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E-Business Innovation on SME Resilience Model: The Moderating Role of Financial Literacy

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A B S T R A C T

In the era of advanced digitalization, the ability of SMEs to adapt and adopt e-business innovation is a key factor to survive and compete in the global market. This study aims to determine the effect of e-business innovation in improving the resilience of SMEs and explore the extent to which financial literacy moderates the relationship between the adoption of e-business innovation and SME resilience. This research was conducted in the printing sector of Malang City, Indonesia, which has around 2,145 printing SMEs based on data from the Malang City Cooperative Office in 2023. The research method uses a quantitative approach with a Structural Equation Model (SEM) assisted by the Smart PLS application. The sampling technique used purposive sampling with a sample of 100 SMEs selected based on criteria such as business size, level of e-business technology adoption, and financial literacy. The results showed that the variables studied had a significant and positive effect so that it was accepted. In addition, strong financial literacy can strengthen the relationship between e-business innovation and SME resilience. These findings underscore the importance of improving financial literacy among SMEs as part of the strategy to maximize the benefits of e-business innovation in improving SMEs' business resilience.

A B S T R A K

Dalam era digitalisasi yang semakin maju, kemampuan UKM untuk beradaptasi dan mengadopsi inovasi e-bisnis menjadi faktor kunci untuk bertahan dan bersaing di pasar global. Penelitian ini bertujuan untuk mengetahui pengaruh inovasi e-bisnis dalam meningkatkan ketahanan UKM serta mengeksplorasi sejauh mana literasi keuangan memoderasi hubungan antara adopsi inovasi e-bisnis dan ketahanan UKM. Penelitian ini dilakukan di sektor percetakan Kota Malang, Indonesia, yang memiliki sekitar 2.145 UKM percetakan berdasarkan data Dinas Koperasi Kota Malang Tahun 2023. Metode penelitian menggunakan pendekatan kuantitatif dengan Structural Equation Model (SEM) yang dibantu aplikasi Smart PLS. Teknik pengambilan sampel menggunakan purposive sampling dengan sampel sejumlah 100 UKM yang dipilih berdasarkan kriteria seperti ukuran usaha, tingkat adopsi teknologi e-bisnis, dan literasi keuangan. Hasil penelitian menunjukkan bahwa variabel-variabel yang diteliti memiliki pengaruh signifikan dan positif sehingga diterima. Selain itu, literasi keuangan yang kuat dapat memperkuat hubungan antara inovasi e-bisnis dan ketahanan UKM. Temuan ini menggarisbawahi pentingnya peningkatan literasi keuangan di kalangan pelaku UKM sebagai bagian dari strategi untuk memaksimalkan manfaat inovasi e-bisnis dalam meningkatkan ketahanan bisnis UKM.

1. INTRODUCTION

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SMEs, or small and medium-sized businesses, are essential to a country's economy. Just SMEs in Indonesia account for almost 60% of the country's GDP (Gross Domestic Product) and 97% to total employment. The SME (Small and Medium Enterprises) resilience model plays an important part in supporting a nation's economic growth. This resilience is the capacity for an SME to endure and prosper amidst changing economy dynamics (Zighan & Ruel, 2023). Some of the key factors that point to the importance of SME resilience models are adaptability to market changes, operational efficiency, and financial independence. A good resilience model will help SMEs face economic challenges, including global crises or policy changes that may affect businesses (Fitriasari, 2020). The importance of SMEs' resilience models is also reflected in their contribution to job creation, increased per capita income, and economic diversification. Investigation by Alshahrani & Salam (2022) little and middling in size businesses' (SMEs') resilience is crucial to their capacity to endure financial hardships and make a major contribution to economic growth. As a result, the SME resilience model greatly enhances the stability and prosperity of a nation's economy in addition to providing benefits to individual companies.

A number of challenges can affect SMEs' capacity to survive and thrive inside a dynamic economic surroundings (Achmad et al., 2023a). One of the problems lies in the lack of access to affordable financing for SMEs. Data from Bank Indonesia (2021) says that MSME access to bank loans in Indonesia is only around 35%. Another problem is the lack of support for digital infrastructure and innovation. Research from Katadata (2022), states that only around 34% of MSMEs use digital in Indonesia platforms. The low adoption of electronic devices, like online platforms, management software, and mobile payments also hampers the efficiency and competitivness of SMEs (Zutshi et al., 2021). Only one-third of SMEs utilize digital technology, making their business processes less efficient and difficult to adapt to changing times. Therefore, measures are needed to expand access to financing with lenient terms, educate SMEs to be proficient in digital technology, and encourage SME novelthy through a partnership. The government needs to provide support in helping to provide financing solutions and digital platforms that are suitable for the needs of SMEs. By improving the resilience and competitiveness of SMEs, they can better survive and compete amidst diverse economic challenges, especially in developing countries where SME resilience levels are often low.

The printing industry, as one of the largest SME sectors in Indonesia, recorded around 7.4 million businesses in 2021 according to data from the Ministry of Cooperatives and SMEs. However, many businesses in the printing sector face difficulties in maintaining their business. In Malang, competition in the industry has intensified with the emergence of new printing businesses that offer services at lower prices or more advanced technology. This makes it difficult for many printing SMEs to retain existing customers and expand their market share. In addition, many printing SMEs in Malang still use traditional production methods that are less efficient and not integrated with digital technology. This inability makes them slow in responding to changing market demands, as well as losing out to more innovative and high-tech businesses (Bagale et al., 2023). Lack of technological innovation is one of the main factors that hinder printing SMEs from growing.

In addition to technological challenges, low financial literacy is also a significant problem. Based on a survey by the Financial Services Authority (OJK) in 2022, the level of financial inclusion among SMEs only reached 29.7%. In Malang, this figure is even lower, with only 25.5% of printing businesses having basic financial literacy. As a result, many printing SMEs struggle to access fintech services and other sources of capital that can help them survive in the long run. This lack of financial literacy also hampers their ability to manage cash flow, hindering smooth operations and business development (Zighan & Ruel, 2023). Hence, these issues point to the need for capacity building in technology and deeper financial literacy for printing SMEs in Malang. This is important to help them compete in an increasingly competitive market and achieve long-term business sustainability.

The inability of SMEs to deal with various problems can have a negative impact. Intense competition, absence of innovation, and low financial literacy can lead to high business failure rates, resulting in many SMEs having to close their businesses and losing jobs and sources of income for local communities. In addition, the inability to thrive and compete effectively will also hamper local economic growth, reduce creativity and innovation in the printing sector, and increase unemployment and poverty rates, which will ultimately be detrimental to the overall well-being of the community. The inability of SMEs to compete effectively in the digital age can lead to an absence of diversified goods and services within the marketplace, harming consumers and hampering global competitiveness (Malesev & Cherry, 2021).

The resilience of the SME model is crucial as the sector plays an important function inside the economy, participating greatly to the generation of jobs and local economic growth (Rahman & Mendy, 2019). Understanding the problems faced by SMEs can open up opportunities to develop effective policy strategies, provide better support from the financial sector, and formulate innovative solutions that can improve the resilience and sustainability of SME business models.

As a plan to raise the rivalry and resilience that of SMEs in the age of digital. The implementation of e-business innovation allows SMEs to optimize their business operations. Various alternative general solutions with e-business innovation can be applied, such as using e-commerce platforms to open online stores to reach a wider market (Verbivska et al., 2023). Digital marketing strategies such as targeted online advertising campaigns are effective measures in interacting with consumers. Digital supply chain management is also in focus, with inventory optimization and constructing stronger relationships with suppliers and distributors. Disruption theory explains that e-business can disrupt traditional business models and create new opportunities for SMEs (Neykova & Miltchev, 2019). In addition, the adoption of financial technology, such as digital payment systems and online lending platforms, can also assist SMEs in accessing business capital and more structured financial management. The utilization of e-business innovations has several advantages such as scalability, flexibility, and accessibility that enable adoption suitable for SMEs in various industries and sectors, as well as with various sizes and levels of resources (AL-Shboul, 2019). Through the implementation of e-business innovation, it is expected that SMEs can achieve significant benefits in the form of increased revenue, reduced operating costs, efficiency, productivity, visibility, and access to new markets.

In addition, the level of financial literacy owned by SMEs will affect how much e-business innovation can increase SME resilience (Kumar et al., 2023). The advantages of good knowledge of finances includes SMEs' readiness to deal with business risks and uncertainties, ability to invest in e-business technology, and understanding financial products and services to manage finances efficiently. However, it will have a negative impact on SMEs with low financial literacy making them vulnerable to fraud and difficulties in capitalizing on new business opportunities through e-business, even to the risk of bankruptcy. Therefore, good financial literacy can support the resilience of SMEs in the face of digital business dynamics, while poor financial literacy can be a serious obstacle to the development and sustainability of SMEs in the e-business era.

The novelty of this study lies in its focus on the role of financial literacy as a moderating variable in the relationship between e-business innovation and SME resilience. In contrast to previous studies, such as those conducted by Sulastri et al. (2023) and Ardiada et al. (2023), which highlight the effects of digital transformation and digitalization partnerships in strengthening the resilience of SMEs, this study seeks to further understand how financial literacy can affect the effectiveness of e-business innovation in strengthening the resilience of SMEs. Researchers examined financial literacy as an important moderator because financial literacy capabilities enable SME owners and managers to better understand and manage the risks associated with the adoption of e-business innovations. With adequate financial literacy, SMEs can optimize the use of e-business technology, make more informed financial decisions, better manage cash flow, and reduce the potential for errors in managing funds obtained from e-business strategies. Financial literacy also helps SMEs to identify potential gains and losses from e-business innovation, which in turn can strengthen SMEs' resilience to market changes and long-term risks.

It is crucial to look into how e-business innovation has an impact on resilience model of SMEs, or small and medium-sized businesses while taking into consideration the moderating effect of knowledge of finance. A better grasp of how e-business innovation may boost SME resilience is crucial in an era of rapid digital change where SMEs are increasingly using technology to conduct their operations. Policy makers, companies, and academics should be able to devise appropriate strategies to improve SMEs' resilience considering the dynamic economic changes using the strategic insights this research is projected to bring. Thus, the goal of this research is to ascertain how e-business innovation can boost SMEs' resilience and investigate the degree to which financial literacy influences the association between e-business innovation adoption and SME resilience.

2. THEORETICAL FRAMEWORK AND HYPOTHESES

2.1 SME Resilience Model

The capacity to recover from failures and crises, adapt, and endure adversity is resilience. In the face of volatility in the business climate, SMEs need resilience to thrive and maintain their competitiveness

(Zutshi et al., 2021). SME tenacity described by Ozanne et al., (2022) pertains to the capability to reply effectively to internal and external disruptions, and to adapt to change, enabling SMEs to survive and recover from crises. According to Marcazzan et al. (2022), SME resilience includes the ability to deal with shocks from operational and financial aspects, which is intimately associated with the capacity to adapt and innovate in order to maintain competitiveness. Kosasih et al. (2021) focus on the resilience of SMEs in managing the risks and uncertainties of the business environment, which is a combination of SME capabilities, resources and adaptive processes. Robledo-Ardila et al. (2020) emphasize resilience as the adaptation and transformation capacity of SMEs to be able to emerge from the crisis in new ways, which is related to mindset, behavior, and organizational culture. Therefore, SME resilience includes effective response, adaptation, innovation, risk management, and transformation capabilities to ensure continuity and progress amidst changing business dynamics.

2.2 SME e-Business Innovation

E-business innovation is primarily driving the growth of small and medium-sized businesses (SMEs) in the digital age. Using information and communication technologies to enhance operations, marketing, and customer interactions is encompassed in the idea of e-business innovation. According to Hossain et al. (2021) To drive value creation, competitive advantage, and growth of SMEs, e-business innovation is the process of integrating new concepts, technology, and business models in the electronic business sector. E-business innovation includes innovative practices, digital technologies, and open business models to facilitate value exchange, improving SME performance (Xie et al., 2022). In addition, e-business innovation involves developing and implementing new strategies, processes, and technologies to improve business performance, customer trust, and commitment, ultimately contributing to the expansion and durability of SMEs (Abbad et al., 2022). Through e-business innovation can have a positive impact on operational efficiency and market access, so that by utilizing online platforms, SMEs can expand their business reach, reach potential consumers around the world, and create more dynamic business models. According to Oecd (2010), innovation in marketing, operations, products, and organizations are all examples of e-business innovation in this research.

Innovation in products is the launch of novel and better products or services or using new raw materials (Andersén, 2021). According to Barykin et al. (2021) The process of technical design, R&D, production, management, and commercial activities in promoting new or enhanced goods in a SME is all included in product innovation. Thus, creating new goods or services using fresh raw materials in an effort to increase consumer pleasure is known as product innovation. According to De Giovanni & Cariola (2021), process innovation is a new method of producing goods and services, which is needed in operations to create innovation. This process completes the missing chain of tasks or fixes weak points in existing processes with new knowledge. Therefore, process innovation changes the way a company produces products by involving various company functions.

In addition to entering new markets, this innovation entails locating new potential consumers and improving methods of catering to those target markets. According to Buccieri & Park (2022) The process of choosing markets and market combinations to satisfy consumer preferences is known as market innovation. To fit the company's tastes and target markets, it entails enhancing the target market mix and market selection. Some research indicates market innovation enhances the performance of businesses, notwithstanding the paucity of literature on the subject.

Innovation inside organizations involves the application of innovative techniques for external relations and company operations, aimed at improving SME performance by reducing administrative and other costs. According to Acharya et al. (2024), this process includes updating organizational methods, practices, and regimens to strengthen cohesion, cooperation, coordination of the team, and practices for exchanging information and knowledge. Organizational innovation helps companies adjust to technological evolution, expand inventiveness acceptance, and achieve significant market growth, both in manufacturing and service industries.

2.3 Financial Literacy of SMEs

Financial knowledge is a collection of information, skills and beliefs that influence attitudes and actions to improve financial decision-making and management, ultimately leading to business success. According to Worthington (2021), an understanding of financial literacy is considered very important as it has the potential to help SMEs access financing and make wiser investment decisions. In addition, financial literacy involves the ability to understand financial products, compile simple financial statements, and plan finances for both the short and long term (Tuffour et al., 2022). Empirical studies highlight the importance of financial literacy in strengthening SMEs' adaptive capacity to innovation. Ključnikov et al. (2021) emphasize that knowledge of digital finance is critical for SMEs to leverage fintech and digital financial services to improve access to finance. Thus, financial literacy enables SMEs to take advantage of technological opportunities to support their business operations and expansion.

Yakob et al. (2021) note that financial literacy focuses not only on understanding risk, but also on prudent financial management, which plays an important role in maintaining the resilience of SME businesses. As an integral part of business practices, financial literacy encompasses financial knowledge, budgeting skills, and rational saving and investing behaviors (Suresh G, 2024). This ensures that SMEs are not only able to survive in a competitive market, but are also able to face financial challenges with more mature and flexible strategies. Furthermore, financial literacy has been empirically shown to moderate the effect of innovation on SME resilience. For instance, financial literacy helps SMEs navigate the challenges that arise from the implementation of product, process, marketing and organizational innovations. Studies conducted by Azadda et al. (2024), Moreno et al. (2024), Kubiak & Pęczkowski (2021) show that a good understanding of finance strengthens the positive relationship between innovation and business resilience. This suggests that financial literacy not only improves managerial understanding but also optimizes the implementation of innovation strategies to support the growth and resilience of SMEs. Based on the literature review previously explained, the subsequent study premise may be developed:

H1. Product innovation affects the SME resilience model.
H2. Process innovation affects the SME resilience model.
H3. Marketing innovation affects the resilience model of SMEs.
H4. Organizational innovation affects the resilience model of SMEs.
H5. Financial literacy acts as a moderating variable in the relationship between product innovation and SME resilience.
H6. Financial literacy acts as a moderating variable in the relationship between process innovation and SME resilience.
H7. Financial literacy acts as a moderating variable in the relationship between marketing innovation and SME resilience.
H8. Financial literacy acts as a moderating variable in the relationship with organizational innovation and SME resilience.

The conceptual framework of this research shown in Figure 1.

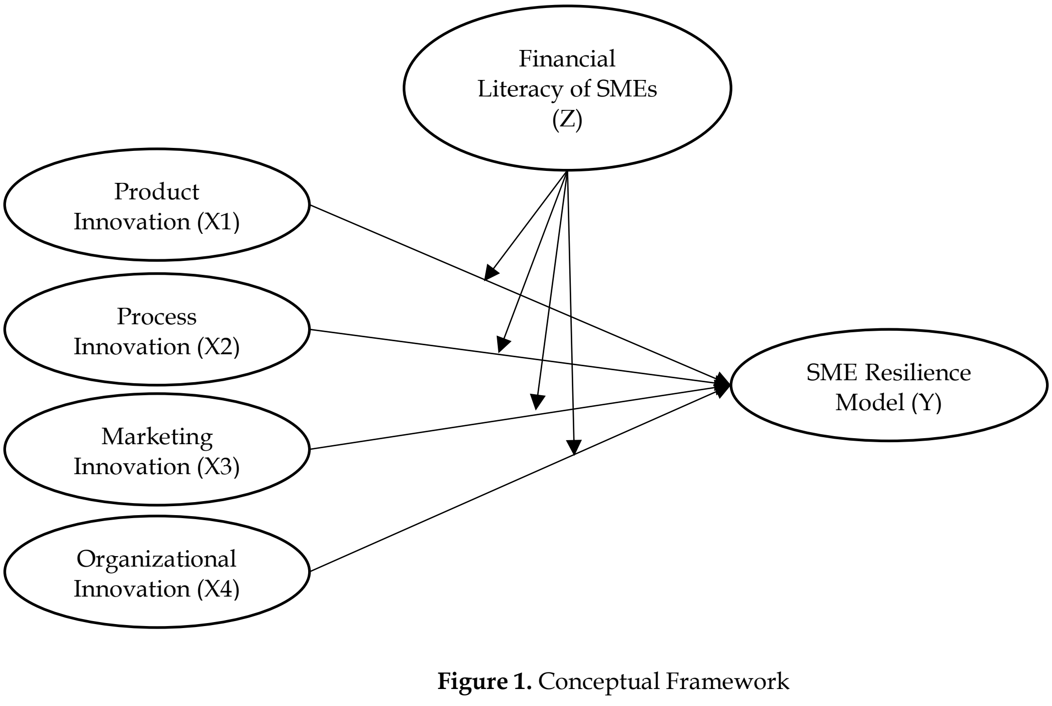

Figure 1. Conceptual Framework

3. RESEARCH METHOD
3.1 Research Design
This research employs quantitative techniques and a particular kind of correlation analysis. Structural Equation Modelling (SEM) method with intelligent PLS application support. This approach was chosen because it aims to determine the connection between innovation factors, marketing, process, and product.

3.2 Population, Sample and Sampling Technique
SMEs in Indonesia's printing sector were the demographic under research in this study. The printing sector has been the subject of significant change with the adoption of digital technology and transformation to a more online-based business model. In this digital era, printing SMEs face new challenges and opportunities associated with e-business integration in their operations. The population in this study includes various types of printing SMEs operating in Malang City, whether it is the size of the company, the degree of technology used, and the degree of participation in e-business innovation. Based on data from the Malang City Cooperative Office in 2023, there are around 2,145 printing businesses as SMEs in Malang City. Sampling was conducted using cross-sectional and non-probability methods, namely purposive sampling techniques. In this context, the sample was selected based on criteria such as business size, degree of adoption of e-business technologies, and degree of financial literacy which resulted in a sample of 100 SMEs.

3.3 Data Collection Technique
The questionnaire that was given to SMEs along with evaluation tools was one of the information gathering techniques used in this investigation. The questionnaires used in this study are distributed using an instrument that uses a Likert scale with five points for items that have been modified specifically for this investigation.

3.4 Data Analysis Technique
In this study, data analysis was carried out using descriptive and statistical analysis through SmartPLS SEM software. Descriptive analysis describes the percentage of sampling results, while statistical analysis involves two stages: outer model and inner model analysis. In the outer model analysis, convergent validity was measured by AVE (value > 0.5), discriminant validity using the Fornell-Larcker Criterion, and reliability was tested by composite reliability and Cronbach's alpha (value ≥ 0.7). In the inner model analysis, the coefficient of determination (R^2) measures how much the independent variable explains the dependent variable, and the t-test is used to test the hypothesis with a t-statistic >1.96 ($p < 0.05$). This standard is used to accept or reject the hypothesis and ensure the accuracy of the research results.

4. DATA ANALYSIS AND DISCUSSION
4.1 Data Analysis
The objective of the outer loading results test is to ascertain the relationship between latent variables and their indicators. This outer loading results test makes use of the PLS Algorithm procedure. Tests for validity and reliability are used to evaluate the outer model's analysis phase. The outer loading results are displayed in Figure 2.

Loading factors are legitimate if their value is higher than 0.7. The output of outer loadings can be obtained from the PLS Algorithm Report SmartPLS. Table 1 below shows the outcomes of the outer loading results.

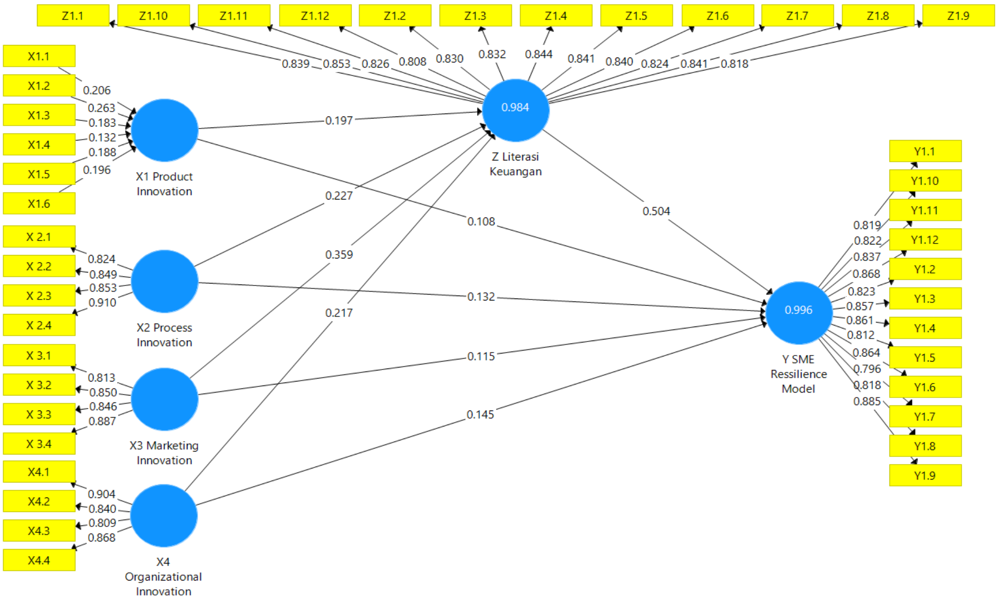

Figure 2. Outer loading results

Table 1. Outer loading results

	Product Innovation (X1)	Process Innovation (X2)	Marketing Innovation (X3)	Organizational Innovation (X4)	SME Resilience Model (Y)	Financial Literacy of SMEs (Z)
X 2.1		0.824				
X 2.2		0.849				
X 2.3		0.853				
X 2.4		0.910				
X 3.1			0.813			
X 3.2			0.850			
X 3.3			0.846			
X 3.4			0.887			
X1.1	0.854					
X1.2	0.870					
X1.3	0.891					
X1.4	0.826					
X1.5	0.829					
X1.6	0.852					
X4.1				0.904		
X4.2				0.840		
X4.3				0.809		
X4.4				0.868		
Y1.1					0.819	
Y1.10					0.822	
Y1.11					0.837	
Y1.12					0.868	
Y1.2					0.823	
Y1.3					0.857	
Y1.4					0.861	

	Product Innovation (X1)	Process Innovation (X2)	Marketing Innovation (X3)	Organizational Innovation (X4)	SME Resilience Model (Y)	Financial Literacy of SMEs (Z)
Y1.5					0.812	
Y1.6					0.864	
Y1.7					0.796	
Y1.8					0.818	
Y1.9					0.885	
Z1.1						0.839
Z1.10						0.853
Z1.11						0.826
Z1.12						0.808
Z1.2						0.830
Z1.3						0.832
Z1.4						0.844
Z1.5						0.841
Z1.6						0.840
Z1.7						0.824
Z1.8						0.841
Z1.9						0.818

Table 2. Discrimant validity results

	Product Innovation (X1)	Process Innovation (X2)	Marketing Innovation (X3)	Organizational Innovation (X4)	SME Resilience Model (Y)	Financial Literacy of SMEs (Z)
Product Innovation (X1)						
Process Innovation (X2)	0.970	0.860				
Marketing Innovation (X3)	0.969	0.984	0.849			
Organizational Innovation (X4)	0.970	0.985	0.987	0.856		
SME Resilience Model (Y)	0.980	0.989	0.990	0.990	0.839	
Financial Literacy of SMEs (Z)	0.975	0.985	0.987	0.986	0.996	0.833

Each variable this study's value exceeds 0.7, as can be seen in the table above, indicating that the variables have a correlation and are suitable for utilization in studies and data analysis.

The prejudiced Fornell–Larcker validity assumption If the variable indicator's cross loading on the variable is greater than that of other variables, the criterion is satisfied. The outcomes of discriminating validity are displayed in Table 2.

Table 2's findings demonstrat that each indicator item's loading value during construction exceeds the value of cross-loading. In summary: that each the loading coefficient of the indication piece on its build exceeds the value of cross-loading. Conclusion: The construct indicator block performs better than previous block indicators, and every construct or latent variables already have strong discriminant validity.

Items are deemed valid within the validity and reliability test phases if the r-count value is constructive and larger than the r-table, and they are deemed reliable if they consistently yield results when employed on several occasions. Cronbach's Alpha's value establishes the dependability threshold; an tool is taken into consideration trustworthy if its value is more than 0.70 and unreliable if it is less than 0.70. The findings of Construct Reliability and Validity are displayed in Table 3 below.

Table 3. Construct reliability and validity results

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Product Innovation (X1)		1.000		
Process Innovation (X2)	0.882	0.883	0.919	0.739
Marketing Innovation (X3)	0.871	0.872	0.912	0.722
Organizational Innovation (X4)	0.878	0.880	0.916	0.733
SME Resilience Model (Y)	0.962	0.962	0.966	0.704
Financial Literacy of SMEs (Z)	0.960	0.960	0.965	0.694

Table 4. R Square test results

	R Square	R Square Adjusted
SME Resilience Model (Y)	0.996	0.996
Financial Literacy of SMEs (Z)	0.984	0.983

Table 5. F Square test results

Variable	SME Resilience Model (Y)	Financial Literacy of SMEs (Z)
Product Innovation (X1)	0.134	0.121
Process Innovation (X2)	0.095	0.073
Marketing Innovation (X3)	0.059	0.164
Organizational Innovation (X4)	0.099	0.056
SME Resilience Model (Y)		
Financial Literacy of SMEs (Z)	1.047	

Table 3's data test findings demonstrate the validity of the variables evaluated, as indicated by the favorable and higher than the r-table r-count value. However, because the r value (Cronbach's alpha) in the preceding table is more than 0.70, the dependability rating is dependable.

The structural model has to be evaluated next, once the model has been evaluated and it has been determined that every build satisfies the requirements. The strength of endogenous variables in producing predictions in the structural model will subsequently be demonstrated by the R-square value test results. Table 4 below shows the findings of the R-square value.

It is evident from Table 4 above that the SME Resilience Model variable has an R-Square value of 0.996 and 0.996 for the R Squared Adjusted value. The financial literacy variable yielded an R-Square value of 0.984, and the R-Square adjusted value was 0.983. Considering that the tested model is nearly close to 1, it is evident that it is categorized as strong.

To assess if a construct is significantly affecting endogenous constructs when it is taken out of the model, the F-Square value is utilized to estimate changes in the value of R-squared. For a minor effect, an F-Square value of 0.02 is utilized; for a moderate effect, it is 0.15; and for a big effect, it is 0.35. The F Square The test findings are shown in Table 5 below.

The results of Table 5 show that each variable has a moderate effect on the structure with an f-square value greater than 0.35.

The calculated importance of the parameters provides important information about the relationship between the research factors. The inner weight output result's value provides the basis for assessing the hypothesis. The estimation output for the Path Coefficient Test or structural model testing is shown in Table 6.

Table 6. Path Coefficient results

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Product Innovation (X1) -> SME Resilience Model (Y)	0.108	0.114	0.038	2.845	0.005

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Product Innovation (X1) -> Financial Literacy of SMEs (Z)	0.197	0.221	0.067	2.943	0.003
Process Innovation (X2) -> SME Resilience Model (Y)	0.132	0.133	0.053	2.509	0.012
Process Innovation (X2) -> Financial Literacy of SMEs (Z)	0.227	0.216	0.082	2.779	0.006
Marketing Innovation (X3) -> SME Resilience Model (Y)	0.115	0.111	0.051	2.239	0.026
Marketing Innovation (X3) -> Financial Literacy of SMEs (Z)	0.359	0.351	0.090	3.980	0.000
Organizational Innovation (X4) -> SME Resilience Model (Y)	0.145	0.141	0.046	3.168	0.002
Organizational Innovation (X4) -> Financial Literacy of SMEs (Z)	0.217	0.212	0.075	2.884	0.004
Financial Literacy of SMEs (Z) -> SME Resilience Model (Y)	0.504	0.505	0.071	7.061	0.000

Table 7. Path Coefficient results

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Product Innovation (X1) → Financial Literacy of SMEs (Z) → SME Resilience Model (Y)	0.099	0.110	0.033	3.056	0.002
Process Innovation (X2) → Financial Literacy of SMEs (Z) → SME Resilience Model (Y)	0.114	0.110	0.047	2.447	0.015
Marketing Innovation (X3) → Financial Literacy of SMEs (Z) → SME Resilience Model (Y)	0.181	0.177	0.051	3.524	0.000
Organizational Innovation (X4) → Financial Literacy of SMEs (Z) →SME Resilience Model (Y)	0.109	0.107	0.042	2.617	0.009

Table 6 shows the test results using Bootstrapping. Overall, X1 → Y, X1 → Z, X2 → Y, X2 → Z, X3 → Y, X3 → Z, X4 → Y, X4 → Z, and Z → Y. All hypotheses show p-values < 0.05 and T-Statistic > 1.96. So it can be stated that all hypotheses have a significant positive effect.

The strength of the effect of variables with other factors, both exogenous and endogenous, is analyzed using the Specific Indirect Effect method. It is noteworthy if the P-Values value is less than 0.05. Given that the impact is mediated by the mediator variable, this shows that an exogenous variable has an indirect effect on an endogenous variable. P-Values greater than 0.05 indicate lack of significance. This suggests that the mediator variable does not moderate the effect of an external variable on an endogenous variable. Table 7 displays the individual indirect impact results.

Based on Table 7, it can be interpreted that all hypotheses from X1 → Z → Y, X2 → Z → Y, X3 → Z → Y, X4 → Z → Y, have p-values < 0.05 and T-Statistic > 1.96. Thus, it may be said that there is a strong influence and that the idea is accepted.

4.2 Discussion

Effect of Product Innovation on SME Resilience Model

The results of this study indicate that product innovation has a significant influence on the resilience model of SMEs. This finding is in line with research conducted by Sulastri et al. (2023), which states that product innovation has a positive effect on SME performance, which is considered very important to improve resilience. Product innovation plays a crucial role in increasing the resilience of SMEs by creating new products that are more in line with evolving market needs and consumer preferences. Product innovation enables SMEs to adapt to changing market trends, technology, as well as competition, which can maintain their relevance and competitiveness (Healy et al., 2018). Recent research by Ulubeyli et al. (2018) also revealed that product innovation not only affects competitiveness, but also strengthens the ability of SMEs to survive in unstable economic conditions. Product innovation can be a source of differentiation that enables SMEs to attract new customers and retain old customers, thereby contributing to increased sales and profitability. In addition, Eggers (2020) in his research showed that product innovation provides flexibility for SMEs in dealing with external challenges, such as economic crises or changes in government policies, by opening up new opportunities in the market. Recent findings by Gamage et al. (2020) also show that SMEs that implement product innovation tend to be better able to cope with external challenges, such as economic crises or changes in government policies, by opening up new opportunities in the market.

Effect of Process Innovation on SME Resilience Model

The results showed that process innovation has a significant effect on the resilience of the SME model. This finding is in line with research by Lopez et al. (2024) which confirms that service innovation implemented by SMEs is critical in the creation of shared value in the service sector. Process innovation, especially those focused on improving operational efficiency, plays an important role in strengthening the resilience of SMEs. In this context, process innovation can reduce production, management and distribution costs, which in turn results in significant cost savings and enhances the competitiveness of SMEs. For example, the application of digital technologies in production processes can speed up the processing of goods or services, reduce waste, and improve overall performance.

In addition, process innovation also contributes greatly to productivity improvement. Based on the findings of Albats et al. (2023) SMEs that implement new technologies in their production systems can increase output without increasing the amount of resources used, thereby maximizing efficiency. This is in line with the recent findings of Dutta et al. (2022), which show that SMEs that adopt automation in manufacturing or service processes can reduce production cycle times and optimize workflows, making them better equipped to face dynamic market challenges. With these innovations, SMEs can adapt more quickly to market and technological changes, ensuring that they remain relevant and competitive in an ever-changing industry.

Effect of Marketing Innovation on SME Resilience Model

The results of this study indicate that marketing innovation has a significant effect on the resilience of the SME model. This finding is in line with recent research by Pathak et al. (2024), which emphasized the importance of e-marketing adoption, such as e-commerce and social media, for SME performance. This research reveals that digital transformation is crucial in enhancing the resilience of SMEs amidst fast-changing market dynamics. In this context, SMEs that adopt digital marketing strategies, such as social media utilization, can face market challenges more effectively and resiliently (Quaye & Mensah, 2019). Recent research by Dumitriu et al. (2019) also highlighted that digitalization enables SMEs to significantly expand their market reach, as well as strengthen their brand image and customer loyalty, impacting their long-term resilience. In addition, marketing innovation can increase sales by creating more engaging and relevant customer experiences, as well as optimizing promotion and distribution processes. As such, marketing innovation not only helps SMEs survive fierce competition, but also enhances their ability to grow and thrive.

Effect of Organizational Innovation on SME Resilience Model

Organizational innovation plays an important role in strengthening the resilience of SMEs, in line with the findings of this study. As found by Akbari et al. (2022), organizational innovation has a significant relationship with organizational resilience, helping SMEs adapt to market and technological changes. Recent research by Verreynne et al. (2023) suggests that changes in organizational structure, such as the introduction of units or divisions that are more responsive to market changes, can increase the flexibility and adaptability of SMEs. In addition, the implementation of an innovation culture that encourages creativity, collaboration between teams, and the ability to take measured risks can help SMEs create new solutions and improve competitiveness (Leckel et al., 2020). Recent findings by Halim et al. (2019) reinforce this argument by showing that organizational innovation is not only concerned with structural change, but also with the creation of an enabling environment for SMEs' growth and competitiveness. By leveraging structural change, a culture of innovation, and the right technology, SMEs can strengthen their foundations of resilience and seize greater growth opportunities.

Effect of Financial Literacy on SME Resilience Model

Recent research confirms that financial literacy plays an important role in strengthening SME resilience. Agatha et al. (2023) show that financial literacy has a positive impact on the resilience of SMEs, especially in the face of economic uncertainty. Good financial literacy not only helps business owners understand the basics of financial management, but also promotes prudent financial behavior, reduces the risk of inefficient decision-making, and improves financial well-being (Hirvonen, 2018). Recent findings by Akpuokwe et al. (2024) revealed that a deep understanding of financial aspects such as cash flow, debt management, and investment enables business owners to make more strategic and targeted decisions. This contributes to a reduced risk of bankruptcy and strengthens the resilience of businesses to financial stress, especially amid uncertain economic conditions. In particular, emphasize the importance of understanding good long-term debt management, which affects SMEs' ability to remain stable in the face of declining revenues (Fadil & St-Pierre, 2021).

Another study by Kulathunga et al. (2020) highlights the role of financial literacy in business risk management. Financial literacy enables SMEs to be more proactive in identifying and managing market risks as well as operational risks. With a comprehensive risk management strategy, SMEs are able to adapt to rapid market changes and increase their capacity to survive in a dynamic business environment. In this context, research by Miswanto et al. (2024) found that SMEs with high financial literacy levels adapt faster to supply disruptions and demand changes compared to SMEs with low financial literacy. Thus, it was found that good financial literacy plays an important role in building a strong foundation for SME resilience through two main mechanisms. In addition, mastery of basic financial concepts provides a foundation for business owners to plan and allocate resources efficiently, and the ability to identify profitable investment opportunities helps SMEs to grow amidst economic pressures.

Simultaneous Effect of Product Innovation moderated by Financial Literacy on SME Resilience Model

This study shows that product innovation through financial literacy has a positive and significant effect on the SME resilience model. In this context, financial literacy serves as a moderating factor that enhances the impact of product innovation on SME resilience. This finding is consistent with research by Lontchi et al. (2023), who stated that financial literacy plays an important role in strengthening the resilience of SMEs, by helping them better manage risks, make wiser decisions, and allocate resources efficiently. Recent research also supports these findings. For example, research by Lema et al. (2021) shows that SMEs with high levels of financial literacy are more capable of responding to market changes and business challenges through product innovation. This is because strong financial literacy enables a better understanding of the costs, benefits and risks involved in product innovation, making SMEs better prepared to deal with economic uncertainty.

In addition, research by Miroshnychenko et al. (2021) found that SMEs with high levels of financial literacy tend to have greater flexibility in business strategy adjustments, especially in volatile economic situations. Adequate financial knowledge allows them to optimize budgets, plan investments that support innovation, and improve their ability to maintain competitiveness. In other words, financial literacy acts as a "guide" for SMEs in implementing product innovations, which directly contributes to improving their resilience and adaptability. From an empirical perspective, this study confirms that financial literacy mediates the relationship between product innovation and SME resilience by strengthening SMEs' ability to respond to market changes. Rachidi & El Mohajir (2021) also suggested that financial literacy enables SMEs to be more accurate in long-term financial planning, minimizing risks arising from economic uncertainty. Thus, financial literacy is shown to have an important role in strengthening the effectiveness of product innovation on SMEs' resilience, enabling them not only to survive but also to thrive in uncertain economic conditions.

Simultaneous Effect of Process Innovation moderated by Financial Literacy on SME Resilience Model

This study found that process innovation moderated by financial literacy has a positive and significant influence on SME resilience. This finding strengthens the results of Sari and Arifin (2023), which show that technology adoption through improved financial literacy can support the resilience of SMEs, particularly in ensuring business sustainability amid fierce market competition. With good financial literacy, SMEs are better able to understand and manage financial aspects related to operational process development, including production cost management and efficiency in the supply chain, which in turn strengthens their competitiveness. Recent research by Pandey & Gupta (2018) highlights that financial literacy not only improves SMEs' ability to conduct more informed financial planning but also helps them to analyze process efficiency more thoroughly. High financial literacy enables SME owners to recognize cost-saving opportunities in process innovation as well as make continuous improvements based on accurate financial data, ultimately contributing to business resilience and sustainability.

In addition, recent research by Temel & Durst (2020) indicates that financial literacy enables better risk management in the implementation of process innovation. In their study, SMEs with high levels of financial literacy were able to be more flexible in dealing with market fluctuations and operational challenges, including adjustments to changes in raw material costs and dynamic labor requirements. This is in line with the findings of this study which show that financial literacy provides the basis for more informed decision-making in process innovation, helping SMEs to maintain business sustainability and resilience. The empirical findings of this study also show that financial literacy assists SMEs in identifying appropriate sources of funding to support their process innovation. With good financial literacy, SMEs are better able to access and utilize financial facilities, such as low-interest small business loans or government subsidy programs, to strengthen their capital for process innovation implementation. This supports the argument of Esiebugie et al. (2018) that good financial literacy expands SMEs' access to various sources of funding that enable them to be more adventurous in innovating and adapting to market changes. Overall, this study shows that financial literacy moderates process innovation by enhancing SMEs to make more strategic, adaptive, and long-term oriented decisions, thus strengthening SMEs' resilience in a competitive market. The findings provide important implications for stakeholders, especially in designing financial literacy improvement programs that can support innovation in the SME sector and facilitate better resilience in the face of evolving economic dynamics.

Simultaneous Effect of Marketing Innovation moderated by Financial Literacy on SME Resilience Model

This study shows that marketing innovation through financial literacy has a positive and significant influence on the SME resilience model. These results are in line with previous studies, including (Burchi et al. (2021) and Alvarez (2022), which support the idea that financial literacy increases the effectiveness of marketing innovations in SMEs, ultimately strengthening the resilience and sustainability of small businesses. This study is also supported by recent research that shows the importance of financial literacy in enabling SMEs to optimize marketing innovation and improve competitiveness in an increasingly dynamic market. The new findings in this study reveal that financial literacy not only strengthens the link between marketing innovation and SME resilience but also becomes a factor that enables SMEs to navigate market uncertainty. For example, high financial literacy enables SME owners to assess the risks and benefits of marketing innovations to be implemented more accurately, as revealed by Mabula & Ping (2018) who stated that accurate cost-benefit analysis supports more informed decision-making.

In addition, this study found that financial literacy opens up access for SMEs to a wider range of funding sources, including external investments and alternative financing instruments, which are increasingly available to small businesses in today's digital marketplace (Fenwick et al., 2018). Good financial literacy also helps SMEs to optimize adaptive and data-driven marketing strategies, so they are better equipped to respond to changing market conditions. The empirical findings in this study show that SMEs with high financial literacy tend to have stronger resilience to economic fluctuations. They are able to make necessary adjustments without having to sacrifice their financial stability or competitiveness. This finding provides empirical evidence that financial literacy plays a dual role in supporting marketing innovation and enhancing SMEs' resilience in the long run. Thus, this study concludes that financial literacy serves not only as a moderator but also as an important reinforcing factor, enabling marketing innovation to contribute more effectively to the resilience and sustainability of SMEs.

Simultaneous Effect of Organizational Innovation moderated by Financial Literacy on SME Resilience Model

The results of this study indicate that organizational innovation moderated by financial literacy has a positive and significant effect on the SME resilience model. This finding enriches the existing literature, in line with the study of Velic et al. (2024) who found that increasing financial literacy among SMEs encourages organizational innovation, thereby increasing their resilience in the face of economic uncertainty. Financial literacy here includes the ability to manage budgets, cash management, financial statement analysis, and investment decision-making, all of which are crucial in supporting organizational innovation. This study also supports the findings of Harel et al. (2020) that organizational innovations, such as the introduction of new structures and processes or the establishment of a culture of innovation, enable SMEs to adapt more quickly to change. However, adequate financial literacy is required to ensure that such innovations can be executed effectively and supported by sound financial planning. Good financial literacy enables SME owners and managers to understand risks, optimize the use of resources, and ensure that innovations have a positive impact on SME resilience.

In addition, recent research by Addo et al. (2022) emphasized that financial literacy assists SMEs in managing the risks that often accompany organizational innovation. Innovations, especially those involving major changes in structure or culture, often bring uncertainty. In this context, a good understanding of financial risk management helps SMEs to identify potential losses and mitigate those risks. New findings from this study suggest that when SMEs are able to adopt organizational change and innovation, financial literacy provides a stable foundation for structured planning and execution. Financial literacy also plays an important role in ensuring that organizational innovations not only increase flexibility and adaptability, but also strengthen the resilience of SME businesses in the face of competitive market challenges. As an empirical example, this study found that SMEs with high financial literacy levels tend to be more successful in maintaining financial stability when undertaking structural changes compared to SMEs with low financial literacy.

5. CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATIONS

Based on the results of this study, all hypotheses were accepted, thus achieving the research objectives. The findings show that product, process, marketing, and organizational innovations positively influence SME resilience, with financial literacy playing an important role in amplifying the impact of these innovations. Financial literacy not only improves SME resilience directly, but also moderates the effect of innovations on SME resilience, including product, process, marketing, and organizational innovations. Thus, strengthening SMEs' resilience and sustainability requires a combination of innovation and financial literacy, which synergistically make SMEs more adaptive, flexible and ready to face various market challenges. The findings of this study have practical and policy implications. Practically, good financial literacy needs to be improved through training and mentoring, so that SMEs are better able to deal with market dynamics and capitalize on opportunities. Policy implications are also important, where the government and related institutions are expected to support financial education and provide incentives for SMEs to adopt innovations. These policies can strengthen the competitiveness of SMEs more broadly and help them survive amid economic uncertainty.

To strengthen the resilience of SMEs, it is recommended that businesses improve their financial literacy through relevant training programs. Collaboration with financial institutions is also important to provide access to mentoring and resources needed for innovation. In addition, SMEs should strengthen innovation capacity in various aspects of the business, including products, processes, marketing, and organization, to increase flexibility and resilience in the face of market changes. The use of e-business technologies is also recommended to enable SMEs to expand their market reach and improve operational efficiency. This study has several limitations. First, the sample used is limited to one particular region or sector so the results may not be fully applicable in different contexts. In addition, this study only focuses on certain variables, namely innovation and financial literacy, so there are still other factors that may be relevant, such as leadership or organizational culture, that have not been discussed.

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