Journal of Enterprise and Development (JED)
Vol. 7, No. 3, 2025
ISSN (PRINT): 2715-3118, ISSN (ONLINE): 2685-8258

ENTREPRENEURSHIP

Exploring the Role of Artificial Intelligence, Business Agility, and Business Model Innovation in Enhancing Culinary MSMEs Performance

Romindo Megawati Pasaribu[1,*], Hanna Meilani Damanik[2], Trimelda Mei Liana Sitorus[3]
Fakultas Ekonomi dan Bisnis, Universitas HKBP Nommensen, Medan, Indonesia[1,2,3]
Corresponding e-mail: romindo.pasaribu@uhn.ac.id[*]

HISTORY

Submitted
8 September 2025

Revised
28 September 2025

Accepted
1 October 2025

ABSTRACT

Purpose: This study aims to identify the factors influencing the performance of Micro, Small, and Medium Enterprises (MSMEs) in the culinary sector, with a particular focus on their capabilities in artificial intelligence (AI). The research examines business model innovation as a mediating factor and business agility as a moderating factor.

Method: The research was conducted in Medan, targeting culinary entrepreneurs with a sample size of 165 respondents. Hypothesis testing was performed using PLS-SEM.

Result: The results indicate that AI capabilities and business model innovation have a positive and significant impact on the business performance of culinary MSMEs in Medan. Mediation analysis reveals that business model innovation effectively mediates the relationship between AI capabilities and the performance of culinary MSMEs. However, moderation analysis shows that business agility does not strengthen the impact of AI capabilities and business model innovation on business performance.

Practical Implications for Economic Growth and Development: This study emphasizes the significance of artificial intelligence, business agility, and business model innovation in enhancing the performance of MSMEs within the culinary sector. Adopting AI, improving business agility, and promoting business model innovation can enhance MSMEs' performance and contribute to digital economic growth.

Originality/Value: This study evaluates AI capacity through mediation and moderation approaches based on the Resource-Based View (RBV) theory. It explores how AI capabilities, business agility, and business model innovation can improve MSME performance, an area that remains underexplored in developing countries such as Indonesia.

Keywords: *Artificial Intelligence, Business Model, Innovation, Business Agility*

How to cite: Pasaribu, R. M., Damanik, H. M., & Sitorus, T. M. L. (2025). Exploring the Role of Artificial Intelligence, Business Agility, and Business Model Innovation in Enhancing Culinary MSMEs Performance. *Journal of Enterprise and Development (JED)*, *7*(3), 580–594. https://doi.org/10.20414/jed.v7i3.14368

INTRODUCTION

Digital learning is a critical element of digital transformation, providing essential platforms that enable MSMEs to access new markets at national, regional, and global levels. A report by the Boston Consulting Group (BCG) and Telkom Indonesia reveals that MSMEs in the culinary sector have particularly embraced digital technology, surpassing other sectors in their use of artificial intelligence. Among the 3,700 MSMEs surveyed, 71% in the culinary sector utilized digital technology to identify suppliers, while 69% used it to engage with customers. However, only 26% of these businesses reported undergoing full digitalization, and just 23% employed market analysis tools (Adi Adhiat, 2022). To improve operational efficiency, market access, and integration of artificial intelligence, it is essential for MSMEs to adopt information technology.

MSMEs play a crucial role in a nation's economic growth, making the adoption of information technology necessary to enhance their operational efficiency, market reach, and competitive position. Artificial intelligence (AI) is a vital aspect of information technology, playing a key role in areas such as data analysis, decision-making, customer service, product development, and financial management. By improving efficiency and productivity, reducing operational costs, and creating competitive advantages, AI has the potential to transform MSMEs (Khaq et al., 2024). The integration of MSMEs, AI, and information technology fosters an ecosystem that promotes growth and sustainability in the digital era (Chen & Esperança, 2022). By leveraging AI, MSMEs can enhance productivity, efficiency, and innovation, ultimately opening new avenues for growth and contributing to sustainable economic development (Hasan et al., 2024).

The impact of AI technology on company performance is significant and is influenced by factors such as AI capabilities, management practices, and decision-making processes, as evaluated through the resource-based view (RBV) theory (Chatterjee et al., 2021). AI capabilities are categorized into three dimensions: basic AI, AI tendencies, and AI skills. Research by Oldemeyer et al. (2024) shows that AI implementation—via tools like chatbots and data analysis—substantially improves operational efficiency and sales, with approximately 70% of respondents reporting an increase in sales.

An increasing number of MSMEs are recognizing AI's potential, with 77% of surveyed businesses acknowledging its applicability in various operations (Mikalef & Gupta, 2021). According to Sharma et al. (2022), factors from the technology-organization-environment (TOE) framework—such as relative advantage, compatibility, sustainable human resources, market demand, and governmental support—are vital for AI adoption. The integration of AI has significantly enhanced the operational and economic performance of MSMEs. Multi-group analysis indicates that medium-sized enterprises experience a stronger correlation between relative advantage and AI adoption compared to smaller firms.

Many studies have explored the role of AI capabilities in enhancing business performance. For example, Badghish & Soomro (2024) examined how technologies like machine learning and predictive analytics can optimize business processes across various sectors. Spallone (2024) assessed AI's potential to elevate MSME performance by focusing on resource involvement and AI adoption. Thayyib et al. (2023) highlighted AI's critical role in supporting MSMEs, emphasizing the importance of effective implementation strategies. Chen & Esperança (2022) explored how AI technology can improve performance from a resource-based view (RBV) perspective, while Hasan et al. (2024) discussed AI's transformative impact on decision-making and customer engagement, thereby enhancing operational performance. Additionally, Deeb et al. (2024) demonstrated that AI integration positively influences organizational outcomes and MSME performance.

While much of the previous research has focused on large companies, this study aims to address the knowledge gap concerning MSMEs by using the RBV theory to evaluate their performance in relation to AI capabilities, business agility, and business model innovation. Chen & Esperança (2022) explored the connections between AI capabilities, management, decision-making, and performance within the RBV framework, while Mikalef & Gupta (2021)

illustrated the role of AI in boosting creativity and performance across MSME sectors. However, there is still a need for systematic research focused on the unique characteristics of MSMEs, especially in areas such as accounting and quality management (Oldemeyer et al., 2024).

This study seeks to explore the factors influencing MSME performance, with a particular focus on AI capabilities—specifically the dimensions of artificial intelligence basic (AIC), proficiency (AIP), and skills (AIS). Business agility will serve as a mediating variable, while business model innovation will act as a moderating variable. The novelty of this research lies in its application of mediation and moderation approaches to measure AI capacity through the RBV theory, a method not widely applied to the MSME sector in developing countries like Indonesia.

Hypotheses Development

AI Capabilities on Business Model Innovation

Mikalef & Gupta (2021) define artificial intelligence (AI) as a system's ability to identify, interpret, draw conclusions, and learn from data to achieve predefined organizational and societal goals. A company's ability to implement AI is considered highly valuable (Yu et al., 2021). To fully leverage AI capabilities, employees must acquire the necessary skills and expertise, which is essential for effective AI implementation in the near future (Chen & Esperança, 2022). AI-driven business model innovation focuses on creating efficiency and competitive advantages, directly addressing economic challenges (Alshawaaf & Lee, 2020). In a sustainable context, AI-based business model innovation acts as a catalyst, driving improvements in business outcomes (Jorzik et al., 2024). Lee et al. (2019) found that companies that innovate their business models using AI demonstrate strong growth potential. By utilizing AI, companies can generate innovations that enhance their ability to compete on a global scale. Based on this analysis, the following hypothesis is proposed:

H1: There is a positive and significant influence between artificial intelligence capabilities and business model innovation.

Business Model Innovation on MSMEs Performance

In order to outperform competitors, improve performance rapidly, and establish a sustainable competitive advantage, companies must innovate their business models. Business model innovation involves adopting new approaches to offering products and services (Likai & Ruoyu, 2022). Changes in a company's business model are often driven by external factors such as the technological environment, institutional context, market competition, and network relationships (Likai & Ruoyu, 2022). Conversely, business model innovation is also an adjustment process shaped by strategic decision-making, management decisions, and executive cognition (Wirtz et al., 2016). Company performance refers to the achievement of organizational goals essential for long-term sustainability, encompassing both financial and non-financial performance metrics (Rehman et al., 2023). Today, companies increasingly rely on hybrid strategies that blend various elements to create flexible and adaptive business models (Abdelwahed et al., 2023). Based on this analysis, the following hypothesis is proposed:

H2: There is a positive and significant influence between business model innovation and MSMEs performance.

AI Capabilities on MSMEs Performance

Artificial intelligence capabilities (AIC) refer to a company's ability to develop, integrate, and utilize AI-based resources (Chen & Esperança, 2022; Mikalef & Gupta, 2021). Effective and efficient AI implementation requires tangible resources, including financial support, data,

hardware, and technical expertise (Chen & Esperança, 2022). Companies in the e-commerce sector, particularly those operating online, have a natural advantage in accessing data resources (Zheng et al., 2017). Objective measures of company performance are preferred over subjective ones, as they provide more reliable indicators; subjective measures of MSME performance are often difficult or impossible to collect (Salfore et al., 2023). Company performance refers to the achievement of corporate goals that are vital for organizational sustainability, encompassing both financial and non-financial aspects (Rehman et al., 2023). Based on this analysis, the following hypothesis is proposed:

H3: There is a positive and significant influence between artificial intelligence capability and MSMEs performance.

AI Capabilities, MSMEs Performance, and Business Model Innovation

Business model innovation is a key factor in achieving competitive advantage and improving performance, making it an essential element in the domain of business strategy and theoretical concepts. It is considered a necessary condition for a sustainable growth strategy (Bhatti et al., 2022). However, business model innovation faces several obstacles, such as the inability of managers to lead the process of identity change, which is crucial for helping companies avoid falling into an identity trap (Liu et al., 2022). Factors driving business model innovation also contribute to enhanced business performance. Consequently, AI capabilities improve company performance, with this relationship being mediated by business model innovation. Based on this analysis, the following hypothesis is proposed:

H4: There is a positive and significant influence between artificial intelligence capabilities and MSMEs performance, with business model innovation acting as a mediator.

Business Agility, AI Capabilities, and MSMEs Performance

Company performance is influenced by business agility, which plays a crucial role in helping companies adapt and align their activities to achieve superior financial performance (Wang et al., 2023). Business agility has a significant impact on company success (Ashrafi et al., 2019), and agility attributes are strongly related to business performance (Ayadi, Alaskar, & Aloulou, 2024). Agility enhances performance by optimizing company responses to market changes and mitigating risks and uncertainties, particularly during global crises and pandemics (Ayadi et al., 2024; Bai et al., 2022; Khalil et al., 2023). As a result, companies that implement agility can experience growth in market share, cost reduction, and higher revenue and profits. Baškarada & Koronios (2018) demonstrate a positive relationship between AI and business agility. Agility, characterized by flexibility and responsiveness, is an invaluable asset for companies seeking to fully leverage the potential of AI. Based on this analysis, the following hypothesis is proposed:

H5: Business agility strengthens the influence of artificial intelligence capabilities on MSMEs performance.

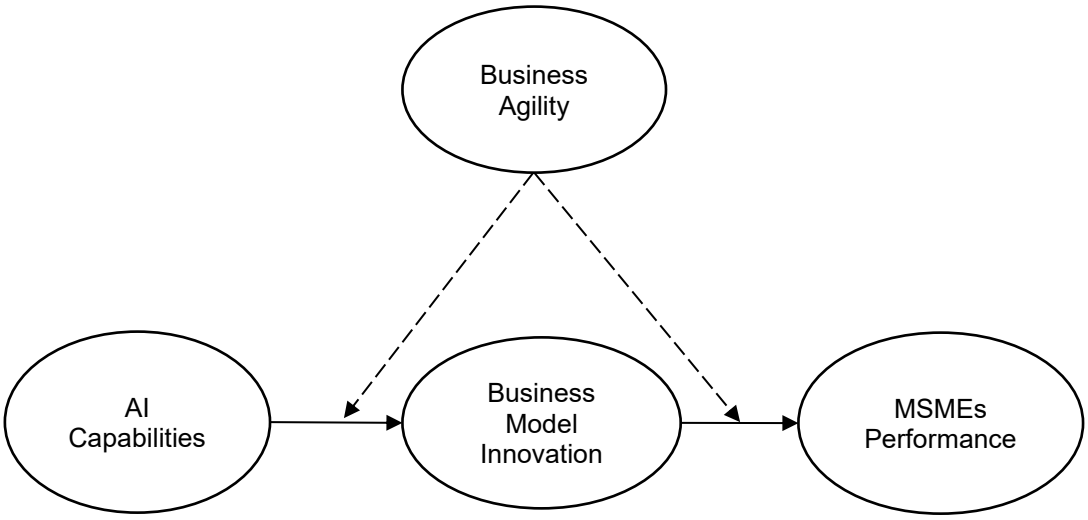
Business Agility, Business Model Innovation, and MSMEs Performance

Agility and its attributes are closely linked to innovation performance (Ayadi, Alaskar, & Aloulou, 2024). Companies that implement agility can experience growth in market share, cost reductions, higher revenue, and increased profits. Aweidah (2024) emphasizes the importance of integrating operational frameworks to maintain competitiveness, which significantly influences business agility and innovation. Agile companies must strike a balance between stability and flexibility, as these two attributes are often seen as conflicting but essential for survival and growth in the face of technological changes and environmental uncertainty (Lu & Ramamurthy, 2011). In fact, artificial intelligence capabilities and business agility are positively related to business model innovation, as agile companies are better

equipped to navigate technological and market changes (Chen & Esperança, 2022). Based on this analysis, the following hypothesis is proposed:

H6: Business agility strengthens the influence of business model innovation on MSMEs performance.

Figure 1. Research Framework



Source: Developed by the authors (2025)

METHOD

This study employs a quantitative research design with a causal approach to analyze the effect of artificial intelligence capabilities, business agility, and business model innovation on firm performance. The causal design allows for testing the relationships between independent and dependent variables in a structured model. The population for this study consists of MSMEs in the culinary sector in Medan. A non-probability sampling technique, specifically incidental sampling, was used to select the sample, which included 165 respondents from culinary MSMEs in Medan. The dimensions for measuring AI capabilities are based on the research by Chen & Esperança (2022), which include basic AI, tendencies, and skills. The dimensions for measuring business model innovation, as referenced in Likai & Ruoyu (2022), include content, structure, and business governance. The dimensions for assessing business agility are adapted from Ahmed et al. (2022) and Mrugalska & Ahmed (2021), and include understanding customer demand, responding to customer demand, operational agility, and partnership agility. The dimensions for MSMEs performance, drawn from Abdelwahed et al. (2023) and Salfore et al. (2023), encompass efficiency, effectiveness, quality, productivity, innovation, and profitability. To test the hypotheses, data analysis was conducted using PLS-SEM with SmartPLS 4.0.

Table 1. Operational Variables

Variable	Code	Statement
AI Capabilities (Chen & Esperança, 2022)	AIC1	We utilize an artificial intelligence system to support our business operations.
	AIC2	We continuously monitor the development of artificial intelligence systems in the industry.
	AIC3	We continuously update our artificial intelligence system.

Variable	Code	Statement
Business Agility (Ahmed et al., 2022)	BA1	We respond promptly to changes in overall consumer demand.
	BA2	We tailor our products and services to meet the individual needs of our customers.
	BA3	We actively respond to the launch of new products or services from competitors.
	BA4	We adjust our prices in response to price changes made by competitors.
	BA5	We are expanding into new domestic and international markets.
	BA6	We adjust the variety of products and services we offer, expanding or reducing as needed.
	BA7	We adopt new technologies to create better, faster, and more cost-effective products and services.
	BA8	We switch suppliers to achieve lower costs, better quality, or improved delivery times.
Business Model Innovation (Likai & Ruoyu, 2022)	BMI1	Our activities and business positions are dynamic, regularly evaluated, and adjusted to ensure optimal performance.
	BMI2	We are constantly seeking ideas to adapt our business model and explore new opportunities.
	BMI3	We recognize and act on new opportunities as they arise.
MSMEs Performance (Abdelwahed et al., 2023)	MP1	Compared to our competitors, our financial performance is significantly better.
	MP2	Compared to our competitors, our market share is much stronger.
	MP3	Compared to our competitors, our sales growth is significantly higher.
	MP4	Compared to our competitors, our product development efforts are much more advanced.
	MP5	Compared to our competitors, our overall business development is much stronger.

Source: Compiled by the authors (2025)

RESULT AND DISCUSSION

Demographic Characteristics of Respondents

Table 2 shows the distribution of MSME operators based on the length of time they have been running their businesses. The businesses are divided into three categories: those operating for more than one year, with 82 respondents (49.70%); those operating for 1-3 years, with 54 respondents (32.73%); and those operating for less than one year, with 29 respondents (17.58%). The study results indicate that the majority of MSMEs have been operating for more than one year, suggesting that these businesses are still relatively new to the culinary sector in Medan. Additionally, the study reveals that the highest concentration of MSMEs is found in the Medan Kota, Perjuangan, Belawan, and Maimun areas. Regarding the number of employees, 123 respondents (74.55%) reported having 1-5 employees, 23 respondents (13.94%) had 6-10 employees, and 19 respondents (11.52%) employed more than 10 people. The findings show that most MSMEs fall into the micro category, with 1-5 employees.

Table 2. Demographic Characteristics of Respondents

Category	Description	Amount	Percentage (%)
Business Duration	More than 1 Year	82	49.70 %
	1 – 3 Years	54	32.73 %

Category	Description	Amount	Percentage (%)
	Less than 1 Year	29	17.58 %
Business Location	Medan Kota	23	13.94 %
	Medan Timur	5	3.03 %
	Medan Perjuangan	15	9.09 %
	Medan Tembung	6	3.64 %
	Medan Belawan	31	18.79 %
	Medan Barat	1	0.61 %
	Medan Amplas	11	6.67 %
	Medan Area	2	1.21 %
	Medan Baru	8	4.85 %
	Medan Deli	7	4.24 %
	Medan Helvetia	7	4.24 %
	Medan Johor	8	4.85 %
	Medan Denai	3	1.82 %
	Medan Labuhan	5	3.03 %
	Medan Marelan	3	1.82 %
	Medan Maimun	15	9.09 %
	Medan Petisah	5	3.03 %
	Medan Sunggal	2	1.21 %
	Medan Polonia	2	1.21 %
	Medan Selayang	2	1.21 %
	Medan Tuntungan	4	2.42 %
Number of Employees	1 – 5 Employees	123	74.55 %
	6 – 10 Employees	23	13.94 %
	More than 10 Employees	19	11.52 %

Source: Processed data (2025)

Convergent Validity

Table 3 shows that all indicators are reliable in explaining their respective constructs. The analysis of the outer model continued by assessing the internal consistency reliability of each construct. Internal consistency reliability was evaluated for each construct, with the composite reliability value expected to be at least 0.7.

Table 3. Convergent Validity Test Result

Variable	Indicator	Loading Factor	Description
AI Capabilities	AIC3	0.731	Valid
	AIC2	0.791	Valid
	AIC3	0.736	Valid
Business Model Innovation	BMI1	0.878	Valid
	BMI2	0.925	Valid
	BMI3	0.909	Valid
Business Agility	BA1	0.805	Valid
	BA2	0.865	Valid
	BA3	0.802	Valid
	BA5	0.797	Valid
	BA6	0.774	Valid
	BA7	0.814	Valid
	BA8	0.836	Valid
MSMEs Performance	MP1	0.854	Valid
	MP2	0.901	Valid

Variable	Indicator	Loading Factor	Description
	MP3	0.885	Valid
	MP4	0.851	Valid
	MP5	0.771	Valid

Source: Processed data (2025)

Outer Model

Table 4 presents the outer model reliability and validity indicators for the variables in the study. The Cronbach's Alpha values range from 0.888 to 0.936, indicating strong internal consistency for all constructs, as values above 0.7 are considered acceptable. The Composite Reliability (rho_a and rho_c) values also exceed the threshold of 0.7, demonstrating good construct reliability. The Average Variance Extracted (AVE) values range from 0.635 to 0.818, with values above 0.5 indicating adequate convergent validity. Overall, these results suggest that the outer model of the constructs is both reliable and valid.

Table 4. Outer Model Reliability and Validity Indicators

Variable	Cronbach's Alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)	Average Variance Extracted (AVE)
AI Capabilities	0.936	0.937	0.945	0.635
Business Model Innovation	0.888	0.889	0.931	0.818
Business Agility	0.915	0.917	0.932	0.662
MSMEs Performance	0.906	0.908	0.930	0.729

Source: Processed data (2025)

Discriminant Validity

Table 5 presents the correlation matrix values as follows: AI capabilities is 0.957, business model innovation is 0.904, business agility is 0.816, and MSMEs performance is 0.854. These values are greater than the correlation values of the other construct variables.

Table 5. Discriminant Validity Test with the Fornell-Larcker Criterion

	AIC	BMI	BA	MP
AIC	0.957			
BMI	0.703	0.904		
BA	0.784	0.772	0.816	
MP	0.816	0.735	0.814	0.854

Source: Processed data (2025)

Model Fit

Table 6 presents the model fit test results, showing that the SRMR values are identical at 0.065. This indicates that the research model meets the assumptions for model fit.

Table 6. Model Fit Test Result Based on Standardized Root Mean Square (SRMR)

Model Fit Test	Saturated Model	Estimated Model
SRMR	0.081	0.200
d_ULS	3.725	22.388
d_G	3.156	4.140
Chi-square	2.218.227	2.593.981

Model Fit Test	Saturated Model	Estimated Model
NFI	0.646	0.585

Source: Processed data (2025)

Coefficient of Determination

Table 7 presents the results of the model formed through a series of SEM. R^2 values ranging from 0.00 to 0.19 are considered weak, values from 0.20 to 0.66 are moderate, and values greater than 0.67 are considered strong. Based on the test results, the model is generally well-formed, as indicated by the coefficient of determination values, which fall within the moderate to strong categories. The R^2 value for the AIC model is 0.673 (67.3%), meaning that the independent variables explain 67.3% of the variation in AIC, which is considered a strong R^2 value. The R^2 value for the BA model is 0.615 (61.5%), indicating a moderate strength. The R^2 value for the BMI model is 0.494 (49.4%), also falling within the moderate range. Finally, the R^2 value for the MP model is 0.756 (75.6%), which is considered a strong R^2 value.

Table 7. Coefficient of Determination Test Result

Indicator	R^2	Adjusted R^2
AIC	0.673	0.671
BA	0.615	0.613
BMI	0.494	0.491
MP	0.756	0.752

Source: Processed data (2025)

Hypotheses Testing

Direct Effect

Table 8 presents the results of the first hypothesis test (H1), which show that AIC has a positive and significant effect on BMI. The T-statistic value is 8.085, which is greater than 1.96, and the p-value is 0.000, which is less than 0.05, meaning that H1 is accepted. The magnitude of the influence of AIC on BMI is 0.554, or 55.4%. In other words, the higher the AIC of MSMEs, the greater their BMI. This indicates that AIC is an important factor to consider in increasing BMI among MSMEs in the culinary sector in Medan. The results of testing H2 show that AIC has a positive and significant effect on MP, with a T-statistic value of 2.879 (greater than 1.96) and a p-value of 0.004 (less than 0.05), meaning that H2 is accepted. The magnitude of the influence of AIC on MP is 0.234, or 23.4%. In other words, the higher the AIC of MSMEs, the higher their MP. This demonstrates that AIC is an important factor in improving the MP of MSMEs in the culinary sector in Medan. The results of testing H3 show that BMI has a positive and significant effect on MP, with a T-statistic value of 3.687 (greater than 1.96) and a p-value of 0.000 (less than 0.05), meaning that H3 is accepted. The magnitude of the effect of BMI on MP is 0.423, or 42.3%. In other words, the higher the BMI possessed by MSME actors, the higher their MP. This shows that BMI is a significant factor to consider in improving the MP of MSME actors in the culinary sector in Medan.

Table 8. Direct Effect Test Result

Relationship	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T statistics (|O/STDEV|)	P values	Conclusion
AIC → BMI	0.554	0.563	0.068	8.085	0.000	Accepted
AIC → MP	0.234	0.243	0.081	2.879	0.004	Accepted
BMI → MP	0.423	0.427	0.115	3.687	0.000	Accepted

Source: Processed data (2025)

Mediating Effect

Table 9 presents the results of indirect testing through mediation, showing a positive and significant influence between the AIC variable and MP, with BMI acting as a mediating variable. This is evident from the T-statistic value of 2.879, which exceeds the threshold of 1.96, and the significance value of 0.004, which is below the 0.05 level (H4 accepted). The effect size of AIC on MP through BMI is 23.4%, indicating that AIC can enhance MP through BMI as a mediator. This suggests that BMI plays a role in improving the performance of MSMEs in the culinary sector in Medan.

Table 9. Mediating Effect Test Result

Relationship	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T statistics (|O/STDEV|)	P values	Conclusion
AIC → BMI → MP	0.234	0.243	0.081	2.879	0.004	Mediate

Source: Processed data (2025)

Moderating Effect

Table 10 presents the results of indirect testing through the first moderation, showing that Business Agility (BA) does not strengthen the influence of Business Model Innovation (BMI) on MSMEs Performance (MP). This is evident from the T-statistic value of 1.694, which is smaller than 1.96, and the significance value of 0.090, which is greater than 0.05 (H5 rejected). The findings indicate that BA weakens the effect of BMI on MP by 0.073, or 7.3%. Thus, BA is unable to enhance the effect of BMI on the MP of MSMEs in the culinary sector in Medan. Additionally, the results of indirect testing through the second moderation show that BA does not strengthen the influence of AIC on MP. The T-statistic value is 1.013, which is smaller than 1.96, and the significance value is 0.311, which is greater than 0.05 (H6 rejected). This indicates that BA weakens the influence of AIC on MP by -0.024, or -2.4%. Therefore, BA cannot strengthen the influence of AIC on the MP of MSMEs in the culinary sector in Medan.

Table 10. Moderating Effect Test Result

Relationship	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T statistics (|O/STDEV|)	P values	Conclusion
BA x BMI → MP	0.073	0.065	0.043	1.694	0.090	Cannot moderate
BA x AIC → MP	-0.024	-0.021	0.024	1.013	0.311	Cannot moderate

Source: Processed data (2025)

Discussion

The Influence of AI Capabilities on Business Model Innovation

AIC has a positive and significant effect on BMI. The foundation of AIC is established by providing necessary hardware, such as computers, human resources (technicians/operators), software (applications and programs), and sufficient funding to operate, update, and maintain AI systems used in business operations. The development of AI capabilities is achieved through strategies aimed at product innovation, implementing these innovations in the target market, and introducing new products or technologies to consumers with the goal of improving the performance of MSMEs in the culinary sector. Structuring AI skills in the culinary sector

involves utilizing existing AI applications and technologies, developing business plans, and providing access to AI training that supports the creation of BMI. This facilitates MSMEs in the culinary sector in better serving their target customers. The use of AI by culinary sector MSMEs is expected to enhance business activities, create new business opportunities, and generate ideas aligned with the business model of the business owner. AIC can assist business owners in recognizing competitors' market share, tracking developments and changes in the markets they serve, and making necessary adjustments to develop new products that meet consumer preferences. This study is consistent with the research conducted by Alshawaaf & Lee (2020), Ashaari et al. (2020), Åström et al. (2022), Chen & Esperança (2022), and Jorzik et al. (2024).

The Influence of AI Capabilities on MSMEs Performance

AIC has a positive and significant influence on MP. Culinary businesses that utilize AI can gain a critical competitive advantage in today's highly competitive environment. AI enhances operational efficiency by automating tasks such as scheduling, inventory management, and in-depth analysis of customer data, market trends, and overall business performance, leading to improved optimization. AI enables customer personalization through tailored menu recommendations and enhances the customer experience by providing more responsive service. The application of AI in the culinary industry supports strategic decision-making by analyzing market trends, customer behavior, and overall MP more deeply. Additionally, culinary businesses that leverage AI are better equipped to identify their competitors' strengths and weaknesses. This information forms the basis for developing smarter and more effective competitive strategies. With more accurate data analysis, AI can predict market changes, customer demand, and economic factors that may affect the culinary business in Medan. Culinary business owners who adopt AIC can unlock new opportunities in product development, marketing, supply chains, and other areas. The findings of this study align with the research by Ashaari et al. (2020), Chen & Esperança (2022), and Yasmin et al. (2020).

The Influence of Business Model Innovation on MSMEs Performance

BMI has a positive and significant effect on MP. Several BMI strategies that culinary businesses in Medan can implement to improve MP include: (1) Gofood and Grabfood, online food and beverage delivery services, which have opened new opportunities for culinary businesses to reach a broader customer base; (2) Thematic restaurant concepts, where businesses can use unique and interesting themes to create a distinct dining experience for customers; (3) Use of local ingredients, where operators can leverage fresh, high-quality local ingredients as a unique selling point, supporting business sustainability; (4) Innovative menus, where culinary operators can create new dishes with unique flavors and more appealing food and beverage presentations; and (5) Use of social media, allowing culinary businesses to use platforms as promotional tools to increase visibility and directly interact with customers. The results of this study, however, do not support the findings of previous studies (Ahmed et al., 2022; Aspara et al., 2010).

Business Model Innovation as a Mediator Between AI Capabilities and MSMEs Performance

The results of the mediation test show that BMI can mediate the influence of AIC on the MP of MSMEs. This indicates that both BMI and AIC are crucial factors to consider when improving the MP of MSMEs in the culinary sector, which can ultimately serve as a competitive advantage in winning the culinary market competition in Medan. Business owners who effectively utilize AIC in their operations can create new opportunities and ideas that can be implemented in their businesses. AIC plays an essential role in developing strategies to create BMI, emphasizing transformative AI in shifting traditional business paradigms (Lee et al., 2019; Trocin et al., 2021). AI-driven BMI aims to create efficiency and a competitive edge for

companies, directly addressing economic challenges (Alshawaaf & Lee, 2020). In a sustainable context, AI-BMI demonstrates that AI serves as a catalyst for BMI, focusing on improving outcomes (Jorzik et al., 2024). Lee et al. (2019) found that companies innovating their business models with AI show strong development potential. This study aligns with research conducted by Bhatti et al. (2021) and Pedersen et al. (2018).

Business Agility as a Moderator Between AI Capabilities and MSMEs Performance

The moderation test results show that BA is unable to strengthen the influence of AIC on the MP of MSMEs in the culinary sector. This study indicates that BA does not enhance the use of AIC on MP. It suggests that MSMEs are currently unable to respond effectively to changes in consumer demand, adjust their products and services to meet consumer needs, react to new products and services launched by competitors, make price adjustments based on competitor pricing, expand into new markets in other cities or countries, adopt new technologies, or replace suppliers to achieve lower costs, better quality, and improved delivery. The study found that MSMEs in the culinary sector in Medan have been operating for only 1-3 years, are still in the early stages, and are still focused on finding customers. As a result, they are not yet capable of demonstrating business agility. MSMEs need more time to understand the market and their consumers, as well as to deliver a positive experience that makes consumers feel connected to the products and services offered. The results of this study do not support the findings of Ahmed et al. (2022).

Business Agility as a Moderator Between Business Model Innovation and MSMEs Performance

The moderation test results show that BA is unable to strengthen the influence of BMI on the MP of MSMEs in the culinary sector. This study indicates that BA is unable to create an BMI that can improve MP. MSMEs in the culinary sector, in this study, are still in the introductory stage and are not yet able to implement various business model innovations to enhance business performance. SMEs that attempt to make changes too quickly will face challenges, as these changes are not supported by sufficient human resources or experience in understanding market conditions and consumer preferences. Sudden changes without proper preparation can lead to instability, inefficient use of labor and financial resources, and a decline in the performance of MSMEs in the culinary sector in Medan. The results of this study do not support the findings of Liu et al. (2024) and Wang et al. (2023).

CONCLUSION

This study aims to identify factors that influence MSMEs performance measured by the variables of AIC, BA as a mediating variable, and BMI as a moderating variable. The results show that AIC has a significant effect on both BMI and MP, and that BMI significantly affects MP. Furthermore, BMI can mediate the effect of AIC on MP, while BA does not strengthen the effect of AIC and BMI on the performance of culinary sector MSMEs. From a practical perspective, AIC and BMI are crucial factors for culinary sector MSME actors to consider in order to improve their MP. However, BA does not play a significant role in improving MP for culinary sector MSME actors. Future research should expand this study by incorporating variables such as innovation culture and the dynamic business environment.

REFERENCES

Abdelwahed, N. A. A., Al Doghan, M. A., & Soomro, B. A. (2023). Business strategy and firm performance in SMEs: Recognizing the role of the environmental management process. *Corporate and Business Strategy Review, 4*(4 Special Issue), 381–390. https://doi.org/10.22495/cbsrv4i4siart18

Adhiat, A. (2022). Sektor UMKM yang memfaatkan digitalisasi. *Databoks.* https://databoks.katadata.co.id/teknologi-telekomunikasi/statistik/f37a159e162724f/ini-sektor-umkm-yang-banyak-manfaatkan-teknologi-digital

Ahmed, A., Bhatti, S., Golgeci, I., & Arslan, A. (2022). Digital platform capability and organizational agility of emerging market manufacturing SMEs: Mediating role of intellectual capital and the moderating role of environmental dynamism. https://doi.org/10.1016/j.techfore.2022.121513

Alshawaaf, N., & Lee, S. H. (2020). Business model innovation through digitization in social purpose organizations: A comparative analysis of Tate Modern and Pompidou Centre. *Journal of Business Research, 125*, 1–9. https://doi.org/10.1016/j.jbusres.2020.02.045

Amit, R., & Zott, C. (2010). Business model innovation: Creating value in times of change. *SSRN Electronic Journal, 23*. https://doi.org/10.2139/ssrn.1701660

Ashaari, M. A., Amran, A., Singh, K., & Singh, D. (2020). Big data analytics capability for improved performance of higher education institutions in the era of IR 4.0: A proposed conceptual framework. *Technological Forecasting and Social Change, 13*. https://doi.org/10.1016/j.techfore.2021.121119

Aspara, J., Hietanen, J., & Tikkanen, H. (2010). Business model innovation vs replication: Financial performance implications of strategic emphases. *Journal of Strategic Marketing, 18*, 39–56. https://doi.org/10.1080/09652540903511290

Åström, J., Reim, W., & Parida, V. (2022). Value creation and value capture for AI business model innovation: A three-phase process framework. *Review of Managerial Science, 16*(7), 2111–2133. https://doi.org/10.1007/s11846-022-00521-z

Aweidah, D. R. M. (2024). The impact of artificial intelligence on organizational agility in industrial companies: The moderating role of dynamic capabilities. *Pakistan Journal of Life and Social Sciences, 22*(2), 8834–8849. https://doi.org/10.57239/PJLSS-2024-22.2.00667

Ayadi, F. M., Alaskar, T. H., & Aloulou, W. J. (2024). From digital platform capabilities to firm performance: A mediation approach based on firm agility and network capabilities. *International Journal of Consumer Relationship Management, 15*(1), 1–24. https://doi.org/10.4018/IJCRMM.338997

Badghish, S., & Soomro, Y. A. (2024). Artificial intelligence adoption by SMEs to achieve sustainable business performance: Application of the technology–organization–environment framework. *Sustainability, 16*(5), 1864. https://doi.org/10.3390/su16051864

Bai, B., Um, K.-H., & Lee, H. (2022). The strategic role of firm agility in the relationship between IT capability and firm performance under the COVID-19 outbreak. *Journal of Business & Industrial Marketing, 38*. https://doi.org/10.1108/JBIM-08-2021-0406

Baškarada, S., & Koronios, A. (2018). The 5S organizational agility framework: A dynamic capabilities perspective. *International Journal of Organizational Analysis, 26*(2), 331–342. https://doi.org/10.1108/IJOA-05-2017-1163

Bhatti, S. H., Ahmed, A., Ferraris, A., Hirwani Wan Hussain, W. M., & Wamba, S. F. (2022). Big data analytics capabilities and MSME innovation and performance: A double mediation model of digital platform and network capabilities. *Annals of Operations Research*. https://doi.org/10.1007/s10479-022-05002-w

Bhatti, S. H., Santoro, G., Khan, J., & Rizzato, F. (2021). Antecedents and consequences of business model innovation in the IT industry. *Journal of Business Research, 123*(March), 389–400. https://doi.org/10.1016/j.jbusres.2020.10.003

Chatterjee, S., Rana, N., Tamilmani, K., & Sharma, A. (2021). The effect of AI-based CRM on organization performance and competitive advantage: An empirical analysis in the B2B context. *Industrial Marketing Management, 97*, 205–219. https://doi.org/10.1016/j.indmarman.2021.07.013

Chen, D., & Esperança, J. P. (2022). The impact of artificial intelligence on firm performance: An application of the resource-based view to e-commerce firms. *Frontiers in Psychology, 13*. https://doi.org/10.3389/fpsyg.2022.884830

Deeb, M., Wahab, A., & Radmehr, M. (2024). The impact of AI assimilation on firm performance in small and medium-sized enterprises: A moderated multi-mediation model. *Heliyon, 10*(8), e29580. https://doi.org/10.1016/j.heliyon.2024.e29580

Hasan, M., Sharif, J. B., & Michael, D. L. (2024). Maximizing business performance through artificial intelligence. *International Journal of Computer Applications, 492(24)*, 252–265. https://doi.org/10.5120/ijca2024924252

Herciu, M. (2017). Drivers of firm performance: Exploring quantitative and qualitative approaches. *Studies in Business and Economics, 12*(1), 79–84. https://doi.org/10.1515/sbe-2017-0006

Jorzik, P., Klein, S. P., Kanbach, D. K., & Kraus, S. (2024). AI-driven business model innovation: A systematic review and research agenda. *Journal of Business Research, 182*(February), 114764. https://doi.org/10.1016/j.jbusres.2024.114764

Khalil, L., Aziz, N., Ariffin, A. A., & Ngah, A. (2023). Big data analytics capability and firm performance in the hotel industry: The mediating role of organizational agility. *Wseas Transactions on Business and Economics, 20*, 440–453. https://doi.org/10.37394/23207.2023.20.40

Khaq, Z. D., Subroto, V. K., & Susanto, E. (2024). AI-driven strategies for enhancing MSME sales and business sustainability in the digital era. *Journal of Management Innovation, 3*(2), 180–194. https://doi.org/10.51903/jmi.v3i2.28

Latifi, M. A., & Bouwman, H. (2018). Business model innovation and firm performance: The role of mediation and moderation factors. *31st Bled EConference: Digital Transformation: Meeting the Challenges, BLED 2018*, June, 67–84. https://doi.org/10.18690/978-961-286-170-4.5

Lee, J., Suh, T., Roy, D., & Baucus, M. (2019). Emerging technology and business model innovation: The case of artificial intelligence. *Journal of Open Innovation: Technology, Market, and Complexity, 5*(3). https://doi.org/10.3390/joitmc5030044

Leone, D., Pietronudo, M. C., Gabteni, H., & Carli, M. R. (2023). Reward-based crowdfunding for building a valuable circular business model. *Journal of Business Research, 157*, 113562. https://doi.org/10.1016/j.jbusres.2022.113562

Likai, Z., & Ruoyu, L. U. (2022). The impact of network ties on SMEs' business model innovation and enterprise growth: Evidence from China. *IEEE Access, 10*, 29846–29858. https://doi.org/10.1109/ACCESS.2022.3158749

Liu, L., Cui, L., Han, Q., & Zhang, C. (2024). The impact of digital capabilities and dynamic capabilities on business model innovation: The moderating effect of organizational inertia. *Sustainability, 1*(1–10). https://doi.org/10.1057/s41599-024-02910-z

Liu, L., Long, J., Fan, Q., Wan, W., & Liu, R. (2022). Examining the functionality of digital platform capability in driving B2B firm performance: Evidence from emerging markets. *Journal of Business & Industrial Marketing, 38*. https://doi.org/10.1108/JBIM-09-2021-0441

Lu, Y., & Ramamurthy, K. (2011). Understanding the link between information technology capability and organizational agility: An empirical examination. *MIS Quarterly, 35*, 931–954. https://doi.org/10.2307/41409967

Mikalef, P., & Gupta, M. (2021). Artificial intelligence capability: Conceptualization, measurement calibration, and empirical study on its impact on organizational creativity and firm performance. *Information & Management, 58*(3), 103434. https://doi.org/10.1016/j.im.2021.103434

Mrugalska, B., & Ahmed, J. (2021). Organizational agility in Industry 4.0: A systematic literature review. *Sustainability, 13*(8272), 1–23. https://doi.org/10.3390/su13158272

Oldemeyer, L., Jede, A., & Teuteberg, F. (2024). Investigation of artificial intelligence in SMEs: A systematic review of the state of the art and the main implementation challenges. *Management Review Quarterly*. https://doi.org/10.1007/s11301-024-00405-4

Pedersen, E., Gwozdz, W., & Hvass, K. K. (2018). Exploring the relationship between business model innovation, corporate sustainability, and organizational values within the fashion industry. *Journal of Business Ethics, 149*, 1–15. https://doi.org/10.1007/s10551-016-3044-7

Rehman, S. U., Elrehail, H., Alshwayat, D., Ibrahim, B., & Alami, R. (2023). Linking hotel environmental management initiatives and sustainable hotel performance through employees' eco-friendly behavior and environmental strategies: A moderated-mediated model. *European Business Review, 35*(2), 184–201. https://doi.org/10.1108/EBR-05-2022-0094

Salfore, N., Ensermu, M., & Kinde, Z. (2023). Business model innovation and firm performance: Evidence from manufacturing SMEs. *Heliyon, 9*(6), e16384. https://doi.org/10.1016/j.heliyon.2023.e16384

Sharma, P., Shah, J., & Patel, R. (2022). Artificial intelligence framework for MSME sectors with focus on design and manufacturing industries. *Materials Today: Proceedings, 62*. https://doi.org/10.1016/j.matpr.2021.12.360

Singh, S., Darwish, T. K., & Potočnik, K. (2016). Measuring organizational performance: A case for subjective measures. *British Journal of Management, 27*(1), 214–224. https://doi.org/10.1111/1467-8551.12126

Spallone, R. M. B. (2024). G7 report on driving factors and challenges of AI adoption and development among companies, especially micro and small. *MIMIT.* https://www.mimit.gov.it/en/media-tools/news/g7-industry-and-technology-ministers-convene-in-rome-to-advance-industrial-competitiveness-digital-innovation-sustainable-digital-transformation

Thayyib, P. V., Mamilla, R., Khan, M., Fatima, H., Asim, M., Anwar, I., Shamsudheen, M. K., & Khan, M. A. (2023). State-of-the-art of artificial intelligence and big data analytics reviews in five different domains: A bibliometric summary. *Sustainability, 15*(5). https://doi.org/10.3390/su15054026

Trocin, C., Hovland, I. V., Mikalef, P., & Dremel, C. (2021). How artificial intelligence affords digital innovation: A cross-case analysis of Scandinavian companies. *Technological Forecasting and Social Change, 173*, 121081. https://doi.org/10.1016/j.techfore.2021.121081

Wang, N., Wan, J., Ma, Z., Zhou, Y., & Chen, J. (2023). How digital platform capabilities improve sustainable innovation performance of firms: The mediating role of open innovation. *Journal of Business Research, 167*, 114080. https://doi.org/10.1016/j.jbusres.2023.114080

Wirtz, B. W., Pistoia, A., Ullrich, S., & Göttel, V. (2016). Business models: Origin, development and future research perspectives. *Long Range Planning, 49*(1), 36–54. https://doi.org/10.1016/j.lrp.2015.04.001

Yasmin, M., Tatoglu, E., Kılıç, H. S., Zaim, S., & Delen, D. (2020). Big data analytics capabilities and firm performance: An integrated MCDM approach. *Journal of Business Research, 114*, 1–15. https://doi.org/10.1016/j.jbusres.2020.03.028

Yu, F., Jiang, D., Zhang, Y., & Du, H. (2021). Enterprise digitalization and financial performance: The moderating role of dynamic capability. *Technology Analysis & Strategic Management, 35*, 1–17. https://doi.org/10.1080/09537325.2021.1980211

Zheng, N. N., Liu, Z. Y., Ren, P. J., Ma, Y. Q., Chen, S. T., Yu, S. Y., Xue, J. R., Chen, B. D., & Wang, F. Y. (2017). Hybrid-augmented intelligence: Collaboration and cognition. *Frontiers of Information Technology and Electronic Engineering, 18*(2), 153–179. https://doi.org/10.1631/FITEE.1700053