming to successfully align their innovations with the triple bottom line mandate.

The Integrating Capability and Sustainable Innovation Performance

Our analysis shows that integration capabilities have a positive effect on SIP. Integration capabilities that involve seamless integration between internal resources and diverse functional expertise are essential for developing sustainable initiatives. To be considered sustainable, an innovation must not only be financially profitable but also address ecological management and social justice. This requires the integration of information sharing between departments. The findings of (Eikelenboom & de Jong, 2019) are consistent with the results of testing this hypothesis, which prove the importance of integrative competencies in supporting SIP.

The Coordinating Capability and Sustainable Innovation Performance

The analysis proved that coordinating capability has a positive influence on SIP. While integration focuses on combining and coordinating, coordination ensures the timely and efficient execution of the innovation process. This factor is especially critical for small businesses, where resource scarcity and organizational complexity pose continuous challenges (Liliani & Wiliana, 2018). The finding supports the theoretical viewpoint that dynamic capabilities serve a key function in enhancing performance by enabling the organization to execute strategic responses effectively in response to evolving external pressures. Therefore, the efficient management of time, human resources, and materials, achieved through strong coordination, is essential for translating sustainable innovation concepts into tangible environmental and commercial successes.

CONCLUSION

The following points conclude the empirical validation of the research hypotheses concerning the impact of dynamic capabilities on sustainable innovation performance. The first hypothesis about the effect of sensing capability on sustainable innovation performance is accepted. The second hypothesis about the effect of learning capability on sustainable innovation performance is accepted. The third hypothesis about the effect of integrating capability on sustainable innovation performance is accepted. The fourth hypothesis about the effect of coordinating capability on sustainable innovation performance is accepted.

DECLARATION OF CONFLICTING INTERESTS

All of the authors declared no potential conflicts of interest.

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