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Skunk Work Dimensions-Driven in Business Model Innovation: A New Approach to SMEs Performance and Resilience

"Innovación del Modelo de Negocio Impulsada por las Dimensiones de Skunk Works: Un Nuevo Enfoque para el Desempeño y la Resiliencia de las PYMES."

1. INTRODUCTION

The Indonesian garment business experienced significant turmoil in 2024, with the ten largest garment businesses shutting down operations, which led to approximately 13,800 workers losing jobs (CNN Indonesia, 2024). This crisis was triggered by global uncertainty, geopolitical conflict, and the rapid import of batik-patterned garment from countries suspected to be implementing dumping practices. The situation further weakened the competitiveness of Small and Medium Enterprises (SMEs) in the garment sector, which has been the backbone of the national economy (Cindy, 2024). These challenges are increasingly complex for business actors with limited resources (Cowling et al., 2020), thereby demanding an innovative approach that differs from conventional business strategies.

Business model innovation (BMI) has been recognized as a more dynamic strategy for creating and maintaining competitive advantage (Morris et al., 2005; Trimi & Berbegal-Mirabent, 2012; Angrisani et al., 2023). However, the implementation in SMEs remains suboptimal due to structural barriers and resource

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EXECUTIVE SUMMARY

In response to the influx of imported batik cloth, each region is producing distinct fabrics both printed and hand-drawn, leading to heightened competition and affecting the sustainability of small and medium-scale batik businesses (SMEs). Therefore, this study aimed to examine the important role of the skunk work (SW) principle and dynamic capability (DC) in accelerating business innovation and improving performance to enhance the resilience of SMEs. It also addressed an empirical gap by introducing the SW dimension as a driver of innovation and strengthening DC in sustaining SMEs. A total of 876 batik-related SMEs were engaged as part of this study. The SEM-PLS method was used to test the research hypothesis. The results showed that SW was positively correlated with DC while positively related to business model innovation (BMI). Additionally, the DC was found to be positively connected to BMI and further influencing performance. BMI was also positively related to resilience while performance was positively related to the resilience of SMEs. These results outlined the importance of SW and DC in driving innovation within resource-constrained SMEs. The study contributed to market policies and strategies that supported SMEs in leveraging SW, DC, and BMI to achieve sustainable performance.

RESUMEN DEL ARTÍCULO

En respuesta a la afluencia de telas de batik importadas, cada región está produciendo tejidos distintivos, tanto estampados como dibujados a mano, lo que ha intensificado la competencia y ha afectado la sostenibilidad de las pequeñas y medianas empresas de batik (PYMES). Por lo tanto, este estudio tuvo como objetivo examinar el papel importante del principio skunk works (SW) y de las capacidades dinámicas (DC) en la aceleración de la innovación empresarial y la mejora del desempeño para fortalecer la resiliencia de las PYMES. Asimismo, aborda una brecha empírica al proponer el enfoque Skunk Works como impulsor de la innovación y como mecanismo de fortalecimiento de las capacidades dinámicas para la sostenibilidad de las PYMES. Un total de 876 PYMES relacionadas con el batik participaron en este estudio. Se utilizó el método SEM-PLS para poner a prueba la hipótesis de investigación. Los resultados mostraron que SW se correlacionó positivamente con DC y, a su vez, se relacionó positivamente con la innovación del modelo de negocio (BMI). Además, se encontró que las DC estaban positivamente conectadas con BMI e influían adicionalmente en el desempeño. BMI también mostró una relación positiva con la resiliencia, mientras que el desempeño se relacionó positivamente con la resiliencia de las PYMES. Estos resultados destacan la importancia de SW y DC en el impulso de la innovación dentro de PYMES con recursos limitados. El estudio contribuye a las políticas y estrategias de mercado que apoyan a las PYMES en el aprovechamiento de SW, DC y BMI para lograr un desempeño sostenible.

limitations (He et al., 2022; Huang & Ichikohji, 2024). Some literature emphasized that dynamic capability (DC), the ability of an organization to sense, seize, and transform, can guide SMEs more agilely in response to change (Teece, 2018; Polyviou et al., 2020; Afeltra & Alerasoul, 2024). Despite the available literature, there is still a gap in explaining how DC concretely accelerate BMI implementation, specifically in the context of developing economies more vulnerable to global market volatility. To address the challenge, this study proposes integrating **Skunk Work (SW)** approach, which includes small autonomous units focused on radical idea exploration, with DC framework to improve BMI acceleration under conditions of high uncertainty (Larsson, 2018; Kneece, 2014). This approach, originally developed by Lockheed Martin, offers a promising alternative model for SMEs to create disruptive innovations without being hampered by conventional bureaucracy (Fosfuri & Rønde, 2016; Greenstein, 2016).

Business model innovation (BMI) has been recognized as a more dynamic strategy for creating and maintaining competitive advantage.

By combining the flexibility of SW and the adaptive capacity of DC, this study found that SMEs will be better prepared to develop new business models responsive to market changes, technological disruptions, and other external pressures. The main findings of this study reveal that the integration of dynamic capabilities (DC) and the seven dimensions of skunk works namely mission focus, small structure, autonomy, direct resource access, risk tolerance, team cohesion, and protective leadership, significantly accelerates business model innovation (BMI) processes. This integration enables SMEs to sustain competitiveness and resilience amid intensifying external pressures. From a theoretical perspective, this study advances the understanding of how dynamic capabilities can be enhanced through skunk works practices to foster agile and adaptive business model innovation. From a practical standpoint, it provides an actionable framework for Indonesian SMEs to design independent, fast-moving innovation units capable of responding effectively to crises and environmental uncertainties.

The originality is reflected in two main aspects, first, in contrast to previous studies that focused on SMEs in developed countries including the US (United States), UK (United Kingdom), and Japan, whose economies tend to be stable (Zhang et al., 2022; Wei & Zheng, 2024), the dynamics of BMI-DC was assesed in a

developing country, namely Indonesia, facing a more fragile and complex business reality. Developed countries generally have adequate infrastructure, logistics systems, and funding networks. However, innovative approaches cannot be fully adopted by SMEs in developing countries facing greater limitations in capital, technology access, and market pressure (Tambunan, 2019).

Previous studies directly focused on how BMIs thrive in a fragile and constrained economic environment are very limited. Second, an integrative framework was proposed, combining SW and DC approaches, which are rarely studied simultaneously in SMEs innovation literature. Third, there is a literature gap in integrating SW approach, which drives radical innovation through flexible work structures, with DC framework in the context of SMEs. Most SW studies focused more on large technology corporations or military projects in developed countries (Kneece, 2014; Greenstein, 2016) rather than as a strategic approach for small-scale entities in a business environment characterized by constraints and unique socio-cultural dynamics. Fourth, there is a lack of investigations aimed at explicitly developing an integrative model between DC, SW, and BMI in the framework of long-term business resilience in SMEs (Hagen et al., 2024; Fernandes et al., 2024). This study attempts to fill the gap by proposing a theoretical and empirical framework that can be realistically implemented by SMEs in Indonesia while adapting to the complexity of the domestic market and ongoing global disruption. It also offers substantive contributions to the development of theory and practice. Theoretically, this study expands the understanding of how DC can be strengthened by SW practices to generate agile BMI, and practically, it presents an applicable guideline for SMEs in designing small units of innovation independent and responsive to crises and uncertainties.

Accordingly, this study is expected not only to enrich the theoretical discourse on innovation and strategic management within the context of SMEs, but also to offer practical solutions for small and medium-sized enterprises in Indonesia to sustain and innovate amid the volatile dynamics of global markets. The structure of this article includes the theoretical foundations of DC, BMI, and SW, conceptual framework, and hypothesis proposal. Other sections include empirical results, theoretical and practical implications, as well as recommendations for future analysis.

KEYWORDS
Skunk Work, Dynamic Capability, Bisnis Model Innovation, Resilience.

PALABRAS CLAVE
Skunk Works, Capacidades Dinámicas, Innovación del Modelo de Negocio, Resiliencia.

2. HYPOTHESIS FOUNDATION AND DEVELOPMENT

2.1. Skunk Work and Dynamic Capability Perspectives for Sustainable Business Model Innovation

Studies on BMI in SMEs are still behind in terms of practical application (Zaheer et al., 2019a), although BMI has been proven to be a strategic foundation for creating customer value and competitive advantage (Clauss et al., 2020; Leipziger et al., 2024). It is increasingly recognized as a key response to environmental turbulence, but many SMEs are facing adaptation challenges due to bureaucratic structures, resource constraints, and lack of organizational agility (Bouwman et al., 2019; Antonio & Kanbach, 2023). To address these challenges, "Skunk Work (SW)" approach and "Dynamic Capability (DC)" theory serve as potential frameworks for driving more responsive and sustainable BMI. SW refers to a managerial approach that forms small, autonomous, cross-functional teams to work on innovative projects quickly and independently (Larson, 2018). Meanwhile, DC refers to the organization capacity to sense, seize, and transform opportunities in a changing business environment (Teece, 2010). SW creates an alternative organizational structure free from bureaucratic constraints, allowing teams to experiment quickly and flexibly in response to market dynamics. The seven core elements of SW include isolation, focus on customer needs, tactical planning, trusted project managers, cross-functional teams, leveraging overlap, and flexibility to accelerate business model change with a focus on customer value-based solutions (Larson, 2018; Teece, 2018). Bouwman et al. (2019) mentioned that the conditions of autonomy and isolation allow SW teams to work free from major operational constraints, exploring alternative business models, including new value offerings, channel changes, new revenue structures, and market diversification (Bouwman et al., 2019; Akpan et al., 2022). Trischler and Li-Ying (2023) added that the focus on customer needs in SW team ensures changes in the business model are established in directly identified market demand, increasing the validity of the new value proposition. Furthermore, cross-functional collaboration facilitates the integration of technical, marketing, and operational insights during the exploration of new business models (Huang & Ichikohji, 2024; Berman et al., 2024). Trusted managers and tactical planning give the team the agility to run experiments, modify BMI

elements incrementally, and adapt quickly when experiments fail (Larson, 2018). In SMEs, SW enables the exploration of new business ideas without the need to wait for decisions from higher organizational structures. This practice accelerates the development of new value propositions, testing alternative distribution channels, and designing new revenue models. A study by Aloulou et al. (2023) demonstrated that agile structures, such as SW, accelerate BMI in decentralized digital SMEs. It is a managerial approach that fosters the creation of small, autonomous, and cross-functional team structures to solve complex problems and design innovative solutions without being hampered by organizational bureaucracy (Larson, 2018; Teece, 2018). These characteristics are particularly relevant for SMEs aiming to undertake rapid business model transformations amid resource constraints. Therefore, the following hypothesis can be proposed:

H1: Skunk work has a positive relationship with business model innovation.

To strengthen the continuous innovation process, an organizational foundation is needed to absorb market information, capture new opportunities, and redesign resources, as reflected in DC framework (Teece, 2018; Ilmudeen et al., 2020). DC is the ability of an organization to sense, seize, and transform internal resources in responding to external changes effectively. According to previous studies, BMI is often the outcome of an organization ability to detect changes in market trends, internalize learning, and strategically adjust business processes (Cosenza & Bivona, 2021; Filser et al., 2021; Leipziger et al., 2024). In this case, DC acts as a key enabler of BMI, allowing organizations to proactively shape and adapt new business models, particularly in the context of changing market pressures and dynamic consumer expectations (Steininger et al., 2022; Teece, 2014). Therefore, the following hypothesis can be proposed:

H2: Dynamic capability has a positive relationship with business model innovation.

SW approach not only drives innovation directly but also creates a conducive environment for the development of DC. Project isolation, cross-functional teams, and trusted project leaders in SW enable cross-skill interactions and rapid decision-making, two important elements in forming sensing and seizing capabilities (Larson, 2018; Guimarães et al., 2023). Additionally, the overlap between

functions and small experiments in skunk teams can accelerate the organizational learning process and facilitate internal transformation (Xu & Koivumaki, 2019; Trischler & Li-Ying, 2023). This implies that SW is not only a tactical path for innovation but also an incubator for the formation of sustainable DC. Therefore, the following hypothesis can be proposed:

H3: Skunk work has a positive relationship with dynamic capability.

2.2. Business Model Innovation (BMI) and SMEs Resilience

BMI is a strategic approach implemented by businesses to create, deliver, and capture value more effectively through improvements or transformations in operations (Kraus et al., 2022c; Cosenz & Bivona, 2021). In SMEs, BMI is a crucial strategy that allows business actors to adapt to changes in the business environment while maintaining sustainable performance. It not only includes changes in value propositions but also modifications in the way value is created and captured. A strong value proposition increases product appeal and customer loyalty. Value creation ensures operational smoothness and resource efficiency, while value capture guarantees financial sustainability through adaptive revenue mechanisms (Huang & Ichikohji, 2024; Christensen et al., 2016). These three elements synergistically contribute to optimal business performance.

The literature suggests that BMI enables businesses to discover new market niches, optimize costs, and tap into untapped alternative revenue sources (Huang & Ichikohji, 2024). This increases the opportunities for profitability and growth. In uncertain situations such as post-COVID-19, traditional business models proved to be no longer relevant, and BMI becomes a tool for survival and development (Akpan et al., 2022; Salamzadeh et al., 2023). Previous studies also supported a positive relationship between BMI and business performance. Breier et al. (2021) and Bouwman (2019) explained that innovation in business model components has a direct effect on increasing efficiency, strategic flexibility, and achieving sustainable profits. Therefore, the higher the ability of SMEs to innovate business models, the greater the business performance achieved.

H4: Business model innovation has a positive relationship with performance

BMI not only contributes to business performance but also plays a central role in building business resilience, specifically in SMEs. Business resilience is defined as an organization ability to adapt positively to environmental changes and face challenges by building new capabilities (Lengnick-Hall et al., 2011; Lee et al., 2013). In a crisis or disruption situation, businesses that have developed and implemented BMI are more prepared and flexible in responding to pressure. It enables SME to quickly and effectively adjust operational structures, distribution channels, and customer interactions. This is very important in forming a resilient business against economic and social turmoil (Boons & Ludeke-Freund, 2013; Leipziger et al., 2024). Resilience derived from BMI is also formed through the creation of new value that is more relevant to changing market needs, as well as value capture, allowing accumulated profits to be reinvested in strengthening internal systems (Michel, 2014).

The ability to create flexible and innovative value propositions is a factor that helps businesses stay relevant and competitive (Ramdani et al., 2019; Schaltegger et al., 2016). Kim (2020) and Pathak and Joshi (2021) found that successful BMI strengthens internal coordination structures, accelerates information flow, and improves communication quality. These characteristics are important for responding to crises quickly and effectively. Therefore, the more intensive and appropriate BMI is carried out, the higher the level of business resilience achieved by SMEs.

H5: Business model innovation has a positive relationship with business resilience

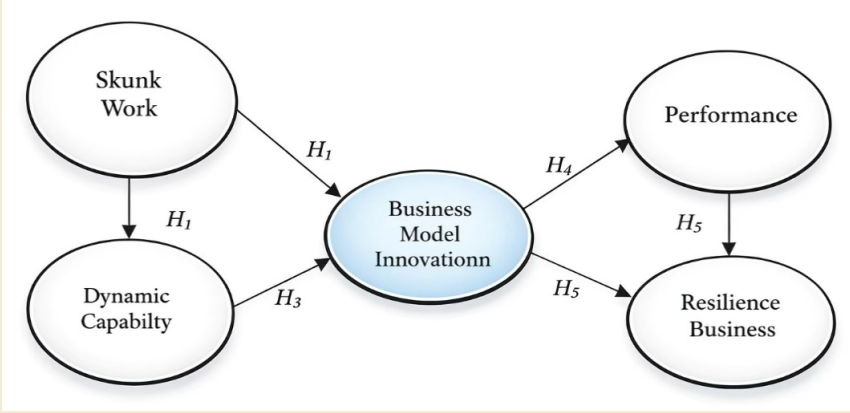
Although there is an assumption that high business performance reflects a resilient organization, the relationship between performance and resilience is not usually direct or linear. Business performance is a reflection of an organization success in achieving short-term goals, such as increasing revenue, operational efficiency, and market growth (Ramdani et al., 2019; Huang & Ichikohji, 2024). However, business resilience is related to the ability to survive and recover from disruptions, as well as adapt to environmental changes in a sustainable manner (Lengnick-Hall et al., 2011). Resilience is a consequence of past performance and an organizational learning process that develops in response to challenges pushing the limits of performance (Werner et al., 2021; Kim, 2020). In this case, organizational learning and adaptive capacity are important mediators between performance and resilience. This implies that

high business performance will only yield resilience when the organization can effectively interpret the results as material for reflection, fostering long-term learning and adaptation. Accordingly, the relationship between performance and resilience should be viewed in a direct causal manner and also through the lens of DC, which empowers organizations to transform after achieving a certain level of performance. This is consistent with the idea that organizations do not merely survive based on performance but rather due to the ability to transform performance into a sustainable competitive advantage through innovation and adaptation (Ali et al., 2021; Teece, 2020; Pathak & Joshi, 2021).

H6: Performance has a positive relationship with business resilience.

Drawing on recent studies (e.g., Huang & Ichikohji, 2024; Leipziger et al., 2024), the linkage between Skunk Works and business resilience is understood to extend beyond a simple direct effect. It also unfolds through indirect mechanisms, specifically via the mediating roles of business model innovation and organizational performance. Therefore, this research not only investigates the direct associations proposed in Hypotheses H1–H6 but also delves into a sequential mediation pathway, whereby Skunk Works and Dynamic Capability exert their influence on Resilience through Business Model Innovation and subsequently Performance. The comprehensive empirical framework capturing these relationships is depicted in **Figure 1**.

Figure 1. **Conceptual Model**



3. METHOD

3.1. Sampling and Sample Size

This study was conducted using a quantitative approach, with a survey design and a structured questionnaire. Data were collected from 876 SMEs engaged in batik garment sector, selected based on a non-probability quota sampling method to ensure representation across various demographic and business characteristics. This number represented 30.8% of the total target population of 1,800 SMEs, making the response rate adequate for the context of social study in a developing country such as Indonesia (Saunders et al., 2016). During the data collection process, the sample was categorized based on the business development phase into new (n = 353; 40.29%) and established SMEs (n = 523; 59.71%). However, the division was not intended for direct group comparison analysis in the study. These categories served more as quota control variables in the sample preparation process to ensure the representation of various phases of the business life cycle.

All analyses were conducted on a combined sample (N = 876), and the results represented the aggregate of all respondents. This division could have been a potential direction for further study, particularly in examining the differences in innovation dynamics and resilience between new and established SMEs. The demographic characteristics of respondents included 627 males (71.57%) and 249 females (28.43%), with an age range between 28 and 52 years. Based on education level, respondents consisted of high school graduates (45%), diploma/bachelor degree holders (38%), and postgraduate degree holders (17%). In terms of business type, 27% were engaged in the production of hand-drawn batik, while the other 73% produced printed or stamped batik. The sample size of 876 respondents was considered sufficient to meet the statistical adequacy requirements for multivariate analysis and representative of studies in developing countries (VanVoorhis & Morgan, 2007; Saunders et al., 2016). However, as with any non-probability sampling-based study, the results needed to be interpreted with caution in terms of generalization to the entire population of SMEs in batik garment sector (Clow & James, 2013).

3.1.1. Measurement

The questionnaire was used as a study instrument, given to SMEs that had been identified to be respondents based on the study criteria. Respondents were asked to respond to seven dimensions of SW, DC, BMI, Performance and business resilience. The responses were categorized based on a Likert scale of 1–7 points (1–strongly disagree; 7–Strongly agree) as shown in **Table 1**.

Table 1. **Descriptive Statistics and Scale Measurement**

VARIABLE	ITEMS	OUTER LOADING	CRONBACH'S ALPHA	CR	AVE
Skunk work (Larsson, 2028; Fosfuri & Rønde, 2016; Pace, 2016)	Our dedicated teams work separately from daily operations to focus on innovation.	0.912	0.972	0.931	0.884
	We have a dedicated budget for innovation experiments and projects.	0.894			
	Our teams have a laser-like focus on ongoing innovation projects.	0.941			
	Planning within our innovation teams is flexible and adaptable.	0.886			
	Our project managers are trusted and competent in leading innovation teams	0.932			
	We have cross-functional teams that collaborate on innovation projects.	0.814			
	We leverage multiple disciplines and expertise within our innovation teams.	0.981			
Dynamic capability (Huang & Ichikohji, 2024; Fernandes, et Al., 2024; Hagen, et al., 2024)	We constantly monitor market trends and consumer preferences.	0.952	0.892	0.981	0.786
	We are quick to capture new opportunities that emerge in the market.	0.976			
	We can adapt our business strategy quickly to market changes.	0.890			
	We continuously enhance our internal capabilities through training and development.	0.812			
	We can transform our business according to market needs.	0.980			
Business Model Innovation. (Akpan et al., 2022; Kraus et al., 2020; Ritter & Pedersen, 2020)	We regularly evaluate and update our business model.	0.922	0.963	0.922	0.877
	We develop new products or services that better meet customer needs.	0.954			
	We use new technologies to improve our operational efficiency.	0.871			
	We collaborate with external parties (such as designers or suppliers) to create added value.	0.919			
	We adopt innovative marketing approaches to reach new customers.	0.852			

Performance (Huang & Ichikohji, 2024; Leipziger et al., 2024)	Our improving business performance helps the firm survive during crises	0.917	0.821	0.935	0.772
	The achievement of sales and profit targets strengthens our ability to face market uncertainty.	0.916			
	Strong operational productivity makes our business more resilient to external disruptions.	0.810			
	Business performance growth enables us to adapt more quickly to environmental changes	0.832			
Resilience Usaha. (Leipziger et al., 2024; Kim, 2020; Pathak & Joshi, 2021)	We have systems in place to maintain business continuity.	0.924	0.911	0.951	0.871
	We can quickly repair businesses affected by the storm of crises.We have competent human resources.	0.971			
	We have strong capital to face the storm of crisis.	0.891			
	Our dedicated teams work separately from daily operations to focus on innovation.	0.869			

3.1.2. Common Method Bias

The term common method bias (CMB) refers to the potential bias resulting from the use of the same measurement method. However, common method variance (CMV) was statistically tested as a manifestation of CMB, according to the approach described by Podsakoff et al. (2003). CMB often occurred when the same respondents filled in all the items. Furthermore, Podsakoff et al. (2003) found that two statistical tools were used to assess whether CMB was a serious problem. First, Harman one-factor test showed that the maximum variance explained by a single factor was 37.32%, which fell below the 50% threshold. Second, the addition of the common method factor to the conceptual model showed a substantial average factor loading of 0.832, while the method factor was only 0.004, with most of the method factor loadings being insignificant, indicating that CMB was not a serious problem (Akhtar et al., 2019).

3.1.3. Analysis Technique

This study used PLS-SEM (Partial Least Squares Structural Equation Modeling) due to the suitability for models with high complexity and better predictivity than covariance SEM (Hair et al., 2011). The analysis was carried out in two stages. First, the validity and reliability of the measurement instrument were tested. Second, the structural model was tested to validate the hypothesis. Convergent and discriminant validity were also tested using the

criteria of factor loading ≥ 0.7, Average Variance Extracted (AVE) ≥ 0.5, and composite reliability (CR) ≥ 0.7. Heterotrait-Monotrait (HTMT) ratio was used for discriminant validity, with results required to be <0.85 (Henseler et al., 2015).

4. RESULT

4.1. Measurement Model Evaluation

Evaluation of the measurement model was conducted to ensure that the constructs had adequate validity and reliability. Convergent validity testing was conducted by evaluating the outer loading value of each indicator and AVE. The analysis results showed that all measurement items had a standard outer loading higher than the recommended threshold of 0.70, suggesting each indicator had a fairly strong contribution in forming the respective latent construct (**Table 1**). AVE values for all constructs were in the range of 0.778 to 0.894, far exceeding the recommended minimum value of 0.50 (Fornell & Larcker, 1981). This confirms that most of the indicator variance can be explained by the latent construct, indicating good convergent validity. In terms of internal reliability, all constructs showed high CR values, ranging from 0.912 to 0.982, exceeding the recommended minimum limit of 0.70 (Fornell & Larcker, 1981).

Table 2. **Correlations and discriminant validity and HTMT Values**

CONSTRUCT	MEAN	SD	SW	DC	BMI	PERF	RB
Skunk Works (SW)	5.261	1.031	0.795	0.654	0.596	0.628	0.532
Dynamic Capability (DC)	3.541	1.651	0.432	0.842	0.710	0.662	0.589
Business Model Innovation (BMI)	4.715	1.042	0.443	0.521	0.825	0.775	0.642
Performance (PERF)	3.920	1.621	0.327	0.344	0.477	0.780	0.681
Resilience Business (RB)	4.748	1.312	0.211	0.238	0.422	0.520	0.810
Model fit: $\chi 2 = 2{,}145$, $p < .01$, $df = 1{,}409$; CFI = 0.983; TLI = 0.909; RMSEA = 0.087; SRMR = 0.09							

SW = Skunk work, DC= Dynamic capability, BMI = Business Model Innovation, Perform = Performance, RB= Resilience business.

a. The square roots of AVE for each construct are presented in bold on the diagonal of the correlation matrix.

b AVEs of formative indicators are not applicable

c.Note. N = 876.

The results indicated that the constructs in the model had very good internal consistency. Therefore, it can be concluded that the

measurement model used met the criteria of convergent validity and internal reliability, supporting the reliability of the instrument in measuring the studied constructs. To assess the discriminant validity of the constructs in the model, two approaches were used, namely, Fornell–Larcker Criterion and HTMT ratio of correlations. Fornell–Larcker Criterion was evaluated by comparing the square root of AVE value for each construct (presented in bold on the diagonal of **Table 2**) with the correlation between constructs (presented below the diagonal). The test results showed that AVE root value for each construct was higher than the correlation with other constructs, suggesting fulfillment of discriminant validity (Gefen et al., 2000). HTMT approach was used to test discriminant validity more stringently, and the values are presented above the diagonal in **Table 2**. All HTMT values were below the conservative threshold of 0.85 (Henseler et al., 2015), strengthening the result that each construct measured a different concept. AVE square root values of all formative constructs were more than 0.7, and each construct had a higher value than the correlation between constructs. Each construct showed a stronger relationship with the indicators compared to other constructs. Therefore, it can be concluded that the measurement model demonstrated adequate discriminant validity for testing the hypotheses.

The finally, while RMSEA (0.087) and SRMR (0.090) slightly exceed conventional thresholds for good model fit (≤ 0.08), it is important to note that PLS-SEM is component-based and does not rely primarily on global goodness-of-fit indices, as does CB-SEM (Hair et al., 2022; Henseler et al., 2016). In PLS-SEM, model evaluation emphasizes predictive accuracy (e.g., R^2, Q^2) and path significance rather than absolute fit measures. Nevertheless, the obtained values still lie within the margin of acceptability in exploratory research contexts, especially when the model includes multiple endogenous variables and mediating paths. Therefore, the overall model is considered to retain adequate validity and explanatory strength.

4.2. Structural Model Evaluation

Structural model analysis in PLS was conducted through several key steps to assess the quality of predictions and relationships between constructs. First, the coefficient of determination (R^2) was used to measure the explanatory power of the model against the dependent variable. R^2 value for SW = 0.223, DC = 0.266, and

BMI = 0.421 indicates that the model has an explanatory ability at a moderate level, according to the classification of Newsted et al. (1998), namely strong (≥ 0.68), moderate (≈ 0.303), and weak (≤ 0.190).

The results indicated that BMI variable was mostly explained by the model compared to other variables (**Table 3**). Second, Stone-Geisser's Q^2 test was conducted to assess the predictive ability of the model for each endogenous construct. The results showed Q^2 value of 0.142 for DC, 0.211 for BMI, 0.376 for performance, and 0.416 for resilience, all greater than zero, indicating that the model had adequate predictive relevance (Hair et al., 2016). Third, the analysis of the relationship between constructs was conducted to test the hypothesis. Given that the main objective of this study was to investigate the mediating role of BMI in the relationship between SW and DC on performance and resilience, the support for the hypothesis was based on indirect and not only direct effects.

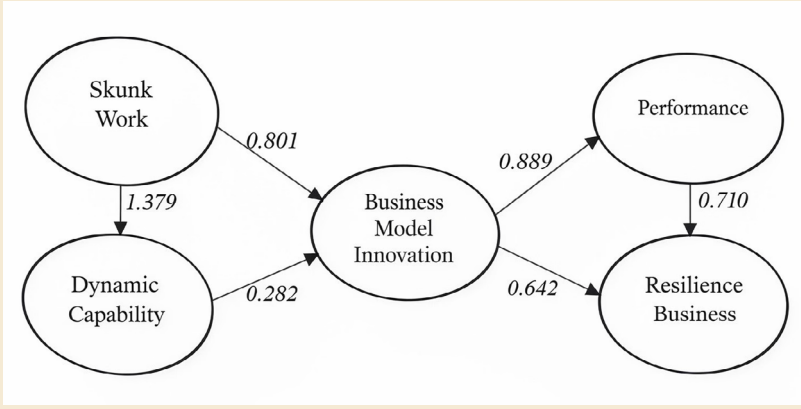
Table 3. **Summary data for the mediation model**

CONSTRUCT	DYNAMIC CAPABILITY	BUSINESS MODEL INNOVATION	PERFORMANCE	RESILIENCE BUSINESS
Established entrepreneurs	0.042 (0.049)	0.172 (0.036)***	0.710 (0.0120)**	0.161 (0.047)***
Skunk work	0.442 (0.067) ***	0.168 (0.057) **	0.284 (0.081) ***	0.215 (0.062) ***
Dynamic capability	0.575 (0.059) ***		0.336 (0.072) ***	
Business model innovation	0.462(0.053) ***		0.401 (0.069) ***	0.521 (0.074) ***
Performance	0.422(0.071) ***			0.681 (0.094) ***
Resilience business	0.069 (0.049) ***		0.298 (0.077) **	0.520 (0.062) ***
R^2 (square)	0.249	0.369	0.424	0.424

Note: *p < 0.05, **p < 0.01, ***p < 0.001.

Second, Stone-Geisser's Q^2 test was conducted to assess the predictive ability of the model for each endogenous construct. The results showed Q^2 value of 0.142 for DC, 0.211 for BMI, 0.376 for performance, and 0.416 for resilience, all greater than zero, indicating that the model had adequate predictive relevance (Hair et al., 2016).

Figure 2. **Hypothesis testing**



Third, the analysis of the relationship between constructs was conducted to test the hypothesis. Given that the main objective of this study was to investigate the mediating role of BMI in the relationship between SW and DC on performance and resilience, the support for the hypothesis was based on indirect and not only direct effects. The results of the hypothesis testing are presented in **Table 4**, which reports the path coefficients (β), standard errors, t-values, 95% confidence intervals, and significance levels (p-values). As shown, all hypotheses (H1–H6) were found to be statistically significant at a high confidence level ($p < 0.05$), thereby supporting the assumption that the relationships among the key constructs Skunk Works, Dynamic Capability, Business Model Innovation, Performance, and Resilience align with the hypothesized directions proposed in this study's conceptual model.

Table 4. **Structural model evaluation of hypothesized test result**

HYPOTHESIS	β	STD. ERROR	T-VALUE	CONFIDENCE INTERVAL (2.5%)	CONFIDENCE INTERVAL (97.5%)	P-VALUE	HYPOTHESIS TESTING
H_1	0.801***	0.5	3.350	-0.179	0.41	0.01	Supported
H_2	0.282***	0.6	8.132	-0.894	0.36	0.03	Supported
H_3	1.379***	0.3	3.136	0.793	0.32	0.00	Supported
H_4	0.889***	0.6	6.801	-0.285	0.40	0.00	Supported
H_5	0.642***	0.3	7.845	0.056	0.30	0.01	Supported
H_6	0.710***	0.4	6.335	-0.074	0.27	0.02	Supported

Notes: Standardized coefficients are reported. Note: *p < 0.05, **p < 0.01, ***p < 0.001.

4.3. Indirect Effects and Mediation Test

In the extended mediation analysis based on the conceptual model (**Figure 1**), the findings reveal that the relationship between Skunk Works (SW) and Resilience operates indirectly through the sequential mediating effects of Business Model Innovation (BMI) and Performance. This result complements the direct hypothesis testing (H1–H6) formulated within the theoretical framework, thereby offering a more comprehensive understanding of the mechanisms through which Skunk Works and Dynamic Capability contribute to organizational resilience.

To test the mediation mechanism, an indirect effect analysis was conducted using the bootstrapping bias-corrected confidence interval (B.C.B.C.I 95%) approach, as recommended in PLS-SEM. Hypotheses 1 and 2 state that SW had a significant indirect effect on resilience through two mediation pathways. First, SW → BMI → Performance → Resilience had a B.C.B.C.I 95% [0.073, 0.144]. Second, SW → DC → BMI → Performance → Resilience had a B.C.B.C.I 95% [0.028, 0.126]. The total indirect effect of 0.415 indicated that BMI acted as the primary mediator. Therefore, Hypotheses 1 and 2 were supported by this indirect effect. Hypothesis 3, stating that SW affected DC with a significant direct effect and B.C.B.C.I 95% [0.073, 0.144], was supported. Similarly, Hypothesis 4, stating that BMI mediated the relationship between DC and Performance, with B.C.B.C.I 95% [0.172, 0.216], and an indirect effect of 0.213 was also supported. Hypothesis 5 suggested that BMI mediated the relationship between SW and Performance, with B.C.B.C.I 95% [0.072, 0.167], a direct effect of 0.233, and a total effect of 0.527. Therefore, Hypothesis 5 was supported through mediation. Finally, Hypothesis 6 posited that BMI mediated the relationship between SW and Resilience, with a B.C.B.C.I of 95% [0.092, 0.187], a direct effect of 0.274, and a total effect of 0.621, leading to the acceptance (see **Table 5**).

5. GENERAL DISCUSSION

The global economic crisis, geopolitical tensions, and market disruptions in the last decade have made risk mitigation and strengthening business resilience a top priority, specifically for small and medium enterprises. Therefore, this study aims to investigate the effect of SW and DC on business performance and resilience, with the mediating

Table 5. **Summary of Mediation Pathways Based on the Empirical Model**

JALUR MEDIASI	INDIRECT EFFECT	B.C.B.C.I 95%
SW → BMI → Performance	0.234	[0.144, 0.173]
DC → BMI → Performance	0.254	[0.172, 0.216]
SW → DC → BMI	0.079	[0.028, 0.126]
DC → BMI → Resilience	0.314	[0.162, 0.212]
SW → BMI → Perf → Res	0.415	[0.092, 0.187]
BMI → Perf → Resilience	0.481	[0.152, 0.260]

role of BMI. The results reveal the presence of a sequential mediation pathway that was not explicitly formulated in the initial hypotheses but emerged strongly from the empirical analysis. This finding indicates that the relationship between Skunk Works and Resilience is indirect, mediated by the combined effects of Business Model Innovation and Performance. Accordingly, these results enrich the original theoretical model and offer new insights into the more complex causal mechanisms underlying the relationships among the key variables.

The results showed that SW has a positive relationship with BMI. Offering small teams autonomy to innovate without bureaucratic constraints hastens the exploration and implementation of new ideas that foster flexibility and adaptability of the business model. Cerf (2016), Aloulou et al. (2023), and Leipziger et al. (2024) emphasized the importance of non-hierarchical structures in facilitating business model renewal. SW also significantly enhances DC. The autonomy given to SW teams accelerates the process of sensing opportunities, seizing strategic decisions, and reconfiguring internal resources. This strengthens the organization adaptability to environmental changes (Larsson, 2018; Huang & Ichikohji, 2024). DC contributes positively to BMI, as organizations capable of sensing, seizing, and reconfiguring tend to quickly detect market changes, evaluate opportunities, and responsively adjust business structure. This shows that DC not only helps in resource management but also plays a key role as an enabler in business model transformation. BMI has been shown to improve business performance significantly.

BMI helps SMEs optimize value flows, discover new value propositions, and improve operational efficiency. Through new strategies that are more relevant to market conditions, businesses can gain competitive advantages that have a direct effect on improving performance. BMI also improves business resilience, as model innovation enables revenue diversification, operational flexibility, and adaptive response

to crises. By changing the pattern of creating and capturing value, businesses become more resilient to market disruptions and external shocks. Improved performance also strengthens business resilience. High-performing businesses tend to have resource reserves, market confidence, and organizational structures better prepared to deal with uncertainty. These results confirm that performance is not only the result but also a foundation for long-term resilience.

The integration of SW, DC, and BMI creates a strategic mechanism that enhances both SMEs performance and resilience, specifically in the face of volatile market conditions. This study confirms the positive relationship between SW, DC, BMI, performance, and resilience in the Indonesian SMEs sector. Key results support the hypothesis that SW not only plays a direct role in driving BMI but also strengthens DC. This in turn, enhances the organization ability to create and implement adaptive business models. Furthermore, BMI contributes to business performance and resilience, underscoring the importance of model innovation as a strategic connection between organizational inputs (SW and DC) and long-term outcomes. Higher performance strengthens business resilience, indicating that resilience is not only the result of structural change but also affected by achieving sustainable performance. As stated by Cerf (2016) and Leipziger et al. (2024), SW practices enable small organizations to explore innovative ideas freely and quickly, reducing reliance on rigid bureaucratic structures. The positive relationship between SW and DC is also consistent with Larsson (2018) that organizational flexibility is strengthened by internal capabilities to recognize, seize, and reconfigure opportunities.

The relationship between DC and BMI strengthens Teece (2018) literature that emphasizes the importance of sensing, seizing, and reconfiguring in BMI. In other words, DC is not only a tool for adapting but also a driving force for strategic innovation. Moreover, the effect on business performance and resilience enriches the understanding of BMI strategic role, as expressed by Ringov (2017) and Sosna et al. (2010), specifically in developing countries. Although the relationship between SW, DC, and BMI has been proven to be strong, it is possible that other factors, such as institutional support, leadership structure, or local market conditions, also play a mediating or moderating role. For example, organizations with more centralized structures may face challenges in implementing SW effectively. Variations in business sectors affect the extent to which DC can be optimally activated to support BMI (Salamzadeh et al., 2023).

6. CONCLUSION

In conclusion, this study underscores the importance of integrating SW and DC as an innovative strategy to accelerate BMI in SMEs, particularly

in uncertain market conditions resulting from the global economic crisis, competitive pressures, and resource constraints in Indonesia. Empirical results showed that SW not only fosters autonomous and flexible exploration of innovative ideas but also contributes directly to strengthening the organization DC. Furthermore, the sensing, seizing, and transforming capabilities inherent in DC have been demonstrated to enhance SMEs ability to strategically and responsively adjust business models. In this context, BMI serves as a strategic connecting mechanism between organizational inputs (SW and DC) and long-term outcomes, resulting in improved business performance and resilience. In other words, BMI is not only a technical innovation but a strategic foundation that enables SMEs to create new value, expand markets, and survive disruption. Theoretically, this study broadens the horizon of the literature by uniting two concepts previously rarely examined together, namely, SW and DC, in the framework of SME innovation in developing countries. The integration presents a new framework that demonstrates how a more autonomous and flexible organizational structure can accelerate internal dynamics in identifying opportunities and adapting business models effectively.

Practically, the results provide strategic guidance for SMEs to form small, autonomous, agile, and risk-taking innovation teams in developing new business model solutions. This approach is particularly relevant for application in sectors with high pressure and limited resources, such as garment business, facing severe pressure due to global disruptions. Although the results support the central hypothesis, there is an opportunity for further exploration of other contextual factors, such as institutional support, leadership characteristics, and local market dynamics, that may mediate or moderate the relationship between SW, DC, and BMI. Further study is suggested to extend this conceptual model across other business sectors and over a longitudinal period to gain a more comprehensive understanding of business resilience dynamics.

7. THEORETICAL IMPLICATIONS

This study makes an essential contribution to the development of BMI, particularly in economic crises and uncertain business environments. Specifically, it expands theoretical understanding by showing that BMI is a product- or process-based innovative activity and also a strategic response mediated by the organization ability to sense change (sensing), seize opportunities (seizing), and transform (transforming), as described in DC framework (Teece, 2018; Teece, 2020). First, this result expands the literature by demonstrating that DC in SMEs comprises not only internal resource adaptation but also the need to develop

more flexible experimental mechanisms, such as SW, in response to environmental challenges.

Eisenhardt and Martin (2000) and Barreto (2010), emphasized that DC is a fixed measure, highly contextual, and depends on organizational dynamics. Second, by integrating the concept of SW, which has been studied more in large organizations and high-tech sectors (Kanter, 2006; Pace, 2016), the results challenge the assumption that SMEs lack the necessary structure and resources to adopt an experimental approach. SW can function as a form of internal entrepreneurship that strengthens innovative agility (Larsson, 2028; Fosfuri & Rønde, 2016), adding a new dimension to the studies on organizational design for innovation, particularly in decentralized innovation management in small-scale organizations. Third, this study contributes to the development of BMI literature by emphasizing the importance of integrating adaptive capabilities and flexible organizational design. Similarly, Pedersen et al. (2018) stressed the importance of value-creation logic in BMI. Kraus et al. (2020) also underscored that BMI during a crisis requires a combination of strategic capabilities and experimental organizational structures.

The results emphasize the significance of value propositions in establishing a long-term competitive advantage amid external pressures. According to Lengnick-Hall et al. (2011) and Ringov (2017), the success of BMI is highly dependent on the extent to which organizations can create relevant and sustainable value for customers rather than only internal efficiency. By connecting the interactions between SW, DC, and BMI, this study provides a more comprehensive and integrative conceptual framework for the exploration of innovation in SMEs sector. The framework offers a theoretical foundation for further studies exploring how small organizations can use experimental structures in developing adaptive and innovative capabilities, specifically under the pressure of economic crises and rapid technological change (Liu & Qu, 2024).

8. MANAGERIAL IMPLICATIONS

SMEs management in batik garment needs to adopt SW approach by forming small teams that have the autonomy to explore innovative ideas without being hindered by bureaucracy. This freedom enables the team to be more responsive to market changes and foster greater creativity in product and service development. By using SW approach, managers can establish work units that prioritize innovation and new product development. As stated by Larsson (2018), SW allows teams to work independently, reducing bureaucracy that hinders innovation. This will help SMEs in Indonesia face challenges from imported products and maintain relevance in the market. SMEs should focus on developing DC,

specifically in three main aspects of sensing (detecting opportunities and threats), seizing (capturing opportunities), and reconfiguring (allocating resources efficiently). Training and skills development in these three aspects are essential to ensure that employees adapt quickly to changes in the business environment. As mentioned by Schaltegger et al. (2016), BMI should focus on creating and capturing sustainable value. Managers need to identify unique value propositions that offer competitive advantages, thereby attracting and retaining customer loyalty amidst increasingly fierce competition.

9. LIMITATIONS AND FUTURE STUDIES

SW and DC were identified as approaches that could accelerate BMI. However, the full implementation in SMEs with resource constraints still requires further exploration to enhance the effectiveness of the resulting innovation (Zaheer et al., 2019a). This study proposes SW as an innovative approach, but the adoption still faces significant challenges in practice (Leipziger et al., 2024). There are limitations in SMEs ability to undertake significant structural transformations, particularly in terms of human resources and technology. Future studies should design a hybrid model by combining the best aspects of SW approach, DC, and other innovation practices, more consistent with the capacities and limitations of SMEs. This model will be more adaptive to market needs and adjusted to the resource constraints in Indonesia or other developing countries.

This study focused on SMEs in Indonesian batik motif garment sector facing specific challenges, such as global economic instability and the effect of lower-priced product imports. The results may not be fully applicable to other sectors or countries with different market characteristics. Future studies should expand the scope to other sectors with varying market challenges. A cross-country approach can also be adopted, specifically in other developing countries, to evaluate the suitability of using SW and DC approaches in a broader context. This will provide a more comprehensive picture of the relevance and adaptability of innovative business models across sectors and countries. Most of the theoretical foundations were based on literature from developed countries, such as the US, Germany, and Japan, which had relatively high innovation infrastructure and economic stability. This led to contextual bias when these models were implemented in developing countries, such as Indonesia, faced with structural barriers, including limited access to capital, weak training systems, and low technology adoption. Therefore, future studies are suggested to explore more literature and practices based on the context of Global South or developing countries to produce more inclusive and locally relevant models. Although this study emphasized the importance of learning from

the COVID-19 pandemic, the dynamics of the post-pandemic market and economy differed from previous crises. The proposed solutions may not be fully applicable to future challenges unrelated to the pandemic. Future studies could explore how SW and DC approaches were adopted in other developing countries, expand the scope to sectors beyond garments, and delve deeper into the limitations of implementing BMI in SMEs with limited resources. In practice, SMEs in Indonesia face structural barriers, including limited human resources, resistance to change, and a lack of a deep innovation culture. Therefore, there was a gap between ideal theory and real conditions in the field. A more practical and grounded approach can be developed by considering the operational realities of SMEs. Field investigations based on qualitative approaches or contextual case studies should explore fundamental ways to modify, simplify, or adapt DC and SW principles to local realities, which are often limited.

10. CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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