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Innovation Capability as a Driver of Business Sustainability in Turbulent Environments

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ABSTRACT

This study explores the role of innovation capability in improving the sustainability of SMEs amidst environmental turbulence. Amidst intense competition and rapid technological change, innovation capability is seen as the key for SMEs to remain relevant and competitive. This study uses a theoretical approach, namely dynamic capability theory and contingency theory, to analyze how strategic flexibility and innovation can mediate the relationship between environmental turbulence and business sustainability. Through a survey of 237 clothes SMEs in Central Java, data analysis was conducted using SmartPLS version 3.0 to test the hypothesis of the relationship between variables. The study was conducted on 237 clothes SMEs in six cities in Central Java selected through a simple random sampling method. The results showed that environmental turbulence has a significant effect on strategic flexibility and innovation capability of SMEs. Strong innovation allows SMEs to adapt quickly to market and technological changes, and increase their competitiveness and business sustainability. Strategic flexibility also plays an important role in responding to rapidly changing market dynamics. However, limited resources such as funding, access to technology, and innovation skills are still major challenges for SMEs. The study recommends collaboration with government agencies and research institutions as well as skills training as a solution to overcome these limitations. With adaptive and innovative strategies, SMEs can maintain business sustainability and remain competitive in an unstable market.

Keywords: Innovation Capability, Business Sustainability, Strategic Flexibility, Environmental Turbulence , Dynamic Capabilities Theory

INTRODUCTION

Concern for environmental protection and the implementation of sustainable business practices are increasingly important for companies to meet market needs and stakeholder expectations (Y. Wu & Tham, 2023; Zhou & Jin, 2023). Studies show that environmental protection behavior can have a positive impact on corporate sustainable development, and environmental regulations can stimulate innovation for the purpose of promoting sustainable development (Achmad et al., 2023; L. Wu et al., 2022; Ying & Jin, 2024). The government has increased attention to environmental protection and meeting social needs and economic goals (Čábelková et al., 2023; Sadiq et al., 2023; L. Wu et al., 2022) . The urgent need for innovation arises from the increasing competition in the business environment. (Zainurossalamia et al., 2016) . Along with increasing competition and technological growth in the business environment, innovative products and services are developing rapidly so that they are very easy to differentiate (Farida & Setiawan, 2022a; Yudistira et al., 2019) .

In general, culture and innovation capability are fundamental factors that can stimulate or inhibit innovative behavior and innovation for SMEs (Halim et al., 2019). SMEs must develop innovation capability (IC) to respond quickly to environmental changes/, and changes in customer needs during economic crises through product or

service innovation (Otache & Obsolescence, 2022). This makes SMEs more flexible, and this flexibility makes it easier to adjust their structures, processes, and practices to suit whatever economic situation they face (Otache & Usang, 2022; Late et al., 2023; Stefan Cristian, 2019) . SMEs become innovative by relying on entrepreneurial ability and creativity to innovate (Ibarra et al., 2020). Added value in the production process and service innovation are benchmarks of competitive advantage compared to profit or market share (Armbruster et al., 2008)

Many studies have been conducted on how SMEs can survive, remain competitive, and succeed in times of economic crisis (Otache & Obsolescence, 2022). SMEs should focus on added value in production processes and service innovation as a measure of competitive advantage (Rodrigues et al., 2021). Better innovation processes / can develop SME products and services that differentiate them in the market (Aksoy, 2017). In times of economic crisis, SMEs are usually badly affected due to their vulnerability to external shocks (Asgary et al., 2020) . During the Covid-19 pandemic, some SMEs were filled, and many are still surviving (Otache, 2020). Therefore, SMEs need to have strong innovation capabilities (IC) to survive, remain competitive, and succeed in times of economic crisis (Asgary et al., 2020; Dempere et al., 2023; Otache & Usang, 2022).

Cultural and innovation skills are fundamental factors that can stimulate or inhibit innovative behavior and innovation (Yirad & Ataei, 2012). This shows that managing SMEs in the midst of an economic crisis requires strong innovation capabilities (Otache, 2020) . Most of the literature on management and innovation points to characteristics that enhance a company's ability to innovate, which until now there has been no consensus on its determinants and nature (Mendoza-Silva, 2020) .

Previous studies have emphasized the importance of different types of innovation in driving business sustainability and competitiveness. Companies that have innovative processes will concentrate on product activities that ensure greater energy efficiency and minimal resource consumption, which are more environmentally valued (Fernández Fernández et al., 2018; Hermundsdottir & Aspelund, 2021b) In addition, companies that focus on innovation to minimize environmental impacts tend to innovate for the purpose of increasing energy efficiency (Albitar et al., 2023) Although innovation capability has been considered a key determinant of business performance and success, few empirical studies have tested its relevance to business sustainability, especially in the context of SMEs. Hanaysha et al., (2022); Rauter et al., (2019); Janjić & Rađenović, (2019) show that only a few studies have examined the relationship between innovation capability and business sustainability. In addition, this study also identifies the influence of environmental turbulence on strategic flexibility and innovation capability to achieve SME business sustainability. Anticipating the impact of environmental turbulence is important because it helps SMEs to remain relevant and competitive in volatile market situations (Al Dhaheri., Ahmed., 2022; Bodlaj & Chatter, 2019). This turbulence can affect the implementation of flexibility strategies and innovation capabilities, which in turn help SMEs to adapt and survive in a changing environment (Bodlaj & Chatter, 2019) (Gutiérrez-Broncano et al., 2024). Strategic flexibility allows SMEs to quickly adapt to changing environments and change direction according to dynamic market conditions, while strong innovation capabilities encourage businesses to be more responsive to market changes and business environments that adapt quickly and remain relevant.

Therefore, this study is an attempt to analyze the mediating effect of innovation capability between environmental turbulence and sustainable business using the support of dynamic capability theory and contingency theory. In the next part of this study, initially the theoretical support and framework have been discussed and after that the development of hypotheses has been argued. After that, the methodology applied to evaluate the hypotheses has been mentioned followed by analysis and discussion. Finally, the conclusion and limitations of the study are mentioned.

THEORETICAL BASIS AND HYPOTHESIS DEVELOPMENT

According to Bowman & Ambrosini, (2003), Dynamic Capabilities theory addresses the lack of a resource-based view in understanding how entities combine resources and capabilities in a dynamic context. Teece et al., (1997) Identify dynamic capabilities as "a firm's ability to integrate, build, and reconfigure internal and external competencies to address a rapidly changing environment." Dynamic Capabilities refer to an organization's ability to adapt and respond to a changing environment by coordinating and integrating internal and external resources and processes (Awad & Martín-Rojas, 2024). Thus, dynamic capabilities reflect a firm's ability to continuously update its competencies to respond rapidly to changing environmental conditions (Garrido-Moreno et al., 2024; Huo et al., 2022). These capabilities have become a major concern for today's businesses as they enable firms to identify, acquire, and transform resources and capabilities according to changing conditions in order to remain competitive (Çakmak, 2023). To develop new services in unstable contexts, firms need to develop dynamic capabilities to drive innovation (Aas & Breunig, 2017; Moreno, Aurora Garrido; Rojas, 2024) In changing and unstable contexts, dynamic capabilities enable firms to reconfigure traditional capabilities and adapt to new challenges by using new capabilities (Schriber & Löwstedt, 2020; Zahoor et al., 2022)

Dynamic capabilities theory emphasizes the importance of organizational resilience and adaptability in a changing environment, asserting that the ability to reconfigure resources and the ability to respond to environmental changes are critical to gaining and sustaining competitive advantage. Dynamic capabilities, innovation, and resilience are essential for firms to manage uncertain contexts and respond to environmental pressures, especially in markets that are constantly changing and evolving (Du et al., 2022) . Research shows that these capabilities help firms maintain their business performance in volatile conditions and help them adapt to rapid change (Moreno, Aurora Garrido; Rojas, 2024) Especially firms whose markets are constantly changing and evolving.

Similarly, from Contingency Theory, we propose that flexibility strategy is a major resource for firms and has a strong impact on the sustainability of SME businesses (Brozović et al., 2023) (Gorondutse et al., 2021). Contingency theory emphasizes that organizations operate as open systems that continuously interact with their environment and must adapt to various environmental pressures (Lawrence & Lorsch, 1967).

Therefore, considering the gap in understanding the impact of environmental turbulence and to develop business sustainability, the researchers propose the following research framework using the theoretical perspective of dynamic capabilities. The theoretical framework depicted in Figure 1 shows the model used to evaluate the direct impact of environmental turbulence on SMEs' flexibility strategy and innovation capability in business sustainability. Through this framework, the mediating role of SMEs' innovation and flexibility capability and sustainable business strategy has also been analyzed by the researchers. This model is based on the theoretical effect, internal capabilities determine the extent to which SMEs can respond to external changes. Contingency as a driver for the development of new capabilities where external changes force SMEs to develop new competencies to survive , for example increase raw material costs encourage culinary SMEs to adopt zero-waste production techniques . If capabilities are inadequate, SMEs must develop new ones (eg, regulatory compliance training) . New capabilities will strengthening resilience to future contingencies.

Thus, the results of this study are expected to strengthen Dynamic Capabilities by adding the mediating effects of innovation capabilities and flexibility strategies with the support of contingency theory to increase the impact of environmental turbulence on the sustainability of SME businesses.

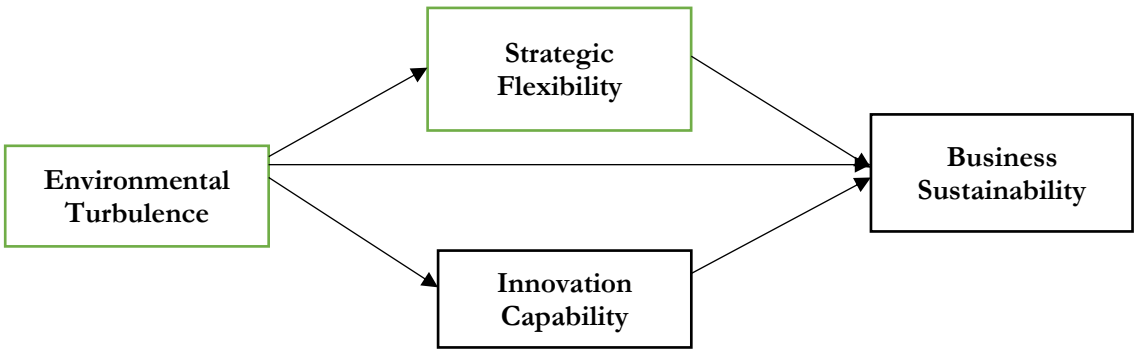

Figure 1: Theoretical Framework

Environmental Turbulence and Flexibility Strategic Innovation Capabilities

Environmental turbulence refers to uncertainty and rapid changes in external factors such as market dynamics, technology, and regulations (Arici & Şahin Gök, 2024). This turbulence challenges a firm's ability to maintain strategic flexibility, which is essential for adapting to change (Çakmak, 2023). Therefore, a strong organizational capability is required to adapt quickly to changes in the external environment in order to adjust strategies, structures, and resources (Awais et al., 2023). Because as environmental uncertainty increases, it becomes increasingly difficult for firms, especially SMEs, to respond effectively, thus reducing their strategic flexibility. Specific findings reveal that there is a significant relationship between environmental turbulence and production flexibility and marketing flexibility (Poi, 2021). Strategic flexibility towards product innovation in countries undergoing economic transition, where strategic flexibility is essential for firms to adapt to uncertain environments (Meng et al., 2020)

In a volatile business environment characterized by uncertainty and rapid change, strategic flexibility and innovation capabilities become increasingly important. Strategic flexibility enables organizations to adapt to external changes, while innovation capabilities enable organizations to innovate and develop new, relevant solutions. The findings of Al Dhaheri., Ahmed., (2022) show that environmental turbulence elements affect the application of innovation capabilities in SMEs. The findings of Bodlay & Chater, (2019) show that environmental turbulence (market turbulence and technological turbulence) enhances innovation capabilities. Based on the results of this study, it can be concluded that the innovation capabilities and intellectual capital of an organization are

significantly influenced by the external environment. The analysis shows that intangible resources, especially innovation capabilities and intellectual capital, are important determinants of sustainable growth and are considered as internal capabilities of the company.

Environmental turbulence has a significant impact on business sustainability. It can enhance the dynamic capabilities and resilience of an organization, which in turn encourages businesses to be more adaptable and thriving in unstable conditions (Hamsal, 2023). Environmental turbulence will have a negative impact on business sustainability if it is not reinforced with strategic flexibility and innovation capabilities. With increasing environmental uncertainty, the ability of companies, especially SMEs, to respond effectively decreases, thereby reducing their strategic flexibility (Dwikat et al., 2023; Haarhaus & Liening, 2020; Yousuf et al., 2021). This has implications for the inability of businesses to develop new innovations needed to maintain relevance in a dynamic market. However, strategic flexibility and innovation capabilities can also act as mediators between environmental turbulence and business sustainability (Awais et al., 2023; Yang et al., 2015). Flexibility allows companies to adapt quickly to external changes (Barry et al., 2022), while innovation provides new solutions that are relevant to market needs (Janjić & Rađenović, 2019). The combination of these two factors helps companies stay competitive and relevant even when the business environment is unstable. Findings by Hamsal, (2023) This shows that dynamic capabilities are a key determinant of business sustainability in a volatile business environment.

Based on the above discussion, the following hypothesis is proposed:

H1: Environmental turbulence has a positive effect on strategic flexibility.

H2: Environmental turbulence has a positive influence on business sustainability.

H3: Environmental turbulence has a positive influence on innovation capability.

Innovation Capability and Business Sustainability

Innovation capabilities are a comprehensive set of organizational capabilities that facilitate companies to identify, search for, learn, organize, implement, and commercialize innovative ideas, processes, products, and services (Cheng et al., 2010) . In line with previous opinions, innovation capabilities are defined as the ability to generate, accept, and implement new ideas, processes, products, or services as one of the main resources that drive companies to succeed in the market (Kurtmollaiev et al., 2022; Wang & Dass, 2017) . However, according to some experts, innovation capabilities are a multidimensional construct, where innovation is not only carried out by focusing on products, but innovation is important to be carried out comprehensively for the development of the company (Freije et al., 2022; Kafetzopoulos et al ., 2023; Zawislak et al ., 2018) . Thus, the innovation process is not only focused on new products and services, but innovation is carried out comprehensively both in processes, management, and so on. Research on the development of the concept of innovation has been widely studied. One of them is the ability to innovate (Tabas et al., 2012) ; Abdullah et al ., (2015) . Innovation capability refers to the ability of an organization to generate new ideas, transform them into valuable products or services, and market them successfully (Lawson & Samson, 2001; Stacchezzini et al., 2019) . Innovation capability includes the creative process of generating new ideas, and the ability to manage and implement innovation effectively in a business context (Nandal et al., 2020; Rindermann et al ., 2015) . Organizations that successfully build strong innovation capabilities tend to have a stronger position in the market and can survive in a rapidly changing environment (Bogers et al., 2019; Weerawardena & Mavondo, 2011) . Distanont & Khongmalai/, (2020) emphasized that innovation is needed for companies to create sustainable businesses amidst the current environmental turmoil. The ability to innovate is very important for the sustainability of a business or business because it has good characteristics in terms of technical, product/marketing and has strong business principles for flexibility and adaptability (Rajapathirana & Hui, 2018) Innovation capability as one of the important elements has been established for small and medium enterprises (SMEs) in achieving growth and prosperity. It is agreed that the adoption of innovative practices by SMEs is critical to their survival and competitiveness in developing countries (Mishrif & Khan, 2023) The findings show that product innovation and service innovation have a significant positive impact on business sustainability (Hanaysha et al., 2022) The results of the analysis by Arshad et al., (2023) show that intangible resources, especially innovation capability, are important determinants of sustainable growth and are considered as internal capabilities of the company.

Based on the statement above, the following are hypotheses that can be formed:

H4: The ability to innovate has a positive impact on business sustainability.

Strategic Flexibility and Business Sustainability

Strategic Flexibility is the ability to respond to a dynamic environment through continuous change and systemic action (Yawson & Greiman, 2016). According to Singh, Oberoi and Ahuja (2013) argue that strategic flexibility is the ability of a company to react, protect, reposition or adapt to fluctuating market conditions, supported by its resources and capabilities, to maintain its competitive advantage (Agostini et al., 2023) . Strategic flexibility refers to "the extent to which a company is willing to change its strategy in response to opportunities,

threats, and changes in the external environment" (Zahra, 2008). In a dynamically changing environment, the ability of companies to quickly recalibrate their strategies is critical to competitive advantage (Li, Yuan, Yi Liu & Antai, 2011). Strategic flexibility helps firms sense changes in the environment, overcome organizational inertia (Zhou, 2010), reallocate resources, stimulate creativity and innovation (Li, Yuan, Yi Liu & Antai, 2011), and explore new business opportunities (Guo & Cao, 2014). Thus, firms must be prepared to face changes in market aspects, regulations, technological advances, digitalization, and unpredictable pandemics (such as the COVID-19 pandemic) (Calantone et al., 2003)Therefore, flexibility strategy has become an important enabler that can help decision makers realize the desired business sustainability (Agostini et al., 2023; Dwikat et al., 2023). Although there is no agreement on the scientific definition of flexibility strategy, there are different definitions in the literature. However, flexibility strategy can be broadly defined as the efficient handling and handling of urgent changes (Brozovic, 2018; Mendoza-Silva, 2020). Flexibility strategy is the capacity or ability of a company to be alert and proactive in responding to uncertainty and quickly adapting to changes in the competitive environment, contributing to growing and maintaining competitive advantage (Kafetzopoulos et al., 2023)

In addition, a flexible strategy is an important administrative need to support businesses in managing a dynamic and unpredictable environment successfully (Fuertes et al., 2020). Therefore, a flexible strategy allows decision makers to achieve higher performance through the availability of strategic options that will allow them to handle or manage change/firms with a resilient strategy can quickly deal with emergencies and adapt to unstable environments. They may face environmental turbulence much better than firms without strategic flexibility, thus enabling them to gain a better competitive advantage. Hensellek et al., (2023) underlined the significant impact of strategic flexibility on business sustainability. The ability to have a high level of strategic flexibility contributes to business sustainability and organizational growth in the long term (Gorondutse et al., 2021) . The findings of Gorondutse et al., (2021); Ziad & Shaima'a, (2021) found a strong positive effect of strategic flexibility on SME business sustainability.

Based on the statement above, the following are hypotheses that can be formed:

H5: Strategic flexibility has a positive effect on business sustainability.

METHODOLOGY

Methodology of the Journal (Assad)-Green Entrepreneurial Leadership, and Entrepreneurial Firm Performance

With several hypotheses that directly influence and mediate, this study seeks to explore the causal relationships between the various constructs. First of all, a total of 5063 clothes SMEs will be selected from the list provided by the Central Java Provincial Industry and Trade Office. The reason behind the selection of these six cities is that the proportion of SMEs owned by these six cities has a large share in the city's GDP and SME exports. Furthermore, 600 SMEs were selected based on simple random sampling using SPSS 25. To ensure that the company is entrepreneurial or not, a filter question was asked by asking whether your company has a research and development department or not. Only such responses were included in the analysis, where the company has a research and development department. Data have been collected from 600 SME owners and managers from 6 different cities in Central Java. The details of the industries that participated in the survey are mentioned in table 1: To collect primary data, the list of SMEs was taken from the Ministry of Industry and Trade. There are almost 600 selected SMEs in the Ministry of Industry and Trade. Questionnaires were distributed to SME owners and managers. Respondents were sent filter questions to screen SMEs. Initially, they were informed through email and phone call, after consent, questionnaires were sent to them. A cover letter was attached with the questionnaire to better understand the respondents about the purpose of the survey. After two weeks, a follow-up call was given to encourage the respondents and provide explanations, if necessary. almost all respondents responded within one month from June 2024 to July 2024. A total of 237 questionnaires were filled indicating a response rate of around 40% as a total of 600 questionnaires were distributed. Common method bias was analyzed by the split halve technique (Podsakoff et al., 2003).

Table 1. Research Participants

No	City Name	SMEs' Population	SMEs' Sample
1	Magelang	29	11
2	Pekalongan	435	173
3	Semarang	28	10
4	Surakarta	22	8
5	Tegal	86	35
	Total	**600**	**237**

To collect data, the instrument was adopted from previous studies. A five-point Likert scale was used to measure the responses of SME owners and managers. The scale to measure business sustainability was adopted from (Khan & Quaddus, 2015) , similarly, the scale for environmental turbulence was adopted from Hamad, (2016) ; Calantone et al., (2003); Hu et al., (2018) , the scale to measure innovation capability was adopted from Gunday, Gurhan; Ulusoy, (2011) , and finally, the scale to measure flexibility strategy was measured from Zahra (2008). SME business sustainability was measured using a questionnaire because for companies in developing countries, the main problem is informal record keeping. All the adapted items used to measure the research constructs have been mentioned in Appendix A.

ANALYSIS AND FINDINGS

Although we collected data using a previously developed and tested questionnaire, we still confirmed the reliability and validity of the collected data since the instrument was used in different demographic settings. For the same purpose, before implementing structural equation modeling, item loadings, Cronbach alpha, composite reliability, mean variance extraction, and discriminant validity were analyzed. In this study, individual item loadings were assessed initially, to identify and assess any issues with the items extracted in the instrument for data collection for the study variables. Table 2 shows the calculated values of the outlier loadings. The threshold level for item loadings is 0.7, if the calculated loading value falls below 0.7, the item is considered unreliable. All the item loading values ranged from 0.7 to 0.922 as illustrated in Table 2. The calculated item loading values in Table 2 indicate that items having loading values equal to or above 0.700 have been retained in the model and items having loading values below 0.700 have been removed from the model for further analysis. No items were removed from Environmental Turbulence and Business Sustainability, however, two items were removed from Flexible Strategy, and two items were removed from Innovation Capability, after excluding items that had loading values below 0.7, quite a lot of items were retained in the model. Since, if less than 10% of the items are removed, the reliability of the scale is not affected and the scale can still be used with confidence. After external loading, the researchers analyzed the calculated values of Cronbach's Alpha, composite reliability, and average variance extracted (AVE) to confirm the reliability and validity of the instrument. For Cronbach's alpha, the threshold level is 0.7 (Hair, 2018) and for composite reliability, the threshold level is 0.7 (Hair, 2018)

Table 2. Outer Loadings

	Business Sustainability	Environmental Turbulence	Flexibility Strategic	Innovation Capability
x1.1		0,609		
x1.2		0,611		
x1.3		0,736		
x1.4		0,669		
x1.5		0,725		
x2.1			0,896	
x2.2			0,876	
x2.3			0,906	
y1.1				0,870
y1.2				0,841
y1.3				0,867
y1.4				0,878
y1.5				0,905
y2.1	0,805			
y2.2	0,887			
y2.3	0,865			
y2.4	0,887			
y2.5	0,741			

Table 3. Reliability and Validity

	Alpha Cronbach	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Business Continuity	0.894	0.905	0.922	0.704
Environmental Turbulence	0.718	0.759	0.804	0.752
Strategic Flexibility	0.874	0.886	0.922	0.797
Innovation Ability	0.922	0.923	0.941	0.761

To evaluate validity and reliability, we followed the standard guidelines recommended by Hair et al. (2021). This involves evaluating convergent and discriminant validity. Criteria such as CR scores, outer loadings, and average variance extracted (AVE) values were evaluated for convergent validity. Table 3 shows that all values exceeded the recommended minimum (Cronbach's alpha and CR greater than 0.70, AVE greater than 0.50). and factor loadings above 0.70, items with outer loadings between 0.40 and 0.70 will only be considered for removal if the composite reliability or AVE is improved (Hair, 2018) .

Next, we conducted discriminant validity. Discriminant validity was analyzed, which refers to the extent to which an item in one variable differs from an item in another variable. Hair, (2018) suggested that the standard approach to examine discriminant validity is the Fornell-Lacker criterion. The calculated values for discriminant validity are mentioned in Table 4. After confirming that the instrument is valid and reliable and has sufficient discriminant validity, hypothesis testing was conducted using a bootstrapping sample of 500. In evaluating the hypothesis, the internal model was analyzed for the direct path coefficients between the independent and dependent variables. The direct relationship between ET showed a significant impact on business sustainability ($\beta = 0.473$, $t = 3.583$, $p = 0.000$). Furthermore, the direct relationship between gtl and entrepreneurial firm performance was also found to be significant ($\beta = 0.523$, $t = 7.887$, $p = 0.000$). The calculated values for path coefficients, significance levels, and t-values are mentioned in table 5. The findings regarding the first hypothesis as mentioned in table 5 are consistent with previous literature that environmental turbulence has a significant impact on sustainability (Hamsal, 2023) . Similarly, the findings regarding the second hypothesis that environmental turbulence has a significant impact on flexibility strategy are also in line with previous studies (Poi, 2021) . The findings of the third hypothesis are that environmental turbulence has a significant impact on innovation capability (Bodlaj & Čater, 2019) . The findings of the fourth hypothesis are that flexibility strategy has a significant impact on business sustainability (Ziad & Shaima'a, 2021) . And the findings of the fifth hypothesis are that innovation capability has a significant impact on business sustainability (Hanaysha et al., 2022) .

Table 4. Discriminant Validity

Construction	Business Continuity	Environmental Turbulence	Strategic Flexibility	Innovation Ability
Business Continuity	0.839			
Environmental Turbulence	0.672	0.672		
Strategic Flexibility	0.251	0.625	0.893	
Innovation Ability	0.838	0.619	0.235	0.872

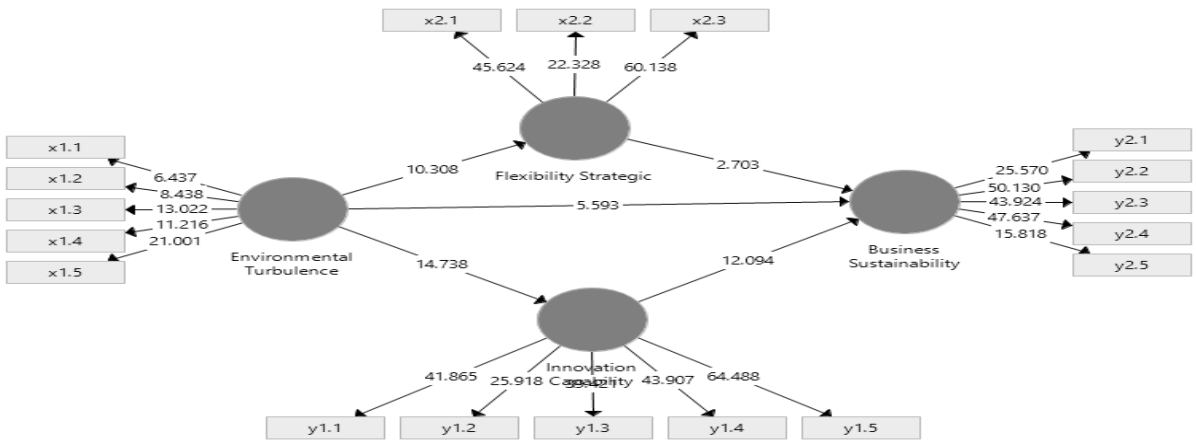

Figure 2. Final research model.

Figure 2 summarizes the results of the internal model test, depicting the estimated paths and causal relationships between Environmental Turbulence (ET) and Business Sustainability (BS), considering Strategic Flexibility (FS) and Innovation Capability (IC) as mediating variables. Path coefficients (β), calculated t-values, and p-values are used to assess these relationships.

Table 5. Direct influence

Road	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Value
Environmental Turbulence -> Business Sustainability	0.338	0.347	0.060	5,593 people	0.000
Environmental Turbulence -> Strategic Flexibility	0.625	0.625	0.061	10,308 people	0.000
Environmental Turbulence -> Innovation Capabilities	0.619	0.623	0.042	14,738 people	0.000
Strategic Flexibility -> Business Continuity	0.114	0.119	0.042	2,703 people	0.007
Innovation Capability -> Business Sustainability	0.655	0.651	0.054	12,094 people	0.000

DISCUSSION AND CONCLUSION

In this study, we analyze the direct impact of environmental turbulence on business sustainability. Furthermore, we examine the mediating role between flexibility strategy and innovation capability on business sustainability. Based on Dynamic Capability Theory, this theory emphasizes the importance of SMEs' ability to continuously adapt and respond to environmental changes quickly (Samsudin & Ismail, 2019) . Flexibility and innovation capability are important factors in this theory. On the other hand, contingency theory highlights the importance of SMEs to interact with their environment dynamically, adapting business strategies according to external pressures and contingency theory (Mahmud et al., 2021) , so we hypothesize that environmental turbulence, flexibility strategy, and innovation capability have a significant impact on business sustainability.

Research findings show that environmental turbulence, such as intense competition and rapid technological change, has a significant impact on the sustainability of SME businesses. (Arici & Gok, 2023; Bodlaj, 2018) . In turbulent conditions, SMEs with strong innovation capabilities tend to be more able to survive and achieve competitive advantage (Sulistyo, 2021; Widodo & Shahab, 2015) . Strategic flexibility in responding to fluctuating market conditions is key for SMEs to remain relevant. (Brozović et al., 2023b; Keelson et al., 2024). Our findings show that market and technological turbulence increase the perception of the importance of innovation, but only market turbulence has a direct impact on SME innovation. The findings of this study are in line with several studies stating that through Innovation allows SMEs to be more flexible in facing business challenges in volatile market conditions (Bodlaj & Chatter, 2019) . Although innovation is an important factor, not all SMEs have enough resources or capacity to continue innovating. These limitations, such as lack of access to funding or lack of skilled labor, can be overcome through collaboration with government agencies, universities, or research institutions. This collaboration opens up opportunities for SMEs to gain access to the resources and technology needed to improve their innovation capabilities.

Developing an adaptive and flexible strategy allows Clothes SMEs to remain relevant in a changing market with environmental turbulence (Awais et al., 2023; Guo & Cao, 2014; Sen et al., 2023) . Strategy requires continuous market monitoring, quick decision-making, and management of risks and uncertainties due to environmental turbulence. Thus, Clothes SMEs can maintain their competitiveness and take advantage of opportunities arising from market changes due to environmental turbulence. Clothes businesses that can change direction quickly according to dynamic market conditions tend to be more successful in dealing with change (Farida & Setiawan, 2022a) . This includes the ability to change business models, adapt products and services, and respond quickly to customer input. Strong innovation capabilities are the key to success in tight market competition (ALI et al., 2020; Farida & Setiawan, 2022b; Huang, 2023). With strong innovation capabilities, Clothes SMEs can remain relevant and thrive in a volatile market. The results of the study identified several shortcomings in the relationship between Clothes SMEs and innovation capabilities. Some of the shortcomings found include lack of access to resources, limited funds for research and development, and lack of knowledge and innovation skills among employees. These shortcomings need to be addressed to improve the innovation capabilities of SMEs. One solution is through collaboration with the government, universities, and research institutions to gain access to resources and funding. In addition, employee training and development in the field of Innovation needs to be improved so that they have the knowledge and skills needed to support the innovation process (De Saá-Pérez et al., 2012; Demirkan et al.,

2022; Kwaido, 2023) . By addressing these shortcomings, SMEs can improve their innovation capabilities and achieve better business sustainability.

The findings of this study confirm that **innovation capability** and **strategic flexibility** mediate the relationship between environmental turbulence and SME business sustainability. These results are in line with previous studies in developing countries such as Indonesia (Farida & Setiawan, 2022b), India (Mishrif & Khan, 2023), and Nigeria (Otache & Usang, 2022), which show that SMEs with high innovation capabilities tend to be more resilient to market turbulence. However, there are significant differences with studies in Malaysia (Hanaysha et al., 2022) and Thailand (Distanont & Khongmalai, 2020), where better access to technology and funding allows SMEs to develop radical innovations, while clothes SMEs in Central Java focus more on incremental innovation due to resource constraints. These findings not only strengthen the dynamic capabilities theory in the context of developing country SMEs, but also highlight the urgency of policies oriented towards inclusive innovation ecosystems . Multidimensional collaboration (government-private-academia) and evidence-based approaches are needed to ensure that SMEs not only survive but also lead sustainable market transformation.

IMPLICATIONS AND LIMITATIONS

This study reinforces the view that environmental turbulence such as technological change and intense competition have a major impact on the sustainability of SMEs. SME owners need to anticipate and mitigate the negative impacts of environmental turbulence by developing dynamic capabilities that help them adapt and remain competitive. For SME owners and managers, investment in developing innovation capabilities is a must. The practical implication is that SMEs must increase resource allocation for research and development and support a culture of innovation within the organization. SMEs that are able to change their strategies quickly will be better prepared to respond to technological changes and consumer needs. Therefore, rapid decision-making and adaptive risk management should be the focus of SME managers in maintaining their competitiveness.

Study This own a number of limitations :

1. Questionnaire data collected from perception SME owners / managers , who may exaggerate ability innovation or sustainability business For guard image . For To reduce this bias , research upcoming can combining objective data (e.g. , reports) finances , number of patents, or environmental audits).
2. Connection causal between turbulence environment and sustainability business need verified through **longitudinal study** For understand dynamics adaptation of SMEs in term long .
3. Findings Possible No fully applicable for SMEs in other sectors (for example , manufacturing) technology) that faces challenge different . Research qualitative (study case or interview depth) recommended For explore mechanism causal like How leadership SME owners influence speed adaptation .

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Appendix A

No	Items	1	2	3	4	5
Environmental Turbulence						
1	Technology in the SME sector is changing fast					
2	Technological changes provide opportunities big marketing in SME sector					
3	Many new product ideas through innovation technology in the SME sector					
4	Other competitors can easily match it and provide it immediately					
5	There are many fierce "promotional wars" in the SME sector					
Innovation Capability (IC)						
1	Defining and eliminating activities which does not provide added value Production process					
2	Develop new products with Technical specifications and functionalitywhich is very different from the current one					
3	Develop new products with Components and materials in all different from the current one					
4	Improve the quality of output in the process manufacturing, engineering, machining, and software					
5	Reduce variable costs and/or Increase delivery speed in Logistics processes related to shipping					
Strategic Flexibility (SF)						
1	Reaction to new product launches by competitors					
2	Changing the response to consumer demand					
3	Response to competitor price changes					
Business Continuity (BS)						
1	Providing employment opportunities for SMEs and others					
2	Increase sales growth					
3	Increase social recognition of SMEs in the community					
4	Using utilities in a way that Environmentally friendly					
5	Produces less waste and emissions					

District data

Respondents fill in data